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A Preliminary Riparian Habitat Type Classification System for the Bureau of Land Management Districts in Southern and Eastern Idaho

by
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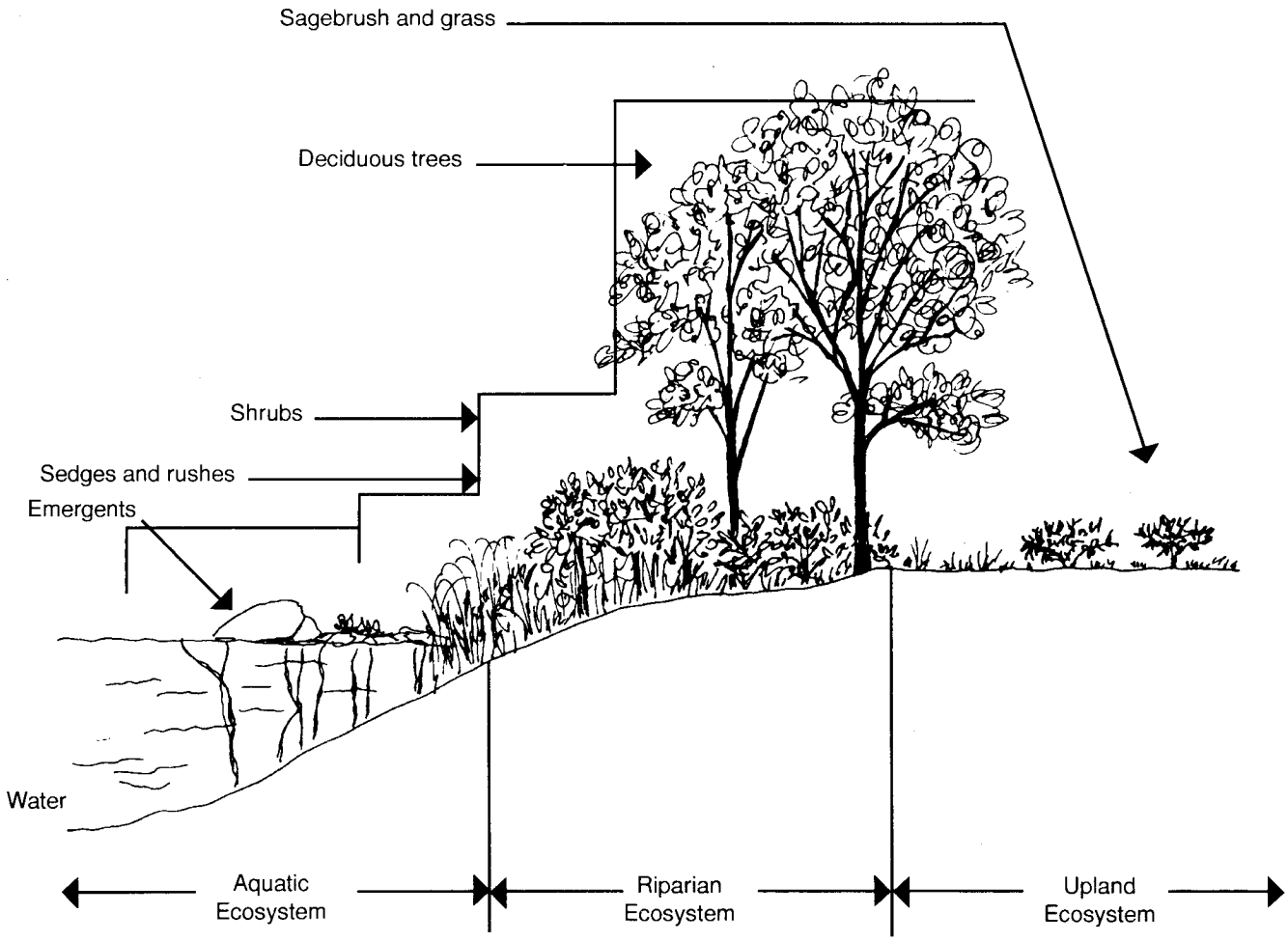

A Preliminary Riparian Habitat Type Classification System for the Bureau of Land Management Districts in Southern and Eastern Idaho

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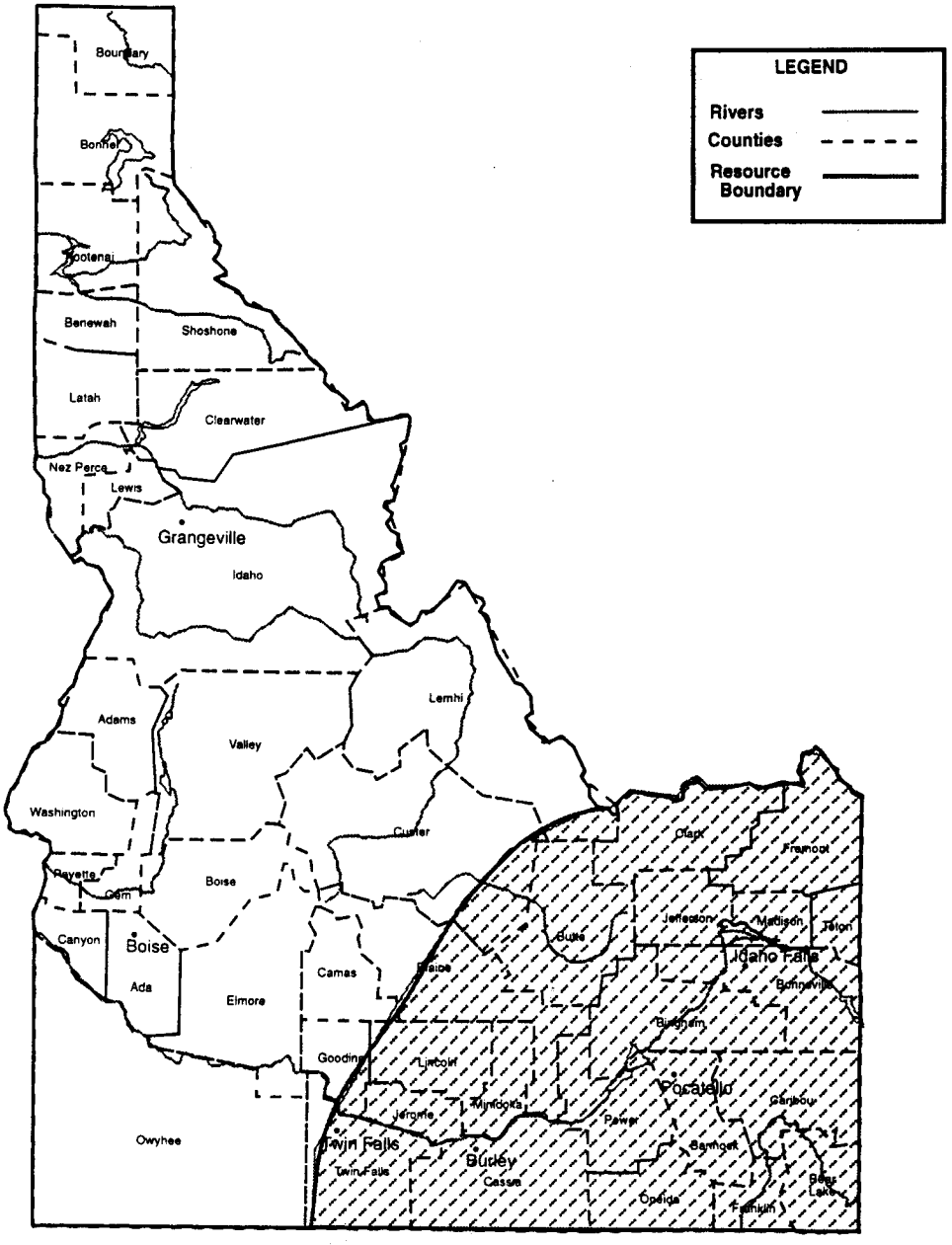

Area covered by the riparian habitat type classification

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RIPARIAN AND WETLAND VEGETATION TYPES ON BLM
ADMINISTERED LANDS IN THE IDAHO FALLS AND BURLEY DISTRICTS

Potential List of Habitat Types and Major Seral Community Types of Idaho

HT = Habitat Type; **CT** = Community Type

CONIFEROUS TREE COMMUNITIES

Abies lasiocarpa/Actaea rubra HT (Subalpine Fir/Baneberry HT) (p. 32)

***Abies lasiocarpa/Galium triflorum*HT (Subalpine Fir/Sweetscented Bedstraw HT) (p. 36)

Abies lasiocarpa/Streptopus amplexifolius (Subalpine fir/Clasping-leaved twisted stalk) (p. 41)

***Juniperus osteosperma* CT (Utah Juniper CT)** (p. 47)

Juniperus scopulorum/Cornus stolonifera HT (Rocky Mountain Juniper/Red-Osier Dogwood HT) (p. 50)

Picea/Cornus stolonifera HT (Spruce/Red-Osier Dogwood HT) (p. 55)

Picea/Equisetum arvense HT (Spruce/Field Horsetail HT) (p. 60)

Picea/Galium triflorum HT (Spruce/Sweetscented Bedstraw Habitat T) (p. 66)

***Pinus flexilis* CT (Limber Pine CT)** (p. 70)

Pseudotsuga menziesii/Cornus stolonifera HT (Douglas Fir/Red-Osier Dogwood HT) (p. 74)

DECIDUOUS TREE COMMUNITIES

Acer negundo/Prunus virginiana HT (Box Elder/Common Chokecherry HT) (p. 80)

Elaeagnus angustifolia CT (Russian Olive CT) (p. 85)

Populus angustifolia/Cornus stolonifera CT (Narrowleaf Cottonwood/Red-Osier Dogwood CT) (p. 89)

*Populus angustifolia/*Herbaceous CT (Narrowleaf Cottonwood/Herbaceous CT) (p.96)

*Populus angustifolia/*Recent Alluvial Bar CT (Narrowleaf Cottonwood/Recent Alluvial Bar CT) (p. 104)

Populus angustifolia/Symphoricarpos occidentalis CT (Narrowleaf Cottonwood/Western Snowberry CT) (p.111)

Populus tremuloides/Calamagrostis canadensis HT (Quaking Aspen/Bluejoint Reedgrass HT) (p. 119)

Populus tremuloides/Cornus stolonifera HT (Quaking Aspen/Red-osier Dogwood HT) (p. 124)

Populus tremuloides/Osmorhiza occidentalis HT (Quaking Aspen/Western Sweet-Cicely HT) (p. 130)

Populus tremuloides/Poa pratensis CT (Quaking Aspen/Kentucky Bluegrass CT) (p.134)

Populus trichocarpa/Cornus stolonifera CT (Black Cottonwood/Red-Osier Dogwood CT) (p. 138)

*Populus trichocarpa/*Herbaceous CT (Black Cottonwood/Herbaceous CT) (p. 146)

*Populus trichocarpa/*Recent Alluvial Bar CT (Black Cottonwood/Recent Alluvial Bar CT) (p. 153)

Populus trichocarpa/Symphoricarpos occidentalis CT (Black Cottonwood/Western Snowberry CT) (p. 160)

Salix amygdaloides CT (Peach-Leaf Willow CT) (p. 168)

WILLOW COMMUNITIES

Salix bebbiana CT (Bebb Willow CT) (p. 171)

Salix drummondiana/Calamagrostis canadensis HT (Drummond Willow/Bluejoint Reedgrass HT) (p. 175)

Salix drummondiana/Carex rostrata HT (Drummond Willow/Beaked Sedge HT) (p.180)
****Salix drummondiana* CT (Drummond Willow CT) (p. 192)
Salix exigua CT (Sandbar Willow CT) (p. 195)
Salix geyeriana/Calamagrostis canadensis HT (Geyer Willow/Bluejoint Reedgrass HT) (p. 201)
Salix geyeriana/Carex rostrata HT (Geyer Willow/Beaked Sedge HT) (p. 206)
Salix geyeriana CT (Geyer Willow CT) (p. 212)
Salix lasiandra CT (Pacific Willow CT) (p. 217)
Salix lutea/Calamagrostis canadensis HT (Yellow Willow/Bluejoint Reedgrass HT) (p. 222)
Salix lutea/Carex rostrata HT (Yellow Willow/Beaked Sedge HT) (p. 227)
Salix lutea CT (Yellow Willow/Beaked Sedge CT) (p. 234)

NON-WILLOW COMMUNITIES

***Acer grandidentatum* CT (Bigtooth Maple CT)** (p. 239)
Alnus incana CT (Mountain Alder CT) (p. 244)
Artemisia cana/Agropyron smithii HT (Silver Sagebrush/Western Wheatgrass HT) (p. 248)
Betula occidentalis CT (Water Birch CT) (p.255)
Cornus stolonifera CT (Red-Osier Dogwood CT) (p. 260)
Crataegus succulenta CT (Succulent Hawthorn CT) (p. 264)
Potentilla fruticosa/Deschampsia cespitosa HT (Shrubby Cinquefoil/Tufted Hairgrass HT) (p. 268)
Prunus virginiana CT (Common Chokecherry CT) (p. 273)
****Rhus aromatica* (Fragrant sumac CT)** (p.277)
****Ribes odoratum* (buffalo currant CT)** (p. 280)
Rosa woodsii CT(Woods Rose CT) (p. 283)
Symphoricarpos occidentalis CT (Western Snowberry CT) (p. 286)

SEDGE COMMUNITIES

Carex aquatilis HT (Water Sedge HT) (p.289)
Carex lasiocarpa HT (Slender Sedge HT) (p. 296)
***Carex microptera* CT (Small-winged Sedge CT)** (p. 301)
Carex nebrascensis CT (Nebraska Sedge CT) (p. 303)
Carex rostrata HT (Beaked Sedge HT) (p. 306)

NON-SEDGE COMMUNITIES

Agropyron smithii HT (Western Wheatgrass HT) (p. 311)
Agrostis stolonifera CT (Redtop CT) (p. 317)
***Butomus umbellatus* (Flowering Rush CT)** (p. 320)
Deschampsia cespitosa HT (Tufted Hairgrass HT) (p. 322)
Eleocharis palustris HT (Common Spikesedge HT) (p. 327)

Hordeum jubatum CT (Foxtail Barley CT) (p. 330)
Juncus balticus CT (Baltic Rush CT) (p. 332)
Phalaris arundinacea HT (Reed Canarygrass HT) (p. 335)
Phragmites australis HT (Common Reed HT) (p. 339)
Poa pratensis CT (Kentucky Bluegrass CT) (p. 341)
Polygonum amphibium CT (Water Smartweed CT) (p. 345)
Scirpus acutus HT (Hardstem Bulrush HT) (p. 347)
Scirpus pungens HT (Sharp Bulrush HT) (p. 350)
***Sparganium emersum* CT (Simplestem Bur-reed C.T)** (p. 353)
Typha latifolia HT (Common Cattail HT) (p. 355)
***Wyethia amplexicaulis* CT (Northern Mule's-ears)** (p. 358)

Bold lettering indicates New Types

* Vegetation types encountered only in the Burley District

** Vegetation types suspected, but not actually collected in Idaho Falls or Burley Districts

INTRODUCTION

Wetland protection and enhancement did not become a significant issue at the federal level until the 1970's when the scientific community began to emphasize the role of wetland and riparian systems in the environment (Mitsch and others 1993). In fact, wetlands were often considered wastelands, areas to be reclaimed for agricultural purposes prior to this period. Approximately 215 million acres of wetlands existed in the continental United States at the time of the country's settlement (1600's). In the mid-1970's, only an estimated 99 million acres, a loss of 54% of the county's indigenous wetlands, remained. Close to 9 million acres alone were converted during the 20 year interval between the mid-1950's to the mid-1970's (USDI Fish and Wildlife Service 1984). Programs such as the Swamp Land Act of 1849 granted a number of states, such as Louisiana and Mississippi, the authority to sell swamplands as part of their flood control programs to private landowners for the express purpose of levee construction and drainage for agricultural use. Although various forms of legislation, like the Duck Stamp Act, indirectly promoted wetland preservation prior to the 1970's, only a few coastal states, in particular, Massachusetts (1963), Rhode Island (1965), and Connecticut (1969), actually passed statutes protecting wetlands before this period (USDI Fish and Wildlife Service 1984).

It wasn't until 1972 with the passage of Section 404 of the Clean Water Act that the managerial philosophy that "wetlands equal wastelands" really began its lethargic transformation. Although not specifically designed for wetland preservation, this program, under the authority of the U.S. Army Corps of Engineers, requires permits for certain dredge and fill activities within the waters of the United States (Mitsch and others 1993). Other programs include the Executive Order 11990 passed in 1977, which requires government agencies to consider wetland protection as a part of their land managing responsibilities, and the Food Security Act (Swampbuster) of 1985 which denies government benefits to farmers who convert wetlands to agricultural lands after 1985. The "No Net Loss" policy under the Bush Administration, proposed to facilitate the creation and restoration of wetlands to replace those that are destroyed during the development of federal projects, plays a dominant role in the design and implementation of government programs in the 1990's (Mitsch and others 1993). Although minimal legislation to protect wetland and riparian habitats currently exist, wetland preservation, mitigation and enhancement play an important role in the decision-making process of state and federal land management agencies, such as the Bureau of Land Management (BLM).

No single definition encompasses all sites classified under the amorphous term "wetland". The Washington State Department of Ecology (1988) proposes that "wetlands are transitional areas between upland and aquatic environments where water is present long enough to form distinct soils and where specialized water-loving plants can grow". This definition is further refined by Cowardin and others (1979) to require at least one of three attributes: 1) at least periodically, the substrate is dominated by hydrophytes; 2) the substrate is predominantly undrained hydric soils; and, 3) the substrate is nonsoil and is either saturated with or covered by shallow water at some time during the growing season. For the purposes of Section 404 permits, wetlands are defined as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil conditions"(Federal Interagency Committee for Wetland Delineation 1989). The U.S. Army Corps of Engineers (Corps) further requires three critical parameters for wetland identification, defined by: hydric soils, hydrophytic vegetation and hydrology (Federal Interagency Committee for Wetland Delineation 1989). These criteria are mandatory for wetland delineation in the East; however, due to the generally drier conditions in the West, and for the purposes of this classification, only one of the above parameters is necessary for a site to be considered a wetland. This approach is similar to that taken by Cowardin and others (1979).

The terms wetland and riparian are not synonymous. Wetlands may be defined by marshes and potholes, bogs and peatlands, swamps and salt flats, rivers and their associated floodplains, and areas along the periphery of impoundments such as ponds and reservoirs, to name some of the major types (Cowardin and others 1979). For the purposes of this classification, riparian zones are reserved for riverine systems and associated landforms such as banks, bars, islands and floodplains. Riparian zones are essentially one of the major subsets of wetland types and are emphasized here for their often singular prevalence in the project area.

By nature, riparian zones constitute dynamic systems with uncertain equilibriums readily degrading or recovering depending on the particular forces acting at any one time. Riparian and wetland vegetation help to reduce bank erosion and trap sediment from side-slope run-off during precipitation events, reducing soil loss over time. Instream vegetation can reduce the velocity of flood waters which in turn may allow sediments and other pollutants to settle out of the water

column, resulting in greater water quality. These zones may act as discharge and recharge areas for ground water within watersheds as well, acting to buffer surface water flows throughout the year (Mitsch and others, 1993). A degraded riparian system is often incapable of many of these functions and can lead to the eventual demise of an area through desiccation or sloughing. Riparian zones in the West help maintain the tentative balance in an environment where water, which is often the most limiting factor, may also represent the most destructive force on the land if not properly checked.

Riparian zones receive a disproportionate amount of "use" for the 1-5% of the landscape that they occupy (USDI Fish and Wildlife Service 1984). Estimates in 1978 indicated that only 10% of the original riparian habitat in the United States remained and 6% of this remnant is lost annually (US Environmental Protection Agency 1993.). Timber harvesting practices, livestock grazing systems, recreational use programs, agricultural practices, even roads and housing developments contribute to the overall degradation and destruction of the remaining riparian and wetland network which persists on the landscape. As a result of public policy in recent years, land supervisors are held responsible for implementing management strategies to ensure the proper health and function of these sites. This requires the identification of the various forces at work in an ecosystem and the documentation of change within these systems over time. The first step in this process is to obtain baseline information on these properties.

A number of land classification systems are available to address the baseline inventory needs of land managers. Three main forms of "land" classification systems are based on soil taxonomy, vegetative community types, and landform associations (Pfister 1991). For the purposes of riparian areas, the vegetative-based classification systems have been the most widely accepted. Soil taxonomy classifications are difficult to develop in riparian zones due to the dynamic nature of stream flow and the constant flux of fluvial substrate which requires regular updating. Landform associations are long-lived but do not provide enough detail to assess micro changes in the environment. Only vegetative-based type classifications provide enough detail to document change yet offer enough longevity to enable managers to observe how various factors, both natural and human-borne, affect these changes in the environment.

Vegetative-based type classifications may be developed according to three different regimes: habitat types, community types and dominance types. Habitat types are based on the potential natural climax plant community that may occur on a site. This system takes into consideration both the vegetative and physical features of a site to predict the climax stage (Hansen and others 1991). Community type classifications are based on the existing structure and composition of communities without any indication of successional status (Padgett and others 1989). Community types may represent seral stages of different plant associations within the habit type framework and help to establish the intermediate successional stages from bare ground to the ultimate climax community (Hansen and others 1991). The third vegetative-based category, the dominance type, represents the dominant vegetation (minimum of 25% coverage), in the tallest layer, observed on a stand. It allows for management in an area based on the existing dominant vegetation, but without regard for ecological status (Hansen and others 1991). Although dominance types are still used by some federal and state agencies, they are not used in this classification. For a more detailed discussion of habitat and community types, consult the section. Ecological Concepts.

OBJECTIVES

Currently, no state-wide riparian/wetland classifications exist for Idaho. A number of classifications for other states overlap portions of Idaho, but most of these are in the form of Community Type systems and do not provide full coverage for the range of riparian site types found in the state. The purpose of this study is to:

1) Develop a preliminary riparian/wetland classification system based on a habitat type and community type vegetation class structure which integrates the overall topography and physiology of the associated landscapes on BLM lands in southern and eastern Idaho; and,

2) Document and assess the general physiographic, edaphic, floristic and functional features of riparian and wetland environments for the compilation of resource information in an attempt to aid private landowners and public administrators in future land management decisions.

PHYSICAL SITE FEATURES

GEOLOGY

Eastern and southcentral Idaho are divided between two distinctly different geologic provinces: the Basin and Range predominates in the southeastern sections while the Snake River Plain composes a wide swath angling from southcentral portions up to the northeast corner near Yellowstone National Park (Fig. 1). The Basin and Range is a product of two superimposed mountain ranges and the forces which led to their creation and ultimate deformation, while the Snake River Plain is primarily the result of volcanic activity that started some 13 million years ago (mya). Glaciation during two separate ice ages, although responsible for scouring much of the landscape to the north in Montana and northern Idaho, and along the higher ranges to the west and south in Wyoming and Utah, was not a significant factor in the development of the topography here (Alt and Hyndman 1989)

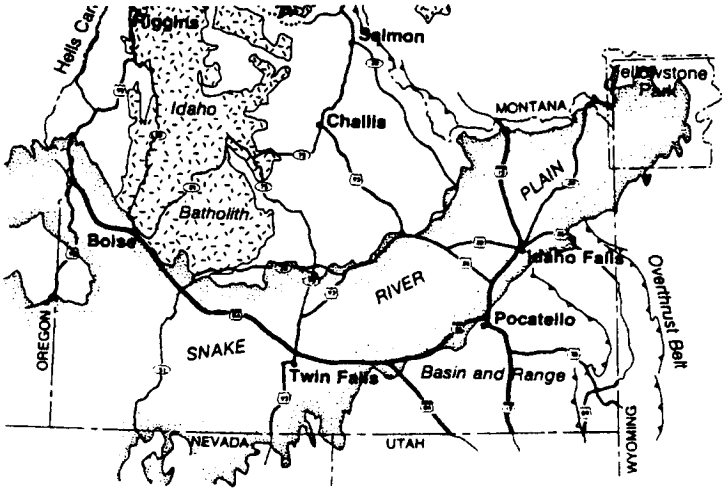

Fig. 1. Geologic Provinces of Central and Southern Idaho(Alt and Hyndman 1993)

The majority of the rock in southeastern Idaho (Basin and Range) is classified as sedimentary, formed some time during the Precambrian Era (> 600 mya) when oceans covered much of the landscape and deposited extensive layers of sand and silt. Successive continental submergances and subsequent depositions in the Paleozoic Era (250-600 mya) during each of the 5 individual periods accounts for most of the remaining limestones and sandstones present in the area. The ridge and valley topography characteristic of this region, however, is inconsistent with the level terrain expected with oceanic deposition and alludes to the more complex and violent history attributed with the geologic development of this region (Alt and Hyndman 1989).

The northern Rocky Mountains, which constitute the first of the two major ranges that developed in the Basin and Range area, originated about 70 to 90 million years ago (Alt and Hyndman 1989). This mountain range formed as the North American continental plate moved westward, colliding with the Pacific Ocean plate. Two major repercussions ensued following this collision. First, the force of the converging plates caused the western edge of the North American plate to buckle and fold along fracture lines. Enormous slabs of rock piled up along these fractures, called thrust faults. As the plates continued to converge, the continental plate rode over the top of the oceanic plate, causing still further uplift along the western border. Second, as the oceanic plate descended into the mantle, it melted and ascended as molten basalt, melting the granitic continental crust above it to magma. The magma rose into the wrinkles and folds under the newly formed mountain range, rupturing it and causing it to slide eastward as a series of immense, discrete slabs. These slabs crumpled and stacked on top of each other and plowed existing rock into massive ridges during their passage eastward to form the present day Rocky Mountains (Alt and Hyndman 1989).

The second phase in the development of the Basin and Range commenced about 17 million years ago when a giant meteorite struck the earth in southeastern Oregon. It passed through the continental crust, the lithosphere, and penetrated the upper layers of the underlying mantle. The impact induced a fracture in the mantle which persists today. This rift,

extending southward from its origin, relieves pressure on the hot rocks forming the mantle, allowing them to partially melt to viscous, molten rock, and fill the breach. During its migration westward, the North American continental plate passes over this rift or fault. The crust above the rift warms, separates as a block or wedge, and settles slightly into the fault. As the plate continues its journey westward, the block heels over, rotating onto its side and pitching so that the leading edge drops while the trailing edge rises. The resulting wedges or blocks overlap one another much like shingles on a roof, forming a series of parallel ridges and valleys in a north to south direction aligned with the fault line. The blocks continue to spread apart as the continental plate progresses west, exposing more of the cross section or side of each block. The result of this block faulting over time has been the gradual accordion expansion of the Rocky Mountains into a series of smaller, parallel ridges and intervening valleys. The ridges appear as exposed, stratified sedimentary rock, eroded over time by wind and water. The valleys are generally blanketed with a layer of alluvium, a collection of eroded mineral materials and lake bottom sediments deposited by river floods and Lake Bonneville, an enormous inland lake which probably appeared during the warming trends at the conclusion of each of the last two ice ages, approximately 15,000 and 100,000 years ago, respectively (Alt and Hyndman 1989).

The Snake River Plain is composed primarily of white rhyolite overlain with a thin veneer of black basalt. The rhyolite hailed from a chain of volcanoes that originated some 13 million years ago, but have long since been extinct. The source for this volcanic activity can be traced back in time roughly 17 million years, again with the collision of the meteorite (Alt and Hyndman 1989). The explosive force of the impact formed a deep crater, which filled with magma from the underlying mantle and formed a lava lake. Pressure-invoked eruptions emptied the lake periodically, although subsequent resurgence of magma refilled the crater after each discharge. This cyclical process continued for about 4 million years. At that time, the intact portion of the North American continental plate east of the lake, which had not been shattered from the collision with the meteorite, began to slid across and cover the crater during its slow progression westward (Alt and Hyndman 1989). The underside of the lithosphere which came in contact with the lava lake melted into rhyolite magma. The crust continued its inexorable progress west and a chain of volcanoes formed. Craters or cones developed where the excessive pressure and heat of the lava lake breached weak locations in the overlying crust, and rhyolite magma spewed forth, covering the surrounding country, present day southcentral and northeastern Idaho. The actual point of impact of the meteorite on the mantle can be traced along the extinct chain of volcanoes to the present day geysers in Yellowstone National Park in Wyoming (Alt and Hyndman 1989).

The thin facade of basalt (10-50 ft) covering the main body of rhyolite is the result of comparatively recent (geologic time frame; about 1,600 years) basalt lava flows that emanated from fissures and vents extending roughly southeast from Craters of the Moon National Monument to American Falls (Alt and Hyndman 1989). Although the basalt represents only a minor fraction of the rock present in this region, it is a predominant surface layer in many locations and may constitute a primary source of parent material in these areas.

PHYSIOGRAPHY

The project area encompasses most of the Idaho Falls and Burley Districts (BLM) in southern and eastern Idaho (see map p. X.). It is bounded by the continental divide at the Montana/Idaho border to the north, and the Wyoming/Idaho border along the Teton, Snake River and Salt River Ranges to the east. The boundaries to the south and west are more obscure physiographically. To the south, it is delineated by the Utah/Idaho border which runs along an east/west axis bisecting a series of parallel, block-faulting ranges aligned north/south. The western boundary, just to the west of Twin Falls and Route 93, travels north from the Utah border and then angles to the southeast to follow the Snake River Canyon. Near Milner Lake it progresses northeast via a tortuous route with a series of east and west meanders, which include the Craters of the Moon National Monument, and converges with the continental divide approximately 25 miles west of Monida Pass on the Idaho/Montana border to complete the circuit.

This area overlaps portions of three physiographic provinces described by Fenneman (1931) : the Middle Rocky Mountain Province, the Great Basin section (Basin and Range Province), and the Snake River Plain section (Columbia Intermountain Province). For the purposes of the geologic discussion, the Middle Rocky Mountain Province is included within the Basin and Range Province, which constitutes the majority of the area. The southeastern portion of Idaho lies on the boundary of the Middle Rocky Mountain and the Basin and Range Provinces, a diffuse zone where a series of active block faults are tearing apart the Rocky Mountains (geologic time frame). The location of these faults and the interpretation of their influences has led to some conflicting boundary designations for the different physiographic provinces in this area.

Although the Middle Rocky Mountain and Basin and Range Provinces are treated separately in this section, there is much geologic overlap here.

A series of mountain ranges in the southeast corner of Idaho are located within the Middle Rocky Mountain Province (Thornby 1965). The combined Wasatch, Bear River, Bannock, Portneuf, Pruess, Caribou, Snake River, and Webster Ranges and the Blackfoot Mountains constitute this chain of the Rocky Mountains in Idaho. These mountains were formed as a result of closed folds and thrust faulting and are characterized by steeply inclined western exposures and more gradually sloping, eastern faces (Thornby 1965). Although a number of peaks attain heights just short of 10,000 ft (3,030 m), most ridges do not exceed much above 8,000 ft (2,424 m). Valleys generally occur between 4,000-6,000 ft (1,212-1,818 m) in elevation. Eroded sedimentary rock is predominant on the ridge lines while the intervening valleys and depressional areas are overlain with alluvium (Alt and Hyndman 1989). These ranges occur at the eastern edge of the Basin and Range Province and are influenced by block faulting which is slowly expanding the valleys and ranges in accordion fashion.

The southcentral portion of Idaho, labeled as part of the Great Basin section, represents the northern most reach of the Basin and Range Province. This section is characterized by a series of short, parallel mountain ranges and intervening valleys with a generally north/south orientation, evidence of the resulting active block faulting characteristic of this subdivision. The main relief in this area are the Albion, Black Pine and Deep Creek Mountains and the Sublett Range. Although Cache Peak in the Albion Mountains rises to 10,339 feet (3,133 m), most of these ranges seldom manage heights greater than 8,000 ft (2,424 m). Valleys range from approximately 4,000-5,000 ft (1,212-1,818 m). Sedimentary deposits are dominant in southern Idaho, although igneous intrusions and alluvial fill are present in the valleys. Although most of the Great Basin section has internal drainage to the Great Salt Lake, this portion in Idaho drains north to the Snake River (Thornby 1965).

The Snake River Plain section represents the eastern most lobe of the Columbia Intermountain Province (Thornby 1965). Level lava plains, primarily rhyolite with a thin, surficial facade of basalt, dominate most of the area. The plains slope to the west, from about 6,000 ft (1,818 m) elevation northeast of Ashton to about 3,500 feet (1,060 m) in the southwest near Twin Falls. Some lava fields, such as the Craters of the Moon complex (643 sq. miles), which are only a few thousand years old are highly resistant to weathering and may appear much as they did at the time of their development; bare rock. Older fields which have undergone wind and water erosion, and are subject to alluvial deposition, may offer rich, often deep soils. Extinct volcanic cones and calderas, craters which formed after the eruption of subsurface lava pockets and the subsidence of the surrounding landscape, occur sporadically throughout the plains region. A complex of sand dunes northwest of St. Anthony, the St. Anthony Dune field (175 sq. miles), represent another of the unusual features of this complex landscape (Alt and Hyndman 1989).

Drainages

Two major drainages may be defined within the project area. The Snake River is by and large the most significant conduit in the region. The northern branch, Henrys Fork, flows south from Island Park Reservoir in the northeast corner of the Idaho Falls District. The South Fork of the Snake River, flowing northwest from the Palisades Reservoir centrally located near the Idaho/Wyoming border, merges with the north fork outside of Rigby to form the main branch of the Snake River. The river proceeds southwest, where it is joined by the Blackfoot River, and on through the American Falls Reservoir. It wends its way due west, traveling across the northern portion of the Burley District before angling north toward Boise. The Snake River captures most of the precipitation south and west of the continental divide in this region and drains five major reservoirs (Henrys Lake, Island Park, Palisades, Blackfoot, and American Falls) and more than 20 minor lakes and reservoirs, in addition to countless perennial and intermittent tributaries which join it. Basalt in the Snake River Plain is extremely porous and often characterized with joints, lava tubes and unconsolidated layers, which promote percolation and subsurface flow. Rivers such as the Big Lost and Little Lost, located northwest of the lava fields, virtually disappear upon entering the plains, to reemerge at the thousand springs canyon headwall west of Twin Falls.

The second watershed, the Bear River, is the primary outlet for Bear Lake, and serves as the main outlet for the southeast corner of Idaho. It flows north, diverting around the end of the Bear River Range, the northern extent of the Wasatch Mountains Range, before proceeding south to drain into the Great Salt Lake in northern Utah (Delorme 1992).

FLORISTIC PATTERNS

Cronquist and others (1972) describe three general floristic divisions (Fig. 2) for the project area within the intermountain region that parallel the physiographic provinces described by Fenneman (1931). The Wasatch Mountains section generally applies to the area classified as the Middle Rocky Mountain Province, the Bonneville Basin section applies to the Great Basin section (Basin and Range Province) while the Snake River Plain section remains consistent in name and area for both floristic and geologic classifications.

The Wasatch Mountains floristic section encompasses the Bannock Range to the west, the Blackfoot Mountains and Caribou Range to the North and all of the intervening country bounded to the east and south by the Wyoming and Utah state lines. Two vegetation zones are present in this Division: Montane and Sagebrush. The Montane zone emerges on the upper slopes, ridges and ravines of mountain ranges where sufficient moisture is present. *Pseudotsuga Menziesii* (Douglas fir) is the dominant species in this alpine zone, although *Pinus contorta* (lodgepole pine), *Abies concolor* (white fir), *Abies lasiocarpa* (white fir), *Picea engelmannii* (Engelmann spruce) and/or *Populus tremuloides* (aspen) may dominate localized sites (Cronquist and others 1972). *Acer grandidentatum* (bigtooth maple) and/or *Juniperus scopulorum* (Rocky Mountain juniper) woodlands are common at lower elevations. The Sagebrush zone is present within the broad valleys and lower foothills between ranges where moisture is a limiting factor. *Artemisia tridentata* (big sagebrush) dominates communities in this zone, often with a mixture of other *Artemisia* spp. (sagebrush) and *Chrysothamnus* spp.(rabbitbrush). Graminoids, particularly *Agropyron spicatum* (western wheatgrass) and *Festuca idahoensis* (Kentucky bluegrass), may occupy some areas and constitute prominent understory species in some locations (Cronquist and others 1972).

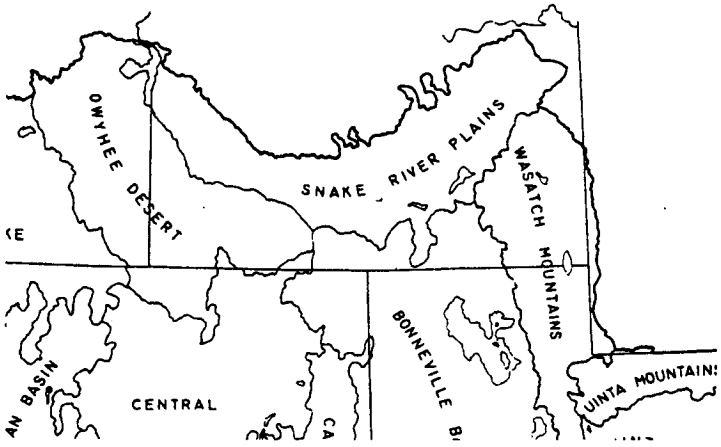

Fig. 2. Intermountain Region illustrating Floristic Sections for the Project Area (Cronquist and others 1972)

The Bonneville Basin floristic section, applicable to the Basin and Range Province, occurs west of the Wasatch Mountains Division and extends to the western edge of the project area, just west of Twin Falls. The northern and southern boundaries essentially coincide with the Snake River Canyon and the Utah state line, respectively. Three vegetation zones are present here: Montane, Pinyon-Juniper and Sagebrush. The distribution of the Montane zone is restricted to the ridge lines at higher elevations and constitutes only a minor floral division here. The other alpine zone, the Pinyon-Juniper, occurs at the northernmost extent of its range, for the pinyon component which is prevalent further south in Utah, is essentially absent here. Instead, communities are dominated primarily by *Juniperus scopulorum* (Rocky Mountain juniper) and *Juniperus osteosperma* (Utah juniper). This zone often dominates lower mountain ranges and is generally restricted from colonizing the broad valley bottoms due to moisture limitations. *Acer grandidentatum* (bigtooth maple) chaparral may also persist on the lower foothills. The Sagebrush zone dominates most valley bottoms and grades into the Pinyon-Juniper forests. In fact, *Artemisia tridentata* (big sagebrush) may be the prominent understory shrub affiliated with these open juniper woodlands (Cronquist and others 1972).

The Snake River Plain floristic section applies both in title and physical location to its geologic counterpart. Two major vegetation zones occur within this region: Sagebrush and Absolute Desert . The Sagebrush zone dominates the level plains, which, in combination with rainfall levels of < 10 inches per year, are considered high desert in many locations. Older lava flows that have undergone pedogenesis and are covered with alluvium may develop thick, rich soils suitable

for agriculture crops, if sufficiently irrigated, such as sugar beets, potatoes and various grains. *Pseudotsuga Menziesii* (Douglas fir) and *Pinus flexilis* (limber pine) may inhabit the pinnacles of taller cinder cones scattered across the plains, but represent only a incidental floristic component (Cronquist and others 1972). Absolute Desert is technically not considered a vegetation zone, but rather a non-vegetation zone. Some of the lava fields, such as the Craters of the Moon complex, are so recent (< 2,000 years) that they have not yet attained any soil development, appearing much as they did shortly after the time of their emergence as bear rock. Due to the porous nature of basalt, water percolates through rather than across it, making it essentially impervious to the effects of erosion on a short-term geologic scale (Alt and Hyndman 1989).

CLIMATE

The state of Idaho, in its entirety, occurs west of the continental divide. Idaho is affected by a maritime climate even though it is approximately 300 miles east of the Pacific ocean (Gale 1978). This influence manifests particularly during the winter months as weather patterns tend toward greater cloud cover, warmer temperatures and elevated precipitation levels, as compared to regions at similar latitudes further inland, east of the divide. However, within the state itself, eastern Idaho is considered to be more continental than either the northern or central portions; the eastern and southeastern regions of the state may be characterized by a wider range of temperature fluctuations between the summer and winter months (Gale 1978). The mountain ranges, particularly in the southern and central region, are partially responsible for this trend, acting as barriers to hinder the natural movement of air masses from west to east. Moisture received in this area accumulates primarily over the Pacific Ocean and is carried across the continent on predominantly westerly winds. Most of it is released as precipitation on the Rocky Mountains and the intervening ranges between the continental divide and the coast. Eastern Idaho generally receives more moisture in the late spring/early summer than in the winter. However, during the hot summer months, fronts may migrate north from the Caribbean and the Gulf of Mexico on high altitude systems to develop as thunderheads over the eastern part of the state. Incidentally, these summer squalls may induce flash flooding in areas of southeastern Idaho, especially between Pocatello and Downy. (Gale 1978).

The project area covered by the classification is quite diverse and is not governed by any singularly dominant climatic feature its the entire range, even though fundamental patterns for the region may be perceived. Riparian zones in particular may not characteristically reflect local climatic conditions either. Padgett and others (1989) indicate that climate affects riparian zones much less directly than it influences drier upland areas. They suggest that climate has a more direct impact on the overall watersheds and, subsequently, the stream systems, instead. They note that climatically drier areas in southern Utah tend to have more narrow riparian zones and smaller wet meadow areas than those regions further north or at higher elevations with greater precipitation and colder temperatures. They do stress that temperature plays a pivotal role in the distribution of wetland species and communities. Youngblood and others (1985) also refute the overall impact of climate on riparian zones. They indicate that precipitation amounts and patterns exert little influence on the development of riparian communities to the extent that they dictate the location and type of upland communities present on a particular location. However, they also note that temperature gradients can significantly influence local vegetation communities. For instance, extremely sharp gradients, as narrow as a few feet, can develop between upland and riparian areas where streamside zones and low, moist pockets act as sinks for cold air.

Weather station data can impart relative climatalogic conditions for each particular area and help emphasize the differences between regions even if the overall effect on the associated riparian zones has less of a direct correlation. The average annual precipitation during 1961-90 varies considerably between Island Park (30 in) in northeast Idaho and Burley (10 in) in south-central Idaho, although Pocatello (12 in) and Ashton (21 in), both somewhat more centrally located, diminish this gap. Mean annual temperature differences during 1961-90 for Island Park (37°F) and Burley (48°F) are almost as extreme, with average annual minimum and maximums (Island Park 22°F, 52°F; Burley 34°F, 61°F) exhibiting as divergent results (University of Idaho Climate Data 1996). Again, temperature and precipitation may not exact as significant an influence on riparian zones, but the relative differences in climate between these areas accurately predicts the disparities between the relative vegetation communities. Another indicator, the length of the annual growing season, may also provide some insight to region variations in vegetation communities. Five years out of every 10, the average growing season (when temperatures do not drop below 32°F) for Idaho Falls is 113 days but for Twin Falls it is 138 (University of Idaho Climate Data 1996). While the growing season must be correlated to daily temperature fluctuations and precipitation to determine the actual potential for growth, a difference of 25 days could substantially effect the development of many plant communities.

Elevation may also significantly influence vegetation development and distribution. Generally, higher altitudes exhibit predominantly colder and wetter conditions than adjacent lowlands. In southern Idaho, monthly mean temperatures collected during the winter months of November-March were observed to reflect an elevational gradient . At elevations ≥ 5,000 ft (1,515 m), mean temperatures ≤ 32°F were present during the entire period of observation. At elevations from 4,000-5,000 ft (1,212-1,515 m), these temperatures occurred for only 4 of the 5 months, while at zones between 3,000-4,000 ft (909-1,212 m) this mean monthly average was recorded for only 3 months. At 2,000-3,000 ft (606-909 m), sub-freezing temperatures persisted for only 1 or 2 months and at elevations of ≤ 2,000 ft (606 m) mean monthly temperatures of ≤ 32°F were observed for one month or not at all (Gale 1978). Regarding moisture trends, monthly precipitation levels at weather stations near 7,000 ft (2,121) elevation were recorded at 26 inches. Rates recorded at other climate stations from 6,000-4,000 ft (1,818-1,212 m) indicated a declining trend from 18-8 inches, respectively (Baker 1944). Local influences and the placement of weather stations may bias some results, but general trends may provide useful insights. In terms of temperature and precipitation, elevation may exert considerable influence on the distribution patterns of local flora and should not be discounted summarily.

It should be stressed that the extreme variation between the different regions located within the project area make it difficult to emphasize any single predominant climatic factor or even multiple ones. General trends in the regional weather patterns may help to establish boundaries for, or explain discrepancies observed between, community or habitat types and should be considered when comparing stands and sites from divergent areas.

SOIL MORPHOLOGY

Five state factors control the direction of soil development: climate, organisms, relief, parent material, and time. These factors, termed "clorpt" by Hans Jenny, determine the "state" or condition of an ecosystem, of which soils is one segment (Buol and others 1989). The factor climate (cl) is intuitive, referring to temperature belts and precipitation zones, essentially the regional and localized weather patterns. Organisms (o) encompass both flora and fauna and might include modifications ranging from the physical deformation of bedrock in the rooting zone or the burrowing activity of rodents to the chemical processing by soil microorganisms and everything in between. Human disturbances are included here. Relief (r) represents the integration of topographic parameters (elevation, aspect, slope configuration and position), but also incorporates the presence of water tables and their contribution to local features on the landscape. Parent material (p) constitutes the underlying bedrock or substrate (initial material), whether it consists of highly weatherable limestone or more resistant stock such as granite, and the particular properties associated with the various formative elements. The final component time (t) reflects the extent to which each of the other factors act upon the environment and the consequences of long-term verses short-term influences (Buol and others 1989). The integration of these five state factors designate the potential range of conditions that may exist on the landscape and, subsequently, the types of soils that may develop at various locations.

One of the most prevailing forces in riparian and wetland environments, in fact, one of its main defining factors, is the presence of water. Whether underground, as a product of subsurface aquifers, at the surface, in the form of lakes, streams or rivers, or as a combination of both processes, coalescing as seeps or springs, water shapes most every faucet of its environment and controls the direction and degree of development in these areas. Hydric soils develop under the influence of these saturated water regimes and may provide substantive evidence of periodically inundated conditions, even when they are not readily apparent at the surface.

Hydric soils are defined as soils that are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part (USDA Soil Conservation Service 1987). These conditions are generally satisfied in areas that are inundated with water for at least one week during a period when soil temperatures remain above 41°F (biological zero). Hydric soils are generally capable of supporting hydrophytic (water-loving) vegetation (Federal Interagency Committee for Wetland Delineation 1989).

The presence of gleyed or mottled soils is a good indicator of saturated conditions present for at least some time during the year. Under prolonged anaerobic conditions, when oxygen supply is low and biological oxygen demand is high, typically as a result of stagnant or saturated water regimes, soils may develop a greenish or bluish gray cast. This distinctive coloration reflects the reduction of iron (gain of an electron (e^-)) from a ferric(Fe^{+3}) to a ferrous(Fe^{+2}) state, a process called gleization. Ferrous iron is a highly mobile form whose presence in the soil solum in the form of sulfides

and other related compounds usually signify undrained or water-logged conditions, with little or no downward movement, or loss, of water (Buol and others 1989).

Fluctuating water tables may result in both leeching and oxidation of iron molecules. Drawdown of prolonged, elevated water tables may leach much of the mobile ferrous iron out of a system. However, exposure of the remaining ferrous(Fe^{+2}) iron to oxygen promotes oxidation to the ferric(Fe^{+3}) form. Oxidized iron accumulates as yellow, red and brown mottles(flecks) or hardened nodules in the soil. This important weathering process, which causes the breakdown of stable, crystalline soil structures impregnated with ferrous iron molecules, results when iron loses an electron (e^-). To maintain neutrality within the crystal lattice and offset the imbalance of charges, other cations split off from the stable framework. The overall molecular structure becomes vulnerable to disintegrative processes and collapses over time, breaking into smaller, disassociated units; the embodiment of pedogenesis itself (Buol and others 1989). The presence of both gleyed and mottled soil features indicates water regimes in a state of flux. Rising water tables promote gleyed characteristics under reducing conditions while withdrawal reverses the trend, enhancing the accumulation of mottles with the shift to an oxidized environment.

The National Technical Committee for Hydric Soils developed the following criteria for the purposes of creating a national list of hydric soils from the Map Unit Interpretation Records (MUIR) national database. These criteria were defined from soil properties documented in Soil Taxonomy (Soil Survey Staff, 1975, 1994). This computer generated list, maintained and distributed by the Natural Resources Conservation Service, is updated annually. Criteria 1, 3, and 4 serve as both database criteria and as indicators for identification of hydric soils in the field, while criterion 2 serves only as part of the selection method used to retrieve those soils from the database that meet the defined requirements. However, not all soils currently classified as "hydric" can be keyed using the existing indicators. Additional selection measures are being developed that ensure the criteria encompass all soils that fit the hydric definition and are included in the national list (USDA Soil Conservation Service 1995).

Criteria For Hydric Soils:

1. All Histosols except Folists, or
2. Soils in Aquic suborders, great groups, or subgroups, Albolls suborder, Aquisalids, Pachic subgroups, or Cumulic subgroups that are:
    - A. Somewhat poorly drained with a water table equal to 0.0 cm (0.0 ft) from the surface during the growing season, or
    - B. poorly drained or very poorly drained and have either:
        - (1) water table equal to 0.0 cm (0.0 ft) during the growing season if textures are coarse sand, sand, or fine sand in all layers within 50 cm (20 in), or for other soils
        - (2) water table at less than or equal to 15 cm (0.5 ft) from the surface during the growing season if permeability is equal to or greater than 15 cm/hr (6.0 in/hr) in all layers within 50 cm (20 in), or
        - (3) water table at less than or equal to 30 cm (1.0 ft) from the surface during the growing season if permeability is less than 15 cm/hr (6.0 in/hr) in any layer within 50 cm (20 in), or
3. Soils that are frequently ponded for long duration* or a very long duration** during the growing season, or
4. Soils that are frequently flooded for long duration* or a very long duration** during the growing season.

* Inundation for a single event that ranges from one week to one month

** Inundation for a single event that is greater than one month

Soils observed on inventoried sites may be classified into five basic orders. These soil orders, along with brief descriptions of each type, are provided in the table below. Although soil classification aids in the definition of a particular site type, vegetation associations and communities are often not restricted to one particular soil class. In fact, they may be found on one or more separate orders, and potentially on many more subgroups and great groups within each order, as defined by the soil classification hierarchy established in the Keys to Soil Taxonomy(Soil Survey Staff 1994). Rather, the presence and quantity of water seems to be the driving force in the development of various riparian communities. The examination of soils during this inventory focused more on the textural classes of the soils, i.e. their water holding or draining capacity, as the most significant feature. The site and soil descriptions are oriented more toward soil textures as indicators of soil

moisture over soil classification, although soil orders are provided where possible.

Table X Soil orders and formative elements of hydric soils of Montana

Order	Formative Element	Derivation	Description
Alfisols	alf	Pedalfer (Al-Fe) Soil	Mineral soils with argillic horizon (clay accumulation); less organic matter, lower base saturation, and lighter colored than Mollisols.
Entisols	ent	Recent Soil	Very young mineral soils; very weak or no horizon development; no deep, wide cracks in most years.
Histosols	ist	Gr.–*histos* (tissue)	Organic soils containing > 12-18 percent organic carbon (by weight), depending on percent of mineral materials and clay, to a depth of 40 cm (16 in).
Inceptisols	ept	L.–*inceptum* (beginning)	Mineral soils; minor horizon development with some weatherable minerals; low organic matter content; ash may be abundant; more developed than Entisols.
Mollisols	oll	L.–*mollis* (soft)	Mineral soils; thick, dark surface horizon, high organic matter content; high base saturation.

Soil texture is generally defined as the relative proportion of the different classes of soil particulates (separates) that constitute the soil material (Buol and others 1989). Sand(0.074-2 mm), silt(0.002-0.074) and clay(≤ 0.002 mm) comprise the fine earth fraction that make up that portion of the substrate termed soil (Buol and others 1989). Coarser materials, including fine(0.08-0.6 in) and coarse(0.6-2.5 in) gravels, small(2.5-5 in) and large (5-10 in) cobbles, and small (10-20 in) and medium + (≥ 20 in) stones, constitute other size classes common in the near-surface substrate layer, but are not actually considered soil and have not undergone soil pedogenesis.

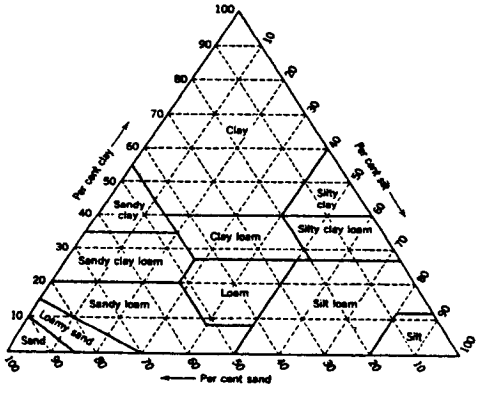

Fig. 3. Guide for Textural Classification of Soils (Black 1960)

Within the fine earth fraction, Black (1960) notes that several descriptive classes have been defined according to the various proportions of sand, silt and clay (see Figure 3. Of the dozen or so arbitrarily divisions based on size, the term "clay" is used in fully half of these names, representing approximately 80% of all of the actual combinations of the three basic soil materials possible. Clay is an essential component in the construct of soil, partially due to the fact that water maintains a greater affinity for fine-textured particles than coarse-textured ones, especially when the particles are charged, as is often the case with clay. This attraction is more critical in upland areas where water stress is a compelling factor for vegetation development. Riparian zones, by nature, are not limited by soil moisture to the degree of adjacent upland sites. However, late in the season, especially along ephemeral and intermittent water courses, and at the outside fringe of the riparian zone opposite the channel, water reserves are often limited. Fine particulate soils are capable of

retaining greater moisture for longer periods of time, allowing more hydrophilic plants an opportunity to persist in an otherwise hostel environment.

ECOLOGICAL CONCEPTS

CLASSIFICATION THEORY

Collins and others (1993) suggest that two major schools of thought have evolved regarding the structural treatment of plant communities: the collective unit (Clements) and the continuum (Whittaker). At its most basic level, the collective unit philosophy maintains that vegetative communities are highly structured entities that occur repeatedly over the landscape in recognizable patterns in response to climatic conditions. The continuum principle, in its most elementary state, suggests that species, and therefore communities, are aligned along environmental gradients and can not be divided into discrete assemblages. Rather than abrupt, recognizable boundaries, communities are thought to grade into one another gradually as conditions shift and one community is favored over another. Neither of these rudimentary definitions adequately portrays the full scope of each of these models, but profiles the schism between these diametric schools of thought.

In light of documenting and understanding ecosystems from a managerial perspective, vegetation communities must be classified into artificial categories. However, no two locales, nor the specific environmental factors which influence them, are identical, so no two vegetation communities are precisely alike. Nevertheless, classes can be created based upon the dominant species observed in communities with a high degree of similarity. Out of necessity, this classification applies principles from the collective-unit model to assess patterns across the landscape for the purposes of management practices. The classification was not created in opposition to the community continuum gradation. In fact, Collins and others (1993) suggest the this model is now the most widely accepted among ecologists in general. This work essentially represents a means to understand the complex processes of ecological succession at the community level.

SUCCESSION

Both primary and secondary succession occur within riparian and wetland environments. Primary succession represents the initial invasion of vegetation on barren sites bereft of soil or pedogenic processes. Primary succession may be evident on previously unoccupied bedrock, on recent colluvial or alluvial deposits, or in areas where severe fire or flood has removed surface soil layers. This form of succession develops slowly, especially in the early stages as pioneer species gradually colonize and modify infertile sites over time (Clements 1920). Secondary succession generally proceeds after disturbances, resulting in the loss of the vegetation component, but where the soil layer remains intact. Revegetation may occur rapidly since the growth medium and nutrients remain primarily in situ (Clements 1920). The end result of succession in either context is climax vegetation, defined by self-replicating vegetation that, barring disturbance, will persist on a site without replacement (Daubenmire 1968).

Daubenmire (1968) essentially defines a stand as an array of vegetation that is predominantly homogeneous in all layers and that is separate from adjacent vegetation arrangements due to differences in qualitative or quantitative characteristics. The assemblage of all climax stands, in which, for all practical purposes, the collective dominant species in each of the apparent layers is similar, is termed a plant association. No two stands within an association are identical in every facet due to minor physical and environmental variations, but overall, all stands are related to the extent that the integral units bear a high degree of similarity. Kovalchik (1987) coined the term riparian association to represent those collections of vegetation in equilibrium with their environment (climax) on sites influenced by specific hydrologic regimes. This classification refers to riparian associations when discussing the actual climax vegetation in and of itself.

Clements (1920) suggests that every plant is an indicator of a particular combination of environmental conditions. Some species are generalists, able to flourish under a wide range of conditions, but even across these seemingly broad ecological amplitudes, there is a finite set of conditions for which each is most suited. In the same respect, vegetation communities also reflect the primary conditions acting on a site. This concept is the basis upon which the Habitat Type classification was developed.

Vegetation Types

The land classification system used in this study employs the habitat type concept, which stresses the importance of the potential natural climax plant community (PNC) as an indicator of cumulative environmental site conditions (Daubenmire 1968). These conditions, reflecting a limited range of environmental variation, are best suited for only one climax community (association) and will result in the same climax vegetation at every location where it occurs on the landscape, barring disturbance. Hansen and others (1995) stress that the habitat type system is based on the land area, while the vegetation that it supports is merely a surrogate, reflecting those conditions acting on the site. This classification is based on the premise that natural climax plant communities occur repeatedly across the landscape, but due to a variety of disturbances, climax vegetation is often not the dominant stage. By necessity, the system incorporates both the vegetative (pre-climax vegetation) and physical features of each particular location to predict the potential climax vegetation or association for each site. Preceding seres often act to modify or alter a site, subsequently preparing it for the next stage, and are crucial for successional extrapolation. Habitat types represent the climax stages while community types represent seral stages preceding the climax.

A community type, as defined for these purposes, is an aggregation of major, seral plant communities with floristic similarities both in the overstory (when present) and understory layers. These seral or disclimax communities persist on the land for a duration and frequency that may be appropriate for land management decisions (Hansen and others 1995). Community types often function as a mechanism to document various successional pathways from the initial pioneer stage to the ultimate climax stage. Due to the nature of disturbances, whether localized or widespread, sporadic or cyclical, plant associations (climax communities) are often not the most prevalent phase of vegetation in the environment. Insect pests, disease, fire, overgrazing and silvicultural practices represent some of the major causes that reverse successional trends from their natural conclusion. These disturbances may act as minor setbacks, stagnating a particular stage or sere of vegetation, or altering conditions to the extent that the physical character of the site has been altered. In some cases, the physical parameters of a site may change rapidly, as a result of major disturbance, or more gradually over decades or even centuries, with shifts in regional climates. As the potential of the site changes, the optimal plant association that may occupy it also varies. In addition to emphasizing dominant seral stages, community types are useful to fill the gaps and document changes where site characteristics are still developing. Although successional pathways on some sites are fairly predictable, readily indicating the potential plant associations, or habitat types, other sites and pathways are much more difficult to gauge, especially under disturbance regimes. Community types may provide a means to classify the existing vegetation but also an avenue to track the successional progression and formulate potentially new pathways for the discrete habitat types.

Plant communities are typically arrayed across the landscape in a mosaic, or series of patterns, according to local and regional climatic conditions and varying physical site features. Subsequently, habitat and community types are ranked into three dominance classes to accommodate these variable conditions. Major types are those plant communities that occupy broad acreages and occur with a high degree of frequency. Minor vegetation types are less prevalent, occupying either occasional larger tracts, or present with some regularity but with smaller coverages. Incidental types occur sporadically, with minor coverage, or with more extensive cover in a few, restricted locales.

Habitat types are named according to their respective riparian associations. A binomial convention is used, beginning with the dominant overstory species followed by the dominant or most diagnostic understory indicator species and separated by a slash (/). Community types are designated similarly, although in most cases, only a single name is applied. In these cases, no single understory indicator species is individually dominant or distinctive, often due to the frequency and/or regularity of disturbance. Both Latin and common names are provided to facilitate use of the classification.

WETLAND DELINEATION

Riparian and wetland zones represent some of the most productive sites across the landscape They are often subject to the greatest utilization, due not only to the high concentration of localized resources but to the presence of water itself. The focus of this attention has led to the development of various forms of regulatory legislation over the past few decades. Perhaps the most controversial task has been the formulation of a nation-wide wetland definition. The U.S. Army Corps of Engineers (Corps) requires three parameters for wetland identification: hydrophytic vegetation, hydric soils, and hydrology (Federal Interagency Committee for Wetland Delineation 1989). These criteria are mandatory for wetland

delineation in the East; however, due to the generally drier conditions in the West, and for the purposes of this classification, only one of the above parameters needs to be satisfied for a site to be considered a wetland in Idaho. This approach is similar to that taken by Cowardin and others (1979), the authors of Classification of Wetlands and Deepwater Habitats of the United States.

The discrepancy between definitions arises from the interpretations of legislators and scientists and their conflicting conceptions of jurisdictional verses functional wetlands. The 1987 Corps definition does not incorporate all areas on the landscape associated with surface and subsurface water resources that provide accredited wetland functions. For instance, more arid environments may not receive sufficient moisture to promote the development of the required "wetland" features outlined by the Corps. Woodlands classified under the *Juniperus scopulorum/Cornus stolonifera* Habitat Type (Rocky Mountain Juniper/Red-Osier Dogwood HT) may provide valuable wildlife habitat, streambank stability and enhanced water quality where they dominates riparian zones, yet due to deficiencies in hydric soil development or the presence of "adequate" hydrology, these sites may not receive a jurisdictional wetland designation. These zones deserve consideration from a management perspective for they furnish a variety of valuable services to the land. The function of these areas is considerably more important than satisfying the definition, especially from a delineation standpoint. This classification promotes the notion of wetland function and relies on the attributes and performance of sites to qualify for inclusion in this draft. Hansen and others (1995) emphasize this key philosophy and stress the critical distinction between terms, for although all jurisdictional wetlands are functional, not all functional wetlands are jurisdictional.

Hydrophytic Vegetation

Hydrophytic vegetation is defined as macrophytic flora that occupies soil/substrate inundated with water for extended periods sufficient to develop an oxygen deficit and anaerobic conditions (Federal Interagency Committee for Wetland Delineation 1989). Approximately 7,000 vascular plant species in the United States have been observed and recorded to inhabit wetland environments. The National List of Plant Species that Occur in Wetlands, developed and published through a joint effort between the FWS, Corps, EPA, and SCS, groups these species into four separate divisions (US Fish and Wildlife Service 1996). A fifth division was created but applies only to upland species (UPL) and is not discussed here. For all intensive purposes, obligate wetland plants (OBL) are found only in wetlands (> 99%). Facultative wetland plants (FACW) typically occupy wetlands with a high degree of regularity (67-99%) while facultative plants (FAC) may occur with equal propensity in upland or wetland environments (34-66%) Facultative upland plants (FACU) seldom occur in wetlands (1-33%), being more suited to drier, upland habitats (Federal Interagency Committee for Wetland Delineation 1989).

The hydrophytic vegetation criteria, defined according to the 1987 federal delineation manual, is satisfied when > 50% of the dominant species present on location consist of obligate wetland (OBL), facultative wetland (FACW) or facultative (FAC) plants. Dominance is based on rank of abundance and measured according to either biomass or absolute area/ground coverage (Federal Interagency Committee for Wetland Delineation 1989). Typically, only those species inclusive through the 50th percentile are considered for evaluation; however, all species with a value of ≥ 20% dominance are automatically included in the tally and may constitute 100% of the vegetation under certain circumstances. Three discreet, vertical class layers are recognized for this analysis: tree, shrub, and herbaceous levels. Each tier is calculated separately and weighted on an equal basis when combined for the ultimate assessment of vegetation characteristics at a site (Federal Interagency Committee for Wetland Delineation 1989).

A second and equally valid method to determine the degree of hydrophytic vegetation present on location involves using a frequency analysis of all species observed (Federal Interagency Committee for Wetland Delineation 1989). A prevalence index value is assessed using arbitrary values for each of the five groups of vegetation: OBL = 1, FACW =2, FAC = 3, FACU = 4, and UPL = 5. The percentage of each vegetation class or group that is observed on site is multiplied by the number assigned to the class. A cumulative value of < 3 qualifies a site under the hydrophytic vegetation requirement.

Hydric Soils

Hydric soils are defined as soils that are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper portions (USDA Soil Conservation Service 1987). Hydric soils are generally capable of supporting hydrophytic (water-loving) vegetation (Federal Interagency Committee for Wetland Delineation 1989). For a further discussion, consult the soil morphology section.

Hydrology

Hydrology, the most critical and compelling of the three wetland criteria, is often the most difficult to ascertain under field conditions. Different sources may influence the landscape in profoundly different manners. Whether surface or subsurface flow, precipitation in the form of rain, snow, or fog, the timing, intensity and location of events, or the influence of variable temperature, elevation, topography, soil or vegetative cover, each of these factors contribute to the complex nature of water collection, transport and storage. Annual, seasonal and even daily hydrologic fluctuations further compound the problem of accurately evaluating water regimes. Although hydrologic assessments may constitute the greatest degree of error of the three wetland delineation criteria, only the minimum requirements need to be met to satisfy the Federal definition (Federal Interagency Committee for Wetland Delineation 1989).

The term wetland hydrology incorporates "all hydrologic characteristics of areas that are periodically inundated or have soils saturated to the surface at some time during the growing season" (USDA Soil Conservation Service 1987). This criteria is somewhat circular, for it is the presence of hydrophytic vegetation and hydric soils, alluding to saturation and anaerobic conditions, that often allow a determination of sufficient hydrologic inundation and duration at a site. The following criteria establish those conditions which define wetland hydrology by Federal standards (Federal Interagency Committee for Wetland Delineation 1989).

Wetland Hydrology

1. Saturation to the surface normally occurs when soils in the following natural drainage classes meet the following conditions:
   A. In somewhat poorly drained mineral soils, the water table is less than 15 cm (6 in) from the surface for usually one week or more during the growing season; or
   B. In low permeability (<15 cm (6.0 in)/h), poorly drained mineral soils, the water table is less than 45 cm (18 in) from the surface for usually one week or more during the growing season; or
   C. In more permeable (≥15 cm (6.0 in)), poorly drained or very poorly drained mineral soils, the water table is less than 30 cm (12 in) from the surface for usually one week or more during the growing season; or
   D. In poorly drained or very poorly drained organic soils, the water table depth where saturation to the surface occurs more than rarely.
2. An area is inundated at some time if ponded or frequently flooded with surface water for one week or more during the growing season.

METHODS

This classification is the product of three seasons of research collected during 1994, 1995 and 1996 summer field sessions. Surveys in 1994 were conducted on BLM lands both in the Idaho Falls District, which includes the Medicine Lodge, Big Butte, and Pocatello Resource Areas, and the Burley District, divided between the Snake River and Deep Creek Resource Areas (see map on p. xx). Surveys in 1995 and 1996 were restricted primarily to the Idaho Falls District due to the location of funding sources.

During the summer of 1994, the Montana Riparian and Wetland Association (MRWA), based out of the University of Montana, was awarded a contract to survey approximately 200 miles (USDI 1994) of streams and rivers on the Bureau of Land Management (BLM) properties in southern and eastern Idaho. This inventory was designed to define physical and vegetative characteristics of the stream reaches for the purposes of creating health and functional assessments for the various drainage systems. Additionally, the inventory served as a pilot study for the draft Idaho habitat type classification system. A tentative list of potential habitat and community types, supplemented with brief descriptions of each type, was derived from the work conducted in 1994 in preparation for field work in 1995 and 1996.

The sampling objective in 1995 and 1996 was to locate homogeneous, pristine or moderately undisturbed climax stands to represent each of the individual vegetation types in their natural states. Pfister (1989) indicates that vegetation may be used as an indicator of physical environmental conditions and notes that a variety of factors may influence the physical expression of a site, specifically: Flora, Fauna, Climate, Topography, Soils, Time and Treatments. To use vegetation as a reflection of the landscape, certain factors must be held constant in order to understand the influences of the remaining factors at any particular location. Flora can be controlled by selecting a defined area or region to be studied with specific boundaries and, therefore, a finite range of vegetation communities. Variation in Treatment and Fauna can be limited by selecting stands that exhibit little influence from outside sources, such as mining or timber practices (Treatment) or

livestock utilization (Fauna). By concentrating mainly on climax stands, a degree of stability, in regard to long-lasting, steady-state communities, can essentially halt Time. The resulting vegetation communities sampled are a product of the Climate, Topography, and Edaphic (Soils) factors that influence the individual sites (Pfister 1989). Although the focus of the inventory was to collect climax stands, many seral stands were sampled to obtain information on the successional pathways of each of the associations encountered. The majority of the landscape does not reside as climax vegetation but generally in a seral state. However, many stands may be considered "stable" at least over a period of time integral to the development of land management practices/strategies.

The considerable size of the Idaho Falls District, comprising essentially the eastern third of the state, precluded either random or stratified sampling approaches. The time and effort involved to implement these methods was considered both unreasonable and costly with the resulting product failing to provide the comprehensive coverage of the region required for a classification. The "subjective sampling without preconceived bias" described by Mueller-Dombois and Ellenberg (1974) was used for the location of sampled stands. This method was chosen because it allows the observer the flexibility in the field to modify the existing hierarchal framework of the classification according to what is observed across the landscape. The investigator relies on common sense and experience to reform unions or create subdivisions as relationships are revealed and documented. Although this sampling strategy limits the number of potential statistical tests which may be applied to data for analytical interpretation, it avoids the development of artificial sideboards that may be established with objective sampling methods and cultivates the application of practical applications over more theoretical ones.

This sampling approach coalesced in 1995 and 1996 into efforts to visit most of the BLM properties in the Idaho Falls District which appeared to contain surface water as delineated on 1:100,000 scale surface management topographic maps issued by the Geological Survey. Sites which appeared to have minimal disturbance, as defined according to weed infestation, or evidence of past timber, mining and livestock use, were preferentially selected. The optimal period for collecting data in this area extended from mid-June to late August, generally considered the greening up period with the highest photosynthetic activity when foliage and reproductive parts are present and individual species can be most readily identified (University of Idaho Climate Data 1996).

Many sites were rejected due to current or past landuse practices. Other sites were dismissed due to a lack of homogeneity within the stand or lack of sufficient size to provide adequate choices for quadrat placement without sampling ecotones. Finally, more commonplace communities were often waived due to self-imposed limits placed on the number of samples collected at any one site and on the number of overall samples inventoried for each type. These restrictions ensured that the majority of BLM properties in the Idaho Falls District with potential riparian zones were visited, guaranteeing coverage of most major and minor types, while reducing the risk of any one particular area over-influencing the defining characteristics of the each type. The down side to this approach arises in the limited number of samples (n) collected for many types.

Rectangular plots, with dimensions of 5x10 m (50 m^2), were used predominantly to collect data for herbaceous communities and shrub-dominated communities, while 375 m^2 plots, with dimensions of 15x25 m, were preferred for forested stands (Hansen and others 1995, Daubenmire and Daubenmire 1968). Reconnaissance of each site provided an initial assessment of vegetation and physical parameters of the area, allowing for a more accurate placement of quadrats that best approximated the dominant characteristics of the site. Metal stakes were positioned at the corners of the quadrats while tape measures and compass bearings were employed to ensure proper dimensions. As the field season progressed, distances were calculated by pacing as personnel became experienced with measurement techniques. Optimally, plots were situated within each stand so that at least one full quadrat width was present between the edge of the stand and the placement of the quadrat. However, due to the difficulty in locating relatively pristine sites, this was not feasible in all cases. At a minimum, stands were required to be at least twice the area of the quadrat. In some cases, riparian zones develop as narrow stringer communities along the periphery of vernal pools, reservoirs or streams in narrow canyon defiles. Under such circumstances, the quadrat dimensions were adjusted accordingly to meet the desired 50 or 375 m^2 area while retaining the buffer zone within the stand to ensure homogeneity of the community and to avoid sampling transition zones or ecotones.

Once quadrats were situated, 100 percent of the vegetation was sampled (Daubenmire 1968). Species composition, recorded in the six letter codes established by the USDA Forest Service, was noted and ocular estimates (Daubenmire and

Daubenmire 1968) of absolute cover for each species were calculated according to predetermined intervals:

T = 0.1<1%	2 = 15<25%	5 = 45<55%	8 = 75<85%
P = 1<5%	3 = 25<35%	6 = 55<65%	9 = 85<95%
1 = 5<15%	4 = 35<45%	7 = 65<75%	F = 95-100%

In addition to species coverages, age distribution and utilization of each tree and shrubs species were assessed. Comments concerning weed infestation, successional trends, adjacent wetland and upland communities, historic disturbance, and anomalies that might not be readily obvious from the field forms, were also provided. Vegetation was generally identified in the field at the time of the surveys. In some cases, particular specimens could not be identified due to a lack of distinguishing floristic parts or due to the limited occurrence of the plants themselves. In these instances, samples were collected and pressed for identification back in the office.

A variety of physical site parameters were also examined at each location. Elevation was delineated to the nearest contour line from topographic maps. Aspect and slope were estimated with a compass and clinometer. Soil pits, used to gauge soil texture and morphology, were excavated to a depth of 75 cm (30 in.) unless a restrictive layer, or in some cases the water table, was encountered first. The height of the water table was recorded where it occurred within 75 cm (30 in.) of the ground surface and diagrammatic cross sections of each site were drawn illustrating relative dimensions of the surface topography. The percentage of unvegetated ground surface and its composition as defined as a percentage of rock, litter/duff, wood, moss or bare soil was also recorded.

Plant specimens collected during the summer field inventory were verified and/or identified in the office. Vascular Plants of the Pacific Northwest (Hitchcock and others 1969) and the Intermountain Flora - Vascular Plants of the Intermountain West, U.S.A. (Cronquist and others 1972) were the main guides used in the identification process, although other texts were consulted. Particularly difficult species were compared to mounted specimens at the University of Montana herbarium, or were verified by Peter Stickney, the lead botanist at the Forestry Sciences Laboratory in Missoula. Although most specimens were identified to species, the lack of distinguishable parts of a few herbaceous specimens precluded a determination even to the level of genus. These individuals were labeled as Grassx or Forbxx respectively.

Constraints on time and the number of field crews in 1995 and 1996 resulted in certain vegetation types being surveyed at only one or two locations. Other types which were observed in 1994 and are known to exist in the Idaho Falls and/or Burley Districts were overlooked entirely during the inventory due to these shortages. Descriptions of these habitat and community types from the Classification and Management of Montana's Riparian and Wetland Sites (Hansen and others 1995) have been included to provide pertinent information about the types and avoid gaps in the knowledge base.

ANALYSIS

Concluding the identification of field collected specimens, existing classifications systems were consulted to facilitate assembly of surveyed stands into groups according to their characteristic vegetation types. Because floristic communities do not respect political or state boundaries, vegetation associations commonly span any number of states and result in overlaps between classifications. The primary classification used for this correlation process was the Classification and Management of Montana's Riparian and Wetland Sites (Hansen and others 1995). Other sources included, but were not restricted to, Forest Habitat Types of Northern Idaho: A Second Approximation (Cooper and others 1991), Riparian Community Type Classification of Utah and Southeastern Idaho (Padgett and others 1989), Aspen Community Types of the Intermountain Region (Mueggler 1988), Forest Habitat Types of Central Idaho (Steele and others 1981) and Riparian Community Type Classification of Eastern Idaho-Western Wyoming (Youngblood and others 1985).

Although the "type" is named after the dominant vegetation found on a site, other environmental factors such as substrate, topography, geology and climate are integral to the characterization as well. Stands were evaluated with keys and matched to the descriptions of the appropriate types. Where successional patterns or trends could be discerned, the individual types were placed within the hierarchical structure of the habitat and community type regime according to their particular successional stage. Some descriptions of previously identified types required any number of modifications due to subtle differences in species diversity and/or coverage, and minor differences in the physical environment. Other stands that did not match existing types under current classifications were either categorized as unclassified riparian sites (approximately 4%) and set aside for future consideration, or described as new types according to their observed frequency and distribution during the field inventory.

Once the initial stands were assigned to their respective types, computer generated synthesis tables were developed as outlined by Mueller-Dombois and Ellenberg (1974). Species composition of individual stands were compared within each type and between similar types for fidelity. Stands were reorganized where inconsistencies in composition and covers were noted. Reorganization generally occurred within the series of a type. Series, in this instance, refers to a collection of habitat or community types in which the common upperstory tree or shrub component has more than one dominant understory layer, generally as a result of slight differences in physical site conditions. The *Abies lasiocarpa* (Subalpine Fir) Series, for example, appears to be distributed along a moisture gradient. *Abies lasiocarpa/Streptopus amplexifolius* (Subalpine fir/Clasping-leaved twisted stalk) occupies moist sites, *Abies lasiocarpa/Galium triflorum HT* (Subalpine Fir/Sweetscented Bedstraw HT) is present on slightly drier sites, and *Abies lasiocarpa/Actaea rubra* HT (Subalpine Fir/Baneberry HT) inhabits zones drier than either of the preceding types. Habitat or community types within a series tend to be more closely related than to other habitat or community types. Regrouping of individual stands into unrelated series were exceptionally rare. Constancy tables, described by Mueller-Dombois and Ellenberg (1974), with average cover and range of cover (maximum/ minimum) for each type were developed for further scrutiny and restructuring where necessary. These tables are provided in conjunction with the description for each type.

Sorensen's similarity indices were manipulated to compare plots within each vegetation type for further discrimination between stands and ensure proper placement of each stand within the classification. A derivative of Sorensen's presence/absence similarity index developed by Roberts (1986) that includes a weighting factor reflecting the abundance of each species in relation to cover was also employed. The combination of these indices predicts the relationship between stands as a function of the presence of mutual species and further refines this relation according to correlation between coverages for each pair of species. In general, one or two similar, dominant species with elevated coverages can influence the weighted index score dramatically. For the purposes of this classification, the weighted Sorensen similarity index provides a more realistic approximation of habitat and community type clusters than the presence/ absence form. The types are based on predominantly homogeneous stands with the dominant vegetation best reflecting cumulative site conditions. The emphasis of dominant vegetation, acting as a surrogate for site conditions, promotes the site classification concept and the essence of the habitat type . Sorensen's similarity indices for pairs of species within individual vegetation types are were calculated. Similarity scores for stands categorized within each type often varied over a wide range due to variations in species composition and coverages. Differences in elevation, topography and overall geographic location are thought to account for much of this variation.

Ordination was an additional tool which helped organize the placement of stands and emphasized potential environmental or successional features not readily established from the field data collected. Although a number of types of ordinations are available for analysis, not all are appropriate for the method of data collection or provided practical application due to the type of data collected. Polar ordination, using the Bray-Curtis method, and Detrended Correspondence Analysis (DCA) provided the best interpretation of results. Although Principal Components Analysis (PCA), Reciprocal Averaging (RA) and Canonical Correlation Analysis (CCA) were considered, each of these tests were rejected due to complications with underlying criteria or lack of sensitivity to the data analyzed. It should be noted that these tests are often interpreted as "fuzzy" and should not be considered as statistical validation with confidence intervals but as a tool by which to predict general trends and establish basic conclusions.

RESULTS

After the series aggregations and individual types were established, the salient features of each habitat and community type were isolated, assessed and defined for the purposes of designing a dichotomous key. The key was patterned after the Key to Riparian and Wetland Sites of the Rocky Mountains, Foothills and Intermountain Valleys of Montana found in the Classification and Management of Montana's Riparian and Wetland Sites (Hansen and others 1995) and focuses on those species that are most indicative of each specific type The key was tested against each of the individual stands collected during the inventory of 1995 to confirm an accurate fit. The 45 stands collected during the inventory of 1996 were reserved to test the key for further verification. Approximately 4% of the stands collected during the 1995 inventory were not classified. These stands were considered transitional stands potentially representing ecotones or were listed as undetermined due to lack of sufficient information for placement in the classification. These isolated stands were designated for further analysis as the classification continues to develop, but were not included in the current draft.

Descriptions of each type were developed primarily from the information collected during the 1995 inventory. The format for these descriptions mirrors the Classification and Management of Montana's Riparian and Wetland Sites (Hansen and

others 1995). Management information was obtained primarily from the Montana classification (Hansen and others 1995), although where new types were developed or where types from other classifications were incorporated, management strategies were assimilated from other sources. Some types observed during the 1994 inventory were not sampled during 1995 due to constraints on time and personnel. Moreover, expanded descriptions for these types could not be developed from the 1994 surveys due to the collection of data at that time as heterogeneous polygons rather than as the homogeneous stands surveyed in 1995. To avoid gaps in the knowledge base and provide descriptions of the types for comparison of floristic communities observed in the field during subsequent inventories, descriptions of these types were incorporated from the Montana classification (Hansen and others 1995). In a few cases, particularly with the *Populus* spp. (cottonwood) series, the initial seedling/sapling stages of development were not observed during any of the surveys. However, the presence of cottonwood forests in Idaho substantiates the existence of these types and justifies the inclusion in this draft of those descriptions from the Montana classification(Hansen and others 1995).

Conclusions

Idaho is an extremely diverse state characterized by a wide range of landforms extending from low desert to alpine environments. No two vegetation communities are precisely alike due to differences in climate, parent material, topography, elevation, disturbance regimes and a host of other variables. The site classification concept used in this study is based on the premise that vegetation is a surrogate reflecting the cumulative effects of the various elements at work at different locations across the landscape. While discrepancies between similar communities on sites are present, these discrepancies generally diminish at successively broader scales, allowing for the development of divisions and potentially ranks. The scale designation appropriate for this classification is applied at the species level, and stresses the dominant species present on site as best typifying the principal forces acting there. This approach provides the means to document baseline information for riparian zones in the state of Idaho and provides land managers with the knowledge essential to develop appropriate management strategies and policies.

Classifications, like the communities they describe, are dynamic by nature. The research conducted for this project represents only the first of potentially many drafts of a comprehensive riparian classification system for the entire state. New types are discovered as a greater percentage of the landscape is inventoried, and existing types are further refined. Three seasons of riparian inventory in eastern and southern Idaho have provided the framework for the riparian classification. However, some communities were limited in the number of samples collected. In other cases, communities thought to occur within the project area according to outside or past references continue to remain undiscovered. Future inventories, both within the project area and in other regions of Idaho, are necessary to provide a more detailed range of physical site and vegetation features of existing types and to ensure that all reoccurring vegetation types found in Idaho have been surveyed and described.

Key To Wetland and Riparian Vegetation Types on BLM Lands in Eastern Idaho: Idaho Falls and Burley Districts

BACKGROUND

1. This classification is the product of three seasons of research collected during the 1994, 1995, and 1996 summer field sessions. Surveys in 1994 were conducted on BLM lands both in the the Idaho Falls District, which includes the Medicine Lodge, Big Butte, and Pocatello Resource Areas, and the Burley District, divided between the Snake River and Deep Creek Resource Areas. Surveys in 1995 and 1996 were restricted primarily to the Idaho Falls District. The descriptions of the vegetation types following this key are modeled after the Classification and Management of Montana's Riparian and Wetland Sites (Hansen and others 1995). Other sources include, but were not restricted to, Forest Habitat Types of Northern Idaho: A Second Approximation (Cooper and others 1991), Riparian Community Type Classification of Utah and Southeastern Idaho (Padgett and others 1989), Aspen Community Types of the Intermountain Region (Mueggler 1988), and Riparian Community Type Classification of Eastern Idaho-Western Wyoming (Youngblood and others 1985). Due to the methods of data collection in 1994, the analyses of 1994 sites were restricted to species composition and physical site features. Vegetation type surveys in 1995 and 1996 were designed specifically for the purposes of developing a classification and represent the majority of the information contained in the type descriptions. Constraints on time and the number of field crews in 1995 resulted in certain vegetation types represented by only one or two sampled sites and other types from being missed entirely. To reduce information gaps in the classification, descriptions from the Classification and Management of Montana's Riparian and Wetland Sites have been provided as they often closely parallel vegetation communities and their respective physical locations on the landscape in Idaho.

2. This classification divides stands of vegetation into habitat and community types. Habitat types represent the climax vegetation that can occupy specific locations on the landscape barring frequent human or natural disturbance. Moisture, temperature, substrate and a variety of other environmental factors determine the position of habitat types throughout geographic regions. Community types represent the seral or transitional stages of vegetation that occupy a site during the successional transformation from pioneer to climax phases.

3. The key organizes stands of vegetation by life form, beginning with coniferous and deciduous trees in the tallest layer, proceeding to shrubs at the next highest level and concluding with herbaceous vegetation at the lowest layer. Habitat type descriptions precede community type descriptions within each of these structural divisions. These vegetation types are further organized along a moisture gradient, with those habitat or community types occupying wetter sites placed in the key before habitat or community types prone toward drier sites.

4. The key allows the user to identify the potential of a site; in other words, the climax vegetation that will eventually occupy a site. Where disturbance, both natural (e.g., recently deposited alluvial bars) and/or human-caused (e.g., livestock, logging), prevents succession to the final climax scenario on a site, the key will direct the user to the appropriate community type. ***Reminder: This publication describes several major seral plant communities (community types) that are stable for time frames important for making land management decisions.*** The possible potential(s) for a site can often be projected by reading the discussion in the Successional Information section of each community type.

5. On severely degraded sites, the user should attempt to locate similar positions on the landscape, in the general vicinity, that exhibit less disturbance, and estimate what forms of vegetation could be present. Once a type has been selected, the user must reread the description to ensure an appropriate match for the site.

INSTRUCTIONS

1. Identify and record the canopy cover for all indicator species. The indicator species are those species used in the key. Consider tree species first, then shrubs and finally herbaceous species.

2. The plot under scrutiny must be representative of the stand as a whole. If not, locate another plot. Environmental or vegetation uniformity is a primary consideration in plot selection.

3. Identify the potential lifeform using the ***Growth Form Types Key.*** Generally a tree species is considered successfully reproducing if 10 or more individuals per acre (25/ha) occupy ***or will occupy*** the site.

4. Within the correct lifeform group, key to the ***Habitat Type or Community Type*** by following the key literally. ***All*** conditions stipulated for each couplet must be satisfied in order to make a correct determination. The first set of conditions to satisfy the site characteristics should supply the correct classification.

5. In sites where the vegetation is obviously depauperate (unusually sparse) because of heavy grazing or browsing pressure, dense shading, or duff accumulations, ***adjust the key downward*** to reflect the reduced canopy coverage. For example, when the key refers to a plant with at least 5 percent canopy cover, the amount would be reduced to needing only 1 percent canopy cover. Extrapolation from the nearest non-depauperate condition occurring on a comparable site will assist in the correct determination of the type.

6 In addition, when classifying a site, be aware of and avoid ***microsites. Microsites*** are small areas that are atypical for the stand as a whole. Examples include windthrow pockets filled with colluvium/alluvium or raised hummocks of willows growing on either active or abandon beaver dams comprised of woody materials.

7. In sites that are heavily impacted by grazing or browsing pressures, look around to see if you see *ANY* shrub or tree growth or remnants (stumps). In extreme situations, the potential natural community (such as a willow habitat type) may be present only in the form of dwarf-looking, widely scattered individuals. If this is the case, again adjust the key downward to reflect the reduced canopy cover. Once again, extrapolation from the nearest non-grazed or non-browsed condition occurring on a comparable site will assist in the correct determination of the type.

8. Habitat types or community types can generally be projected for a site in an early seral stage by examining the closest site(s) with similar site conditions (soils, hydrologic characteristics, position on the landscape, etc.).

9. ***Caution!*** The potential of a site may change if there is a change in the soil and/or water characteristics of the site.

10. ***Warning! The key is not the classification! Validate your determination by comparing the site characteristics with the written description of the type. Be aware that the environmental conditions described in the text are from both sampled sites and personal observations and may not include all the sites on the landscape in which the type is found.***

Key to Growth Form Types

1. Coniferous trees present and successfully reproducing (≥ 10 trees per acre) and not restricted to micro sites. . . . . **Coniferous Tree-Dominated Types (p. 21)**

1. Coniferous trees absent or, if present, **not** successfully reproducing and/or restricted to microsites 2

    2. Deciduous trees present and successfully reproducing (≥ 10 trees per acre) or with a combined canopy cover ≥ 25 percent, and not restricted to microsites. . . . . **Deciduous Tree-Dominated Types (p. 23)**

2. Deciduous trees absent, or if present, **not** successfully reproducing and with a combined canopy cover < 25 percent, and/or restricted to microsites. 3

3. Shrub species present with a combined canopy cover of ≥ 25 percent and not restricted to microsites . . . . . **Shrub-Dominated Types (p. 25)**

3. Shrub species absent or, if present, not successfully reproducing and/or restricted to microsites . . . . . **Herbaceous Types (p. 28)**

Key to Coniferous Tree-Dominated Types

* Coniferous trees present and successfully reproducing (≥ 10 trees per acre), and not restricted to microsites

1. *Abies lasiocarpa* (subalpine fir) present and reproducing successfully. 2

1. *Abies lasiocarpa* (subalpine fir) absent or, if present, **not** reproducing successfully. 5

2. *Streptopus amplexifolius* (clasping-leaved twisted stalk), *Mitella breweri* (Brewer's mitrewort), *Mitella pentandra* (five-stamened mitrewort), *Senecio triangularis* (arrowleaf groundsel), individually or in combination, with ≥ 1 percent cover, **or** presence of *Gymnocarpium dryopteris* (oak-fern) . . . . . ***Abies lasiocarpa/Streptopus amplexifolius* (subalpine fir/clasping-leaved twisted stalk) Habitat Type (p. 41)**

2. *Streptopus amplexifolius* (clasping-leaved twisted stalk), *Mitella breweri* (Brewer's mitrewort), *Mitella pentandra* (five-stamened mitrewort), *Senecio triangularis* (arrowleaf groundsel), individually or in combination, with < 1 percent cover, **and** absence of *Gymnocarpium dryopteris* (oak-fern). 3

3. *Actaea rubra* (baneberry) with ≥ 1 percent cover. . . . . ***Abies lasiocarpa/Actaea rubra* (subalpine fir/baneberry) Habitat Type (p. 32)**

3. *Actaea rubra* (baneberry) with < 1 percent cover 4

4. Site **containing** at least **two** of the following moist site indicator species: *Streptopus amplexifolius* (clasping-leaved twisted stalk), *Galium triflorum* (sweetscented bedstraw), *Actaea rubra* (baneberry), or *Thalictrum occidentale* (western meadowrue) . . . . . ***Abies lasiocarpa/ Galium triflorum* (subalpine fir/sweetscented bedstraw) Habitat Type (p. 36)**

4. Site **lacking** at least **two** of the following moist site indicator species: *Streptopus amplexifolius* (clasping-leaved twisted stalk), *Galium triflorum* (sweetscented bedstraw), *Actaea rubra* (baneberry), or *Thalictrum occidentale* (western meadowrue) 17

5. *Picea* spp. (spruce) present and reproducing successfully 6

5. *Picea* spp. (spruce) absent or, if present, **not** reproducing successfully 9

6. *Equisetum arvense* (field horsetail) with ≥ 25 percent cover. . . . . ***Picea/Equisetum arvense* (spruce/field horsetail) Habitat Type (p.60)**

6. *Equisetum arvense* (field horsetail) with < 25 percent cover 7

7. *Cornus stolonifera* (red-osier dogwood), *Alnus incana* (mountain alder), or willow species present . . . . . ***Picea/Cornus stolonifera* (spruce/red-osier dogwood) Habitat Type (p. 55)**

7. *Cornus stolonifera* (red-osier dogwood), *Alnus incana* (mountain alder), or willow species absent 8

8. Site containing at least **two** of the following moist site indicator forbs: *Streptopus amplexifolius* (clasping-leaved twisted stalk), *Galium triflorum* (sweetscented bedstraw), *Actaea rubra* (baneberry), or *Thalictrum occidentale* (western meadowrue) . . . . . ***Picea/Galium triflorum* (spruce/sweetscented bedstraw) Habitat Type (p. 66)**

8. Site lacking at least **two** of the following moist site indicator forbs: *Streptopus amplexifolius* (clasping-leaved twisted stalk), *Galium triflorum* (sweetscented bedstraw), *Actaea rubra* (baneberry), or *Thalictrum occidentale* (western meadowrue) 17

9. *Pseudotsuga menziesii* (Douglas fir) present and reproducing successfully 10

9. *Pseudotsuga menziesii* (Douglas fir) absent or, if present, **not** reproducing successfully 11

10. *Cornus stolonifera* (red-osier dogwood), *Acer glabrum* (Rocky Mountain maple), *Prunus virginiana* (common chokecherry), *Poa pratensis* (Kentucky bluegrass) or *Thalictrum occidentale* (western meadowrue), individually or in combination, with ≥ 1 percent canopy cover . . . . . ***Pseudotsuga menziesii/Cornus stolonifera* (Douglas fir/red-osier dogwood) Habitat Type (p. 74)**

10. *Cornus stolonifera* (red-osier dogwood), *Acer glabrum* (Rocky Mountain maple), *Prunus virginiana* (common chokecherry), *Poa pratensis* (Kentucky bluegrass) or *Thalictrum occidentale* (western meadowrue), individually or in combination, with < 1 percent canopy cover 17

11. *Pinus Flexilis* (Limber Pine) present and reproducing successfully 12

11. *Pinus Flexilis* (Limber Pine) absent or, if present, **not** reproducing successfully 13

12. *Betula occidentalis* (water birch), *Prunus virginiana* (common chokecherry), *Equisetum arvense* (field horsetail), or *Poa pratensis* (Kentucky bluegrass) , individually or in combination, with ≥ 1 percent canopy cover . . . . . ***Pinus Flexilis* (limber pine) Community Type (p. 70)**

12. *Betula occidentalis* (water birch), *Prunus virginiana* (common chokecherry), *Equisetum arvense* (field horsetail), or *Poa pratensis* (Kentucky bluegrass) , individually or in combination, with ≥ 1 percent canopy cover . . 17

13. *Juniperus scopulorum* (Rocky Mountain juniper) present and reproducing successfully 14

13. *Juniperus scopulorum* (Rocky Mountain juniper) absent or, if present, **not** reproducing successfully 15

14. Cottonwoods with ≥ 5 percent cover **or** *Cornus stolonifera* (red-osier dogwood), *Poa pratensis* (Kentucky bluegrass), or *Agrostis stolonifera* (redtop), individually or in combination, with ≥ 1 percent canopy cover . . . . . ***Juniperus scopulorum/Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) Habitat Type (p. 50)**

14. Cottonwoods with < 5 percent cover **or** *Cornus stolonifera* (red-osier dogwood), *Poa pratensis* (Kentucky bluegrass), or *Agrostis stolonifera* (redtop), individually or in combination, with < 1 percent canopy cover 17

15. *Juniperus osteosperma* (Utah juniper) present and reproducing successfully 16

15. *Juniperus osteosperma* (Utah juniper) absent or, if present, **not** reproducing successfully 17

16. *Prunus virginiana* (common chokecherry), *Ribes lacustre* (swamp currant), *Agrostis stolonifera* (redtop), or *Poa pratensis* (Kentucky bluegrass), individually or in combination, with ≥ 1 percent canopy cover . . . . . ***Juniperus osteosperma* (Utah juniper) Community Type (p. 47)**

16. *Prunus virginiana* (common chokecherry), *Ribes lacustre* (swamp currant), *Agrostis stolonifera* (redtop), or *Poa pratensis* (Kentucky bluegrass), individually or in combination, with < 1 percent canopy cover 17

17. Site **containing** at least **one** of the wetland attributes: hydric soils, hydrophytic vegetation, or wetland hydrology

..... **Unclassified Riparian/Wetland Site**

17. Site **lacking** at least **one** of the wetland attributes: hydric soils, hydrophytic vegetation, or wetland hydrology .....**Upland Site**

Key to Deciduous Tree-Dominated Types

* Deciduous trees present and successfully reproducing (≥ 10 trees per acre), **or** with a combined canopy cover ≥ 25 percent, and not restricted to microsites

1. *Acer negundo* (box-elder) present and successfully reproducing 2

1. *Acer negundo* (box-elder) absent or, if present, **not** reproducing successfully 3

2. *Prunus virginiana* (common chokecherry), *Cornus stolonifera* (red-osier dogwood), *Acer grandidentatum* (bigtooth maple), cottonwood species, or willow species, individually or in combination, with ≥ 5 percent canopy cover ....***Acer negundo/Prunus virginiana*(box-elder/common chokecherry) Habitat Type (p. 80)**

2. *Prunus virginiana* (common chokecherry), *Cornus stolonifera* (red-osier dogwood), *Acer grandidentatum* (bigtooth maple), cottonwood species, or willow species, individually or in combination, with < 5 percent canopy cover 18

3. *Populus tremuloides* (quaking aspen) present and successfully reproducing 4

3. *Populus tremuloides* (quaking aspen) absent or, if present, **not** reproducing successfully 8

4. *Cornus stolonifera* (red-osier dogwood), *Prunus virginiana* (common chokecherry), *Alnus incana* (mountain alder) or willow species, individually or in combination, with ≥ 5 percent canopy cover ....***Populus tremuloides/Cornus stolonifera* (quaking aspen/red-osier dogwood) Habitat Type (p. 124)**

4. *Cornus stolonifera* (red-osier dogwood), *Prunus virginiana* (common chokecherry), *Alnus incana* (mountain alder) or willow species, individually or in combination, with < 5 percent canopy cover 5

5. *Calamagrostis canadensis* (bluejoint reedgrass) or *C. stricta* (narrow-spiked reed-grass), individually or in combination, with ≥ 5 percent canopy cover ....***Populus tremuloides/Calamagrostis canadensis* (quaking aspen/bluejoint reedgrass) Habitat Type (p. 119)**

5. *Calamagrostis canadensis* (bluejoint reedgrass) or *C. stricta* (narrow-spiked reed-grass) individually or incombination, with < 5 percent canopy cover 6

6. Site **containing** at least **two** of the following moist site indicator species: *Osmorhiza occidentalis* (western sweet-cicely), *Galium triflorum* (sweetscented bedstraw), *Actaea rubra* (baneberry), or *Thalictrum occidentale* (western meadowrue) ..... ***Populus tremuloides/Osmorhiza occidentalis* (quaking aspen/western sweet-cicely) Habitat Type (p. 130)**

6. Site **lacking** at least **two** of the following moist site indicator species: *Osmorhiza occidentalis* (western sweet-cicely), *Galium triflorum* (sweetscented bedstraw), *Actaea rubra* (baneberry), or *Thalictrum occidentale* (western meadowrue) 7

7. *Poa pratensis* (Kentucky bluegrass), *Phleum pratense* (common timothy), or *Agrostis stolonifera* (redtop), individually or in combination, with ≥ 5 percent canopy cover ....***Populus tremuloides/Poa pratensis* (quaking aspen/Kentucky bluegrass) Community Type (p. 134)**

7. *Poa pratensis* (Kentucky bluegrass), *Phleum pratense* (common timothy), or *Agrostis stolonifera* (redtop), individually or in combination, with < 5 percent canopy cover 8

NOTE : The *Populus trichocarpa* and *P. angustifolia* types do not represent self-regenerating communities and must constitute a combined canopy cover of ≥ **25 percent** deciduous tree species to be considered as one of the following community types.

8. *Populus trichocarpa* (black cottonwood) with greater cover than other deciduous tree species 9

8. Other deciduous tree species with greater cover than *Populus trichocarpa* (black cottonwood) 12

9. *Populus trichocarpa* (black cottonwood) seedlings or saplings (dbh <5.0 inches) dominate the site; site is a recently deposited alluvial bar . . . . . ***Populus trichocarpa*/Recent Alluvial Bar (black cottonwood/Recent Alluvial Bar) Community Type (p. 153)**

9. Pole-sized or mature (dbh <5.0 inches) *Populus trichocarpa* (black cottonwood) dominate the site . . . . . 10. Shrub species with ≥ 25 percent cover 11

10. Shrub species with < 25 percent cover . . . . . .***Populus trichocarpa*/Herbaceous (black cottonwood/Herbaceous) Community Type (p. 146)**

11. *Cornus stolonifera* (red-osier dogwood) or willow species, individually or in combination, with ≥ 1 percent canopy cover . . . . . ***Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) Community Type (p. 138)**

11. *Cornus stolonifera* (red-osier dogwood) or willow species, individually or in combination, with < 1 percent canopy cover; understory may be dominated by shrub species including *Rosa* spp.(rose), *Symphoricarpos* spp. (snowberry), or *Amelanchier alnifolia* (western serviceberry) . . . . . ***Populus trichocarpa/Symphoricarpos occidentalis* (black cottonwood/western snowberry) Community Type (p. 160)**

12. *Populus angustifolia* (narrowleaf cottonwood) with greater cover than other deciduous tree species 13

12. Other deciduous tree species with greater cover than *Populus angustifolia* (narrowleaf cottonwood) 16

13. *Populus angustifolia* (narrowleaf cottonwood) seedlings or saplings (dbh <5.0 inches) dominate the site; site is a recently deposited alluvial bar . . . . . ***Populus angustifolia*/Recent Alluvial Bar (narrowleaf cottonwood/Recent Alluvial Bar) Community Type (p. 104)**

13. Pole-sized or mature (dbh <5.0 inches) *Populus angustifolia* (narrowleaf cottonwood) dominate the site 14

14. Shrub species with ≥ 25 percent cover 15

14. Shrub species with < 25 percent cover . . . . . ***Populus angustifolia*/Herbaceous (narrowleaf cottonwood/Herbaceous) Community Type (p. 96)**

15. *Cornus stolonifera* (red-osier dogwood) or willow species, individually or in combination, with ≥ 1 percent canopy cover . . . . . ***Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) Community Type (p. 89)**

15. *Cornus stolonifera* (red-osier dogwood) or willow species, individually or in combination, with < 1 percent canopy cover; understory may be dominated by shrub species including Rosa spp.(rose), *Symphoricarpos* spp. (snowberry), or *Amelanchier alnifolia* (western serviceberry) . . . . . ***Populus angustifolia/ Symphoricarpos occidentalis* (narrowleaf cottonwood/western snowberry) Community Type (p. 111)**

16. *Salix amygdaloides* (peach-leaf willow) or *Elaeagnus angustifolia* (Russian olive) with greater canopy cover than any other individual tree species 17

16. Other individual tree species with greater canopy cover than *Salix amygdaloides* (peach-leaf willow) or *Elaeagnus angustifolia* (Russian olive) 18

17. *Salix amygdaloides* (peach-leaf willow) with greater canopy cover than *Elaeagnus angustifolia* (Russian olive) ..... ***Salix amygdaloides* (peach-leaf willow) Community Type (p.168)**

17. *Elaeagnus angustifolia* (Russian olive) with greater canopy cover than *Salix amygdaloides* (peach-leaf willow) ..... ***Elaeagnus angustifolia* (Russian olive) Community Type (p.85)**

18. Site **containing** at least **one** of the following wetland attributes: hydric soils, hydrophytic vegetation, or wetland hydrology ..... **Unclassified Riparian/Wetland Site**

18. Site **lacking** at least **one** of the following wetland attributes: hydric soils, hydrophytic vegetation, or wetland hydrology ..... **Upland Site**

Key to Shrub-Dominated Types

1. Willows with ≥ 10 percent canopy cover ..... **Willow Key**

1. Willows with < 10 percent canopy cover ..... **Non-Willow Key**

Willow Key

1. *Salix lutea* (yellow willow) with ≥ 10 percent canopy cover **and** with a greater canopy cover than any other willow species present 2

1. *Salix lutea* (yellow willow) with < 10 percent canopy cover **and** with less canopy cover than any other willow species present 4

2. *Carex rostrata* (beaked sedge), *Carex vesicaria* (inflated sedge), *Carex atherodes* (awned sedge), and/or *Carex aquatilis* (water sedge), individually or in combination, with ≥ 10 percent canopy cove ..... ***Salix lutea/Carex rostrata* (yellow willow/beaked sedge) Habitat Type (p. 227)**

2. *Carex rostrata* (beaked sedge), *Carex vesicaria* (inflated sedge), *Carex atherodes* (awned sedge), and/or *Carex aquatilis* (water sedge), individually or in combination, with < 10 percent canopy cover 3

3. *Calamagrostis canadensis* (bluejoint reedgrass), *Calamagrostis stricta* (narrow-spiked reedgrass), and/or *Deschampsia c cespitosa* (tufted hairgrass), individually or in combination, with ≥ 5 percent canopy cover ..... ***Salix lutea/Calamagrostis canadensis* (yellow willow/bluejoint reedgrass) Habitat Type (p. 222)**

3. *Calamagrostis canadensis* (bluejoint reedgrass), *Calamagrostis stricta* (narrow-spiked reedgrass), and/or *Deschampsia cespitosa* (tufted hairgrass), individually or in combination, with < 5 percent canopy cover ..... ***Salix lutea* (yellow willow) Community Type (p. 234)**

4. *Salix geyeriana* (Geyer willow) and/or *Salix boothii* (Booth willow) with ≥ 10 percent canopy cover **and** with a greater canopy cover than any other willow species present 5

4. *Salix geyeriana* (Geyer willow) and/or *Salix boothii* (Booth willow) with < 10 percent canopy cover **and** with less canopy cover than any other willow species present 7

5. *Carex rostrata* (beaked sedge), *Carex vesicaria* (inflated sedge), *Carex atherodes* (awned sedge), and/or *Carex aquatilis* (water sedge), individually or in combination, with ≥ 10 percent canopy cover ..... ***Salix geyeriana/Carex rostrata* (Geyer willow/beaked sedge) Habitat Type (p. 206)**

5. *Carex rostrata* (beaked sedge), *Carex vesicaria* (inflated sedge), *Carex atherodes* (awned sedge), and/or *Carex aquatilis* (water sedge), individually or in combination, with < 10 percent canopy cover 6

6. *Calamagrostis canadensis* (bluejoint reedgrass), *Calamagrostis stricta* (narrow-spiked reedgrass), and/or *Deschampsia cespitosa* (tufted hairgrass), individually or in combination, with ≥ 10 percent canopy cover . . . . . ***Salix geyeriana/Calamagrostis canadensis*** **(Geyer willow/bluejoint reedgrass) Habitat Type (p. 201)**

6. *Calamagrostis canadensis* (bluejoint reedgrass), *Calamagrostis stricta* (narrow-spiked reedgrass), and/or *Deschampsia cespitosa* (tufted hairgrass), individually or in combination, with < 10 percent canopy cover . . . . . ***Salix geyeriana*** **(Geyer willow) Community Type (p. 212)**

7. *Salix drummondiana* (Drummond willow) with ≥ 10 percent canopy cover **and** with a greater canopy cover than any other willow species present. 8

7. *Salix drummondiana* (Drummond willow) with < 10 percent canopy cover **and** with less canopy cover than any other willow species present 10

8. *Carex rostrata* (beaked sedge), *Carex vesicaria* (inflated sedge), *Carex atherodes* (awned sedge), and/or *Carex aquatilis* (water sedge), individually or in combination, with ≥ 10 percent canopy cover . . . . . ***Salix drummondiana/Carex rostrata*** **(Drummond willow/beaked sedge) Habitat Type (p.180)**

8. *Carex rostrata* (beaked sedge), *Carex vesicaria* (inflated sedge), *Carex atherodes* (awned sedge), and/or *Carex aquatilis* (water sedge), individually or in combination, with < 10 percent canopy cover 9

9. *Calamagrostis canadensis* (bluejoint reedgrass), *Calamagrostis stricta* (narrow-spiked reedgrass), and/or *Deschampsia cespitosa* (tufted hairgrass), individually or in combination, with ≥ 10 percent canopy cover . . . . . ***Salix drummondiana/Calamagrostis canadensis*** **(Drummond willow/bluejoint reedgrass) Habitat Type (p.175)**

9. *Calamagrostis canadensis* (bluejoint reedgrass), *Calamagrostis stricta* (narrow-spiked reedgrass), and/or Deschampsia *cespitosa* (tufted hairgrass), individually or in combination, with < 10 percent canopy cover . . . . . ***Salix drummondiana*** **(Drummond willow) Community Type (p. 192)**

10. **Individual non-willow species** with a greater canopy cover in the tallest layer than any **individual willow species** present . . . . . **Go to the Non-willow Key**

10. **Individual willow species** with a greater canopy cover in the tallest layer than any **individual non-willow species** present 11

11. *Salix lasiandra* (Pacific willow) with a greater canopy cover than any other individual willow species present . . . . . ***Salix lasiandra*** **(Pacific willow) Community Type (p. 217)**

11. Any other individual willow species Salix *lasiandra* (Pacific willow) with a greater canopy cover than present 12

12. *Salix bebbiana* (Bebb willow) with a greater canopy cover than any other individual willow species present . . . . . ***Salix bebbiana*** **(Bebb willow) Community Type (p. 171)**

12. Any other individual willow species present with a greater canopy cover than *Salix bebbiana* (Bebb willow) 13

13. *Salix exigua* (sandbar willow) with a greater canopy cover than any other individual willow species present . . . . . ***Salix exigua*** **(sandbar willow) Community Type (p. 195)**

13. Any other individual willow species present with a greater canopy cover than Salix *exigua* (sandbar willow) 14

14. Site **containing** at least **one** of the wetland attributes: hydric soils, hydrophytic vegetation, or wetland hydrology . . . . . **Unclassified Riparian/Wetland Site**

14. Site **lacking** at least **one** of the wetland attributes: hydric soils, hydrophytic vegetation, or wetland hydrology . . . . . **Upland Site**

Non-Willow Key

1. *Potentilla fruticosa* (shrubby cinquefoil) with ≥ 10 percent canopy cover. . . . . ***Potentilla fruticosa/Deschampsia cespitosa* (shrubby cinquefoil/tufted hairgrass) Habitat Type (p. 268)**

1. *Potentilla fruticosa* (shrubby cinquefoil) with < 10 percent canopy cover 2

2. *Artemisia cana* (silver sagebrush) with ≥ 10 percent canopy cover . . . . . ***Artemisia cana/Agropyron smithii* (silver sagebrush/western wheatgrass) Habitat Type (p. 248)**

2. *Artemisia cana* (silver sagebrush) with < 10 percent canopy cover 3

3. *Betula occidentalis* (water birch) with ≥ 15 percent canopy cover **and with** the greatest canopy cover in the tallest layer. . . . . ***Betula occidentalis* (water birch) Community Type (p. 255)**

3. *Betula occidentalis* (water birch) with < 15 percent canopy cover **or without** the greatest canopy cover in the tallest layer 4

4. *Alnus incana* (mountain alder) with ≥ 15 percent canopy cover **and with** the greatest canopy cover in the tallest layer . . . . . ***Alnus incana* (mountain alder) Community Type (p. 244)**

4. *Alnus incana* (mountain alder) with < 15 percent canopy cover **or without** the greatest canopy cover in the tallest layer 5

5. *Crataegus succulenta* (succulent hawthorn) or *Crataegus douglasii* (black hawthorn), individually or in combination, with ≥ 15 percent canopy cover **and with** the greatest canopy cover in the tallest layer . . . . . ***Crataegus succulenta* (succulent hawthorn) Community Type (p. 264)**

5. *Crataegus succulenta* (succulent hawthorn) or *Crataegus douglasii* (black hawthorn), individually or in combination, with < 15 percent canopy cover **and without** the greatest canopy cover in the tallest layer 6

6. *Acer grandidentatum* (big-tooth maple) with ≥ 15 percent canopy cover **and with** the greatest canopy cover in the tallest layer. . . . . ***Acer grandidentatum* (big-tooth maple) Community Type (p. 239)**

6. *Acer grandidentatum* (big-tooth maple) with < 15 percent canopy cover **or without** the greatest canopy cover in the tallest layer 7

7. *Prunus virginiana* (common chokecherry) with ≥ 15 percent canopy cover **and with** the greatest canopy cover in the tallest layer . . . . . ***Prunus virginiana* (common chokecherry) Community Type (p. 273)**

7. *Prunus virginiana* (common chokecherry) with < 15 percent canopy cover **or without** the greatest canopy cover in the tallest layer 8

8. *Cornus stolonifera* (red-osier dogwood) with ≥ 15 percent canopy cover **and with** the greatest canopy cover in the tallest layer . . . . . ***Cornus stolonifera* (red-osier dogwood) Community Type (p. 260)**

8. *Cornus stolonifera* (red-osier dogwood) with < 15 percent canopy cover **or without** the greatest canopy cover in the tallest layer 9

9. *Rosa woodsii* (woods rose) or *Rosa acicularis* (prickly rose), individually or in combination, with ≥ 15 percent canopy cover **and with** the greatest canopy cover in the tallest layer . . . . . ***Rosa woodsii* (woods rose) Community Type (p. 283)**

9. *Rosa woodsii* (woods rose) or *Rosa acicularis* (prickly rose), individually or in combination, with < 15 percent canopy cover **and without** the greatest canopy cover in the tallest layer. 10

10. *Symphoricarpos occidentalis* (western snowberry) or *Symphoricarpos albus* (common snowberry), individually or in combination, with ≥ 15 percent canopy cover **and with** the greatest canopy cover in the tallest layer . . . . . ***Symphoricarpos occidentalis* (western snowberry) Community Type (p. 286)**

10. *Symphoricarpos occidentalis* (western snowberry) or *Symphoricarpos albus* (common snowberry), individually or in combination, with < 15 percent canopy cover **and without** the greatest canopy cover in the tallest layer 11

11. *Rhus aromatica* (Fragrant sumac) with ≥ 15 percent canopy cover **and with** the greatest canopy cover in the tallest layer . . . . . ***Rhus aromatica* (fragrant sumac) Community Type (p. 277)**

11. *Rhus aromatica* (Fragrant sumac) with < 15 percent canopy cover **or without** the greatest canopy coverin the tallest layer 12

12. *Ribes odoratum* (buffalo currant) with ≥ 15 percent canopy cover **and with** the greatest canopy cover in the tallest layer . . . . . ***Ribes odoratum* (buffalo currant) Community Type (p. 280)**

12. *Ribes odoratum* (buffalo currant) with < 15 percent canopy cover **or without** the greatest canopy cover in the tallest layer 13

13. Site **containing** at least **one** of the wetland attributes: hydric soils, hydrophytic vegetation, or wetland hydrology . . . . . **Unclassified Riparian/Wetland Site**

13. Site **lacking** at least **one** of the wetland attributes: hydric soils, hydrophytic vegetation, or wetland hydrology . . . . . **Upland Site**

Key to Herbaceous-Dominated Types

1. Sedges with ≥ 25 percent canopy cover . . . . . **Sedge Key**

1. Sedges with < 25 percent canopy cover . . . . . **Non-Sedge Key**

Sedge Key

1. *Carex rostrata* (beaked sedge) with ≥ 25 percent canopy cover . . . ***Carex rostrata* (beaked sedge) Habitat Type (p. 306)**

1. *Carex rostrata* (beaked sedge) with < 25 percent canopy cover 2

2. *Carex aquatilis* (water sedge) with ≥ 25 percent canopy cover . . . . . ***Carex aquatilis* (water sedge) Habitat Type (p. 289)**

2. *Carex aquatilis* (water sedge) with < 25 percent canopy cover 3

3. *Carex lasiocarpa* (slender sedge) or *Carex lanuginosa* (woolly sedge), individually or in combination, with ≥ 25 percent canopy cover . . . . . ***Carex lasiocarpa* (slender sedge) Habitat Type (p.296)**

3. *Carex lasiocarpa* (slender sedge) or *Carex lanuginosa* (woolly sedge), individually or in combination, with ≥ 25 percent canopy cover 4

4. *Carex microptera* (small-winged sedge) with ≥ 25 percent canopy cover . . . . . ***Carex microptera* (small-winged sedge) Habitat Type (p. 301)**

4. *Carex microptera* (small-winged sedge) with < 25 percent canopy cover 5

NOTE : The remaining type(s) represent disturbance communities, human-caused or otherwise; therefore, read the following instructions before continuing in this key.

a. If **any** shrub species are observed on the site, return to the shrub-dominated key and reduce all minimum canopy cover requirements in the key to "present" to determine a vegetation type.
b. If **no** shrub species are observed, return to the sedge key and reduce all minimum canopy cover requirements in the key to ≥ 5 percent to determine a vegetation type for the site.
c. If a vegetation type still cannot be determined for the site, return to this key and proceed to step 5.

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5. *Carex nebrascensis* (Nebraska sedge) with ≥ 25 percent canopy cover . . . . . ***Carex nebrascensis* (Nebraska sedge) Community Type (p. 303)**

5. *Carex nebrascensis* (Nebraska sedge) with < 25 percent canopy cover 2

6. Site **containing** at least **one** of the wetland attributes: hydric soils, hydrophytic vegetation, or wetland hydrology . . . . . **Unclassified Riparian/Wetland Site**

6. Site **lacking** at least **one** of the wetland attributes: hydric soils, hydrophytic vegetation, or wetland hydrology . . . . . **Upland Site**

Non-Sedge Key

1. *Typha latifolia* (common cattail) or *Typha angustifolia* (lesser cattail), individually or in combination, with ≥ 25 percent canopy cover . . . . . ***Typha latifolia* (common cattail) Habitat Type (p. 355)**

1. *Typha latifolia* (common cattail) or *Typha angustifolia* (lesser cattail), individually or in combination, with < 25 percent canopy cover 2

2. *Scirpus acutus* (hardstem bulrush) or *S. validus* (softstem bulrush), individually or in combination, with ≥ 25 percent canopy cover . . . . . ***Scirpus acutus* (hardstem bulrush) Habitat Type (p. 347)**

2. *Scirpus acutus* (hardstem bulrush) or *S. validus* (softstem bulrush), individually or in combination, with < 25 percent canopy cover 3

3. *Phragmites australis* (common reed) with ≥ 25 percent canopy cover . . . . . ***Phragmites australis* (common reed) Habitat Type (p. 339)**

3. *Phragmites australis* (common reed) with < 25 percent canopy cove 4

4. *Phalaris arundinacea* (reed canarygrass) with ≥ 25 percent canopy cover . . . . . ***Phalaris arundinacea* (reed canarygrass) Habitat Type (p. 335)**

4. *Phalaris arundinacea* (reed canarygrass) with < 25 percent canopy cover 5

5. *Scirpus pungens* (sharp bulrush) or *Scirpus americanus* (American bulrush), individually or in combination, with ≥ 25 percent canopy cover . . . . . ***Scirpus pungens* (sharp bulrush) Habitat Type (p. 350)**

5. *Scirpus pungens* (sharp bulrush) or *Scirpus americanus* (American bulrush), individually or in combination, with < 25 percent canopy cover 6

6. *Eleocharis palustris* (common spikesedge) or *E. acicularis* (needle spike-rush), individually or in combination, with ≥ 25 percent canopy cover . . . . . ***Eleocharis palustris* (common spikesedge) Habitat Type (p. 327)**

6. *Eleocharis palustris* (common spikesedge) or *E. acicularis* (needle spike-rush), individually or in combination, with < 25 percent canopy cover 7

7. *Deschampsia cespitosa* (tufted hairgrass) with ≥ 15 percent canopy cover . . . . . ***Deschampsia cespitosa* (tufted hairgrass) Habitat Type (p. 322)**

7. *Deschampsia cespitosa* (tufted hairgrass) with < 15 percent canopy cover 8

8. *Agropyron smithii* (western wheatgrass) with ≥ 15 percent canopy cove . . . . . ***Agropyron smithii* (western wheatgrass) Habitat Type (p. 311)**

8. *Agropyron smithii* (western wheatgrass) with < 15 percent canopy cove 9

NOTE : The remaining type(s) represent disturbance communities, human-caused or otherwise; therefore, read the following instructions before continuing in this key.

a. If **any** shrub species are observed on the site, return to the shrub-dominated key and reduce all minimum canopy cover requirements in the key to "present" to determine a vegetation type.
b. If **no** shrub species are observed, return to the herbaceous-dominated key and reduce all minimum canopy cover requirements in the key to ≥ 5 percent to determine a vegetation type for the site.
c. If a vegetation type still cannot be determined for the site, return to this key and proceed to step 10.

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9. *Polygonum amphibium* (Water Smartweed) with a greater canopy cover than any other individual herbaceous species . . . . . ***Polygonum amphibium* (water smartweed) Community Type (p. 345)**

9. Other individual herbaceous species with a greater canopy cover than *Polygonum amphibium* (Water Smartweed) 10

10. *Sparganium emersum* (Simplestem Bur-reed) with a greater canopy cover than other individual herbaceous species . . . . . ***Sparganium emersum* (simplestem bur-reed) Community Type (p. 353)**

10. Other individual herbaceous species with a greater canopy cover than *Sparganium emersum* (Simplestem Bur-reed) 11

11. *Butomus umbellatus* (Flowering Rush) with a greater canopy cover than any other individual herbaceous species . . . . . ***Butomus umbellatus* (flowering rush) Community Type (p. 320)**

11. Other individual herbaceous species with a greater canopy cover than *Butomus umbellatus* (Flowering Rush) 12

12. *Juncus balticus* (Baltic rush) with a greater canopy cover than other individual herbaceous species . . . . . ***Juncus balticus* (Baltic rush) Community Type (p. 332)**

12. Other individual herbaceous species with a greater canopy cover than *Juncus balticus* (Baltic rush) 13

13. *Agrostis stolonifera* (redtop) with a greater canopy cover than any other individual herbaceous species . . . . . ***Agrostis stolonifera* (redtop) Community Type (p. 317)**

13. Other individual herbaceous species with a greater canopy cover than *Agrostis stolonifera* (redtop). 14

14. *Hordeum jubatum* (foxtail barley) with a greater canopy cover than other individual herbaceous species . . . . . ***Hordeum jubatum* (foxtail barley) Community Type (p. 330)**

14. Other individual herbaceous species with a greater canopy cover than Hordeum *jubatum* (foxtail barley) 15

15. *Poa pratensis* (Kentucky bluegrass) with a greater canopy cover than any other individual herbaceous species . . . . . ***Poa pratensis* (Kentucky bluegrass) Community Type (p. 341)**

15. Other individual herbaceous species with a greater canopy cover than *Poa pratensis* (Kentucky bluegrass) 16

16. *Wyethia amplexicaulis* (northern mule's-ears) with a greater canopy cover than other individual herbaceous species . . . . . ***Wyethia amplexicaulis* (northern mule's-ears) Community Type (p. 358)**

16. Other individual herbaceous species with a greater canopy cover than *Wyethia amplexicaulis* (Northern Mule's-ears) 17

17. Site **containing** at least **one** of the wetland attributes: hydric soils, hydrophytic vegetation, or wetland hydrology . . . . . **Unclassified Riparian/Wetland Site**

17. Site **lacking** at least **one** of the wetland attributes: hydric soils, hydrophytic vegetation, or wetland hydrology . . . . . **Upland Site**

DESCRIPTIONS OF HABITAT TYPES AND MAJOR SERAL COMMUNITY TYPES OF IDAHO

Abies lasiocarpa/Actaea rubra Habitat Type (Subalpine Fir/Baneberry Habitat Type)

ABILAS/ACTRUB (ABLA/ACRU)
Number Of Stands Sampled in Montana= 7

NOTE: The *Abies lasiocarpa/Actaea rubra* (subalpine fir/baneberry) habitat type has been documented in Idaho according to field surveys conducted in 1994. However, due to time constraints during the 1995 field season, homogeneous stand data could not be collected for this type. In the subsequent discussion, any references to physical site location and vegetation characteristics for this type in Idaho were interpreted from 1994 field surveys. The remainder of this description was taken from the Classification and Management of Montana's Riparian and Wetland Sites (Hansen and others 1995).

LOCATION AND ASSOCIATED LANDFORMS

The *Abies lasiocarpa/Actaea rubra* (subalpine fir/baneberry) habitat type is an incidental type at mid elevations in the mountains of central and eastern Idaho. Elevations of sampled sites range from 1,696 to 1,727 m (5,600 to 5,700 ft). This habitat type occurs on moist but drained alluvial terraces and lower slopes of V- and U-shaped canyons.

VEGETATION

Climax stands in Idaho are codominated by *Abies lasiocarpa* (subalpine fir) and *Pseudotsuga menziesii* (Douglas fir). Dominant shrubs often include *Cornus stolonifera* (red-osier dogwood), *Acer glabrum* (Rocky Mountain maple), and *Betula occidentalis* (water birch). Herbaceous species may consist of *Actaea rubra* (baneberry), *Poa pratensis* (Kentucky bluegrass), *Epilobium angustifolium* (fireweed), and *Geranium viscosissimum* (sticky geranium). Although *Actaea rubra* (baneberry) is present, it may not represent one of the primary understory species for this habitat type.

Climax stands in Montana are codominated by *Abies lasiocarpa* (subalpine fir), *Picea* spp. (spruce) and *Pseudotsuga menziesii* (Douglas fir). The shrub understory is dominated by *Spiraea betulifolia* (shiny-leaf spiraea) and *Symphoricarpos albus* (common snowberry). The herbaceous understory is dominated by *Carex geyeri* (elk sedge), *Arnica latifolia* (broadleaf arnica), *Actaea rubra* (baneberry), and *Thalictrum occidentale* (western meadowrue). *Actaea rubra* (baneberry) is the characteristic species and typically forms small clumps throughout the stands (Table 1). Table 1 reflects vegetation surveyed on sites in Montana only and may not accurately portray species composition and canopy cover for sites identified in Idaho but is provided here for reference purposes.

Table 1. Average canopy cover, range of canopy cover, and constancy for species in Montana recorded in late seral to climax stands of the *Abies lasiocarpa/Actaea rubra* (subalpine fir/baneberry) habitat type (number = 7 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Trees			
Abies lasiocarpa (subalpine fir)	32	20-40	100
Larix occidentalis (western larch)	20	0-20	20
Picea spp. (spruce)	45	0-60	80
Pinus contorta (lodgepole pine)	20	0-40	60
Pseudotsuga menziesii (Douglas fir)	31	0-60	80
Shrubs			
Acer glabrum (Rocky Mountain maple)	12	0-20	40
Alnus sinuata (Sitka alder)	1	0-1	20
Amelanchier alnifolia (western serviceberry)	1	0-3	60
Berberis repens (creeping oregongrape)	1	0-1	40
Cornus canadensis (bunchberry)	20	0-20	20
Cornus stolonifera (red-osier dogwood)	1	0-1	40
Linnaea borealis (twin flower)	1	0-1	40
Lonicera involucrata (twin-berry)	2	0-3	60
Lonicera utahensis (Utah honeysuckle)	1	0-1	80
Menziesia ferruginea (fool's huckleberry)	1	0-1	20
Pachistima myrsinites (mountain-boxwood)	3	0-3	20
Physocarpus malvaceus (mallow ninebark)	1	0-1	20
Ribes lacustre (swamp currant)	1	1-3	100
Rosa acicularis (prickly rose)	1	0-1	20
Rubus parviflorus(thimbleberry)	2	0-3	80
Salix scouleriana (Scouler willow)	1	0-1	40
Sambucus racemosa (red elderberry)	1	0-1	40
Shepherdia canadensis (Canada buffaloberry)	1	0-1	40
Sorbus scopulina (Cascade mountain-ash)	1	0-1	60
Spiraea betulifolia (shiny-leaf spiraea)	27	0-40	60
Symphoricarpos albus (common snowberry)	7	0-20	60
Vaccinium globulare (globe huckleberry)	12	0-20	40
Vaccinium myrtillus (dwarf bilberry)	1	0-1	20
Graminoids			
Bromus vulgaris (Columbia brome)	2	1-3	100
Carex concinnoides (northwestern sedge)	1	0-1	20
Carex geyeri (elk sedge)	12	0-20	40

Festuca occidentalis (western fescue)	1	0-1	40
Melica subulata (Alaska oniongrass)	2	0-3	40
Forbs			
Actaea rubra (baneberry)	13	1-20	100
Angelica arguta (sharptooth angelica)	1	0-1	20
Aquilegia flavescens (yellow columbine)	1	0-1	40
Arnica cordifolia (heart-leaf arnica)	1	0-1	20
Arnica latifolia (broadleaf arnica)	21	1-60	100
Aster conspicuus(showy aster)	1	0-1	60
Aster engelmannii (Engelmann's aster)	1	0-1	20
Aster foliaceus (leafy aster)	1	0-1	20
Calypso bulbosa (fairy-slipper)	1	0-1	20
Campanula rotundifolia (lady's-thimble)	1	0-1	20
Corallorhiza maculata (spotted coral-root)	1	0-1	20
Disporum trachycarpum (wartberry fairy-bell)	1	0-1	20
Epilobium angustifolium (fireweed)	1	0-1	60
Erythronium grandiflorum (glacier-lily)	1	0-1	60
Fragaria vesca (woods strawberry)	1	0-1	20
Fragaria virginiana (Virginia strawberry)	1	0-1	40
Galium boreale (northern bedstraw)	1	0-1	40
Galium triflorum (sweetscented bedstraw)	1	0-3	80
Geranium richardsonii (white geranium)	2	0-3	40
Goodyera oblongifolia (western rattlesnake-plantain)	1	0-3	80
Heracleum lanatum (cow parsnip)	2	0-3	40
Hieracium albiflorum (white-flowered hawkweed)	1	0-1	20
Hydrophyllum capitatum (ballhead waterleaf)	1	0-1	20
Lathyrus ochroleucus (cream-flowered peavine)	1	0-1	40
Listera caurina (western twayblade)	1	0-1	20
Mitella stauropetala (side-flowered mitrewort)	3	0-3	20
Mitella trifida (three-tooth mitrewort)	3	0-3	20
Myosotis sylvatica (wood forget-me-not)	1	0-1	20
Osmorhiza chilensis (mountain sweet-cicely)	1	1-3	100
Osmorhiza occidentalis (western sweet-cicely)	1	0-1	20
Pedicularis bracteosa (bracted lousewort)	1	0-1	60
Pedicularis racemosa (sickletop lousewort)	1	0-1	20
Pyrola asarifolia (pink wintergreen)	1	0-1	40
Pyrola chlorantha (green wintergreen)	1	0-1	20
Pyrola secunda (one-sided wintergreen)	1	1-3	100
Pyrola uniflora (woodnymph)	1	0-1	20
Senecio pseudaureus (streambank groundsel)	1	0-1	40
Smilacina racemosa (false spikenard)	1	0-1	60

Smilacina stellata (starry Solomon-plume)	1	0-3	60
Streptopus amplexifolius (clasping-leaved twisted stalk)	1	0-1	20
Taraxacum officinale (common dandelion)	1	0-1	20
Thalictrum occidentale (western meadowrue)	5	1-20	100
Tiarella trifoliata (trefoil foamflower)	1	0-1	20
Trillium ovatum (white trillium)	1	0-1	20
Urtica dioica (stinging nettle)	1	0-1	20
Valeriana dioica (northern valerian)	40	0-80	40
Veratrum viride (green false hellebore)	1	0-1	60
Vicia americana (American vetch)	1	0-1	40
Viola adunca (Hook violet)	1	0-1	20
Viola orbiculata (round-leaved violet)	1	0-3	80
Xerophyllum tenax (beargrass)	1	0-1	20
Zigadenus elegans (glaucous zigadenus)	1	0-1	20
Ferns and Allies			
Athyrium filix-femina (ladyfern)	1	0-1	20
Equisetum arvense (field horsetail)	1	0-1	20
Equisetum hyemale (common scouring-rush)	1	0-1	20

SOILS

Most soils are Mollisols or Entisols (Fluvents). Soils commonly develop from noncalcareous alluvial parent material. Soil texture varies but is typically very cobbley silt loam or sandy loam. Water tables are less than 1 m (39 in) below the soil surface for some part of the growing season. Some sites have organic layers greater than 50 cm (20 in) in depth.

ADJACENT COMMUNITIES

The *Abies lasiocarpa/Actaea rubra* (subalpine fir/baneberry) habitat type is one of the drier wetland types in the *Abies lasiocarpa* series, second only to *Abies lasiocarpa/Galium triflorum* (subalpine fir/sweetscented bedstraw) which generally occupies drier zones. Adjacent upland sites support other *Abies lasiocarpa* (subalpine fir) habitat types while adjacent wetter sites include wetland habitat types from the *Abies lasiocarpa* series.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Grazing potential is low.

Timber

Timber productivity is moderate to high. *Picea* (spruce) regeneration appears to occur readily wherever the shrub layer is reduced. However, *Abies lasiocarpa* (subalpine fir) regeneration may be sporadic. When present, *Pinus con-*

torta (lodgepole pine) and *Pseudotsuga menziesii* (Douglas fir) may be highly productive. Potentially high water tables during the spring and early summer may restrict the use of heavy equipment.

Wildlife

Forage productivity for big game is moderate and cover is low to moderate. This type's moderate forage productivity and proximity to streams results in moderately heavy use by moose.

Soil Management and Rehabilitation Opportunities

In spring, when water tables are highest, soils in this habitat type are most susceptible to compaction; developmental activities should be planned with this problem in mind.

Recreational Uses and Considerations

Old growth stands with large diameter trees have high recreational and aesthetic values, but site development should take into account the difficulty of managing sites with high water tables.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = forested wetland; Subclass = needle-leaved evergreen; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

OTHER STUDIES

The *Abies lasiocarpa/Actaea rubra* (subalpine fir/baneberry) habitat type represents the wet end of the *Abies lasiocarpa/Galium triflorum* (subalpine fir/sweetscented bedstraw) habitat type described by Pfister and others (1977) for Montana and Steele and others (1983) for eastern Idaho and western Wyoming. Stands from the wet end of the *Abies lasiocarpa/Galium triflorum* (subalpine fir/sweetscented bedstraw) habitat type described by Pfister and others (1977) were used in defining the *Abies lasiocarpa/Actaea rubra* (subalpine fir/baneberry) habitat type.

Abies lasiocarpa/Galium triflorum Habitat Type
(Subalpine Fir/Sweetscented Bedstraw Habitat Type)

ABILAS/GALTRI (ABLA/GATR3)
Number Of Stands Sampled in Montana= 10

NOTE: The *Abies lasiocarpa/Galium triflorum* (subalpine fir/sweetscented bedstraw) habitat type is suspected to occur in Idaho, although no stands were observed during the 1994 and 1995 field seasons. This description was

taken from the Classification and Management of Montana's Riparian and Wetland Sites (Hansen and others 1995).

LOCATION AND ASSOCIATED LANDFORMS

The *Abies lasiocarpa/Galium triflorum* (subalpine fir/sweetscented bedstraw) habitat type is a minor type in the mountains of central and eastern Montana. Sites are located on moist valley bottoms and occasionally near seeps. In dry mountain areas, sites are confined to stream bottoms. It occurs at middle elevations from approximately 1,439 to 2,440 m (4,720 to 8,000 ft).

VEGETATION

Picea (spruce) rather than *Abies lasiocarpa* (subalpine fir) is usually the overstory dominant in all but the oldest stands of this habitat type. In those stands with large amounts of *Picea* (spruce), the stand structure data indicates that *Abies lasiocarpa* (subalpine fir) is potentially the climax dominant. *Pseudotsuga menziesii* (Douglas fir) and *Pinus contorta* (lodgepole pine) are present in seral stands. Characteristic undergrowth species are *Galium triflorum* (sweetscented bedstraw), *Osmorhiza chilensis* (mountain sweet-cicely), *Angelica arguta* (sharptooth angelica), *Pyrola secunda* (one-sided wintergreen), and *Smilacina stellata* (starry Solomon-plume) (Table 2).

Table 2. Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax stands of the *Abies lasiocarpa/Galium triflorum* (subalpine fir/sweetscented bedstraw) habitat type (number = 5 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Trees			
Abies lasiocarpa (subalpine fir)	25	3-60	100
Picea spp. (spruce)	66	60-80	100
Pinus contorta (lodgepole pine)	12	0-20	40
Populus tremuloides (quaking aspen)	3	0-3	20
Pseudotsuga menziesii (Douglas fir)	20	0-20	20
Shrubs			
Acer glabrum (Rocky Mountain maple)	40	0-40	20
Amelanchier alnifolia (western serviceberry)	1	0-3	60
Arctostaphylos uva-ursi (kinnikinnick)	1	0-1	20
Berberis repens (creeping oregongrape)	2	0-3	80
Chimaphila umbellata (common Prince's pine)	1	0-1	20
Clematis occidentalis (Columbia clematis)	1	0-1	20
Cornus canadensis (bunchberry)	10	0-10	20
Cornus stolonifera (red-osier dogwood)	2	0-3	40
Crataegus douglasii (black hawthorn)	1	0-1	20
Juniperus communis (common juniper)	1	0-1	20

Ledum glandulosum (Labrador-tea)	3	0-3	20
Linnaea borealis (twinflower)	22	0-40	40
Lonicera involucrata (twin-berry)	2	0-3	60
Lonicera utahensis (Utah honeysuckle)	1	0-1	40
Menziesia ferruginea (fool's huckleberry)	3	0-3	20
Prunus virginiana (common chokecherry)	3	0-3	20
Rhamnus alnifolia (alder buckthorn)	3	0-3	20
Ribes lacustre (swamp currant)	1	0-1	80
Rosa acicularis (prickly rose)	1	0-1	60
Rubus parviflorus (thimbleberry)	3	0-3	20
Shepherdia canadensis (Canada buffaloberry)	3	0-3	20
Spiraea betulifolia (shiny-leaf spiraea)	8	0-20	60
Symphoricarpos albus (common snowberry)	8	0-20	60
Vaccinium globulare (globe huckleberry)	20	0-20	20
Vaccinium myrtillus (dwarf bilberry)	3	0-3	20
Vaccinium scoparium (whortleberry)	12	0-20	40
Graminoids			
Bromus carinatus (mountain brome)	2	0-3	40
Bromus ciliatus (fringed brome)	1	0-1	20
Bromus inermis (smooth brome)	1	0-1	20
Bromus vulgaris (columbia brome)	1	0-3	60
Calamagrostis canadensis (bluejoint reedgrass)	1	0-1	20
Calamagrostis rubescens (pinegrass)	8	0-20	60
Carex concinnoides (northwestern sedge)	1	0-1	20
Carex geyeri (elk sedge)	1	0-1	40
Carex leptalea (bristle-stalked sedge)	1	0-1	20
Elymus glaucus (blue wildrye)	1	0-1	80
Festuca occidentalis (western fescue)	1	0-1	20
Glyceria borealis (northern mannagrass)	1	0-1	20
Oryzopsis asperifolia (roughleaf ricegrass)	3	0-3	20
Forbs			
Actaea rubra (baneberry)	1	0-1	80
Allium cernuum (nodding onion)	1	0-1	20
Angelica arguta (sharptooth angelica)	1	1-3	100
Aquilegia flavescens (yellow columbine)	1	0-1	40
Arnica cordifolia (heart-leaf arnica)	3	0-3	60
Arnica latifolia(broadleaf arnica)	25	0-40	40
Aster conspicuus (showy aster)	14	0-40	60
Aster engelmannii (Engelmann's aster)	1	0-1	20
Aster foliaceus (leafy aster)	1	0-1	20
Aster laevis (smooth aster)	1	0-1	20

Aster modestus (few-flowered aster)	1	0-1	20
Campanula parryi (Parry's bellflower)	1	0-1	20
Campanula rotundifolia (lady's-thimble)	1	0-1	40
Castilleja miniata (scarlet paintbrush)	1	0-1	20
Cerastium arvense (field chickweed)	1	0-1	20
Disporum trachycarpum (wartberry fairy-bell)	1	0-1	60
Epilobium angustifolium (fireweed)	1	0-1	60
Fragaria vesca (woods strawberry)	1	0-1	20
Fragaria virginiana (Virginia strawberry)	1	0-1	80
Galium boreale (northern bedstraw)	1	0-1	60
Galium triflorum (sweetscented bedstraw)	1	1-3	100
Geranium richardsonii (white geranium)	1	0-1	60
Geranium viscosissimum (sticky geranium)	1	0-1	20
Geum macrophyllum (large-leaved avens)	1	0-1	20
Goodyera oblongifolia (western rattlesnake-plantain)	1	0-1	60
Habernaria saccata (slender bog-orchid)	1	0-1	20
Hedysarum sulphurescens (yellow hedysarum)	1	0-1	20
Heracleum lanatum (cow-parsnip)	1	0-1	40
Hieracium albiflorum (white-flowered hawkweed)	1	0-1	40
Mitella nuda (bare-stemed mitrewort)	10	0-10	20
Mitella stauropetala (side-flowered mitrewort)	1	0-1	20
Osmorhiza chilensis (mountain sweet-cicely)	1	1-3	100
Osmorhiza occidentalis (western sweet-cicely)	1	0-1	20
Pedicularis bracteosa (bracted lousewort)	1	0-1	20
Potentilla richardsonii (Richardson's pondweed)	20	0-20	20
Pyrola asarifolia (pink wintergreen)	1	0-1	60
Pyrola chlorantha (green wintergreen)	1	0-1	60
Pyrola secunda (one-sided wintergreen)	1	1-3	100
Pyrola uniflora (woodnymph)	1	0-1	40
Senecio pseudaureus (streambank groundsel)	1	0-1	20
Senecio triangularis (arrowleaf groundsel)	1	0-1	40
Smilacina racemosa (false spikenard)	1	0-1	40
Smilacina stellata (starry Solomon-plume)	1	1-1	100
Streptopus amplexifolius (clasping-leaved twisted-stalk)	1	0-1	40
Taraxacum officinale (common dandelion)	1	0-1	40
Thalictrum occidentale (western meadowrue)	10	0-20	80
Thalictrum venulosum (veiny meadowrue)	1	0-1	20
Trillium ovatum (white trillium)	1	0-1	20
Valeriana sitchensis (Sitka valerian)	1	0-1	20
Viola adunca (Hook violet)	1	0-1	20
Viola canadensis (Canada violet)	1	0-1	40

Viola orbiculata (round-leaved violet)	1	0-1	60
Xerophyllum tenax (beargrass)	1	0-1	20
Zigadenus elegans (glaucous zigadenus)	1	0-1	20
Ferns and Allies			
Botrychium virginianum (Virginia grape-fern)	1	0-1	40
Equisetum arvense (field horsetail)	25	0-80	80
Equisetum hyemale (common scouring-rush)	1	0-1	20

SUCCESSIONAL INFORMATION

Picea (spruce), *Pseudotsuga menziesii* (Douglas fir), and *Pinus contorta* (lodgepole pine) are usually present in seral stands.

On some sites where big game browse is fairly prevalent, big game have had a significant impact on secondary succession (Steele and others 1983). In some stands, overwintering moose may browse young *Abies lasiocarpa* (subalpine fir) to the point that succession is slowed dramatically. In these instances, the stands may superficially appear as *Pseudotsuga menziesii* (Douglas fir) or *Picea* (spruce) climax. Only close observation of these stands will reveal the remnants of *Abies lasiocarpa* (subalpine fir) as the indicated climax species. In other stands the greatest impacts may be on the major seral shrub species and *Populus tremuloides* (quaking aspen).

SOILS

Soils textures range from loams to silts. Gravels are largely absent from surface horizons. Sites may have surface water in early spring and generally remain moist throughout the summer. Duff layers averaged 6 cm (2.4 in) in depth. Soil reactions ranged from strongly acid to neutral.

ADJACENT COMMUNITIES

Wetter extremes of this habitat type are transitional to the *Abies lasiocarpa/Streptopus amplexifolius* (subalpine fir/clasping-leaved twisted stalk) habitat type, the *Abies lasiocarpa/Actaea rubra* (subalpine fir/baneberry) habitat type, or the *Abies lasiocarpa/Calamagrostis canadensis* (subalpine fir/bluejoint reedgrass) habitat type. Adjacent drier sites support a range of habitat types in the *Pseudotsuga menziesii* (Douglas fir), *Abies lasiocarpa* (subalpine fir), and *Picea engelmannii* (Engelmann spruce) series.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Forage value is moderate to high. Livestock may use this type for shade and bedding, especially where stands are near meadows and water. Grazing during wet periods, however, can churn the wet soil and destroy plant cover as well as limit conifer establishment.

Timber

Timber productivity is moderate. High water tables in spring may preclude logging activities at this time. Partial cutting generally favors *Abies lasiocarpa* (subalpine fir). *Picea* (spruce), *Pseudotsuga menziesii* (Douglas fir), and *Pinus contorta* (lodgepole pine) will be favored by complete stand removal, and may result in mixed stands depending upon the site and existing coniferous species.

Wildlife

Browse production and cover levels are good to excellent for elk, deer, bear, and moose. Good cover is also provided for upland game and small mammals. Overwintering moose can have a tremendous impact on seedlings of *Abies lasiocarpa* (subalpine fir) (see the discussion in the seral stages section of this habitat type). Reduction or elimination of the seral shrub species tends to hastens succession toward climax with less suitable food being available for big game (Steele and others 1983). In this case, logging or burning the stand may renew production of the browse species.

Soil Management and Rehabilitation Opportunities

Moist, fine textured soils are subject to early season compaction. Equipment should not be used on this type in spring or early summer when the soil is moist due to high water tables.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = forested wetland; Subclass = needle-leaved evergreen; Water Regime (nontidal) = temporarily flooded.

OTHER STUDIES

This habitat type represents a finer subdivision of the *Abies lasiocarpa/Galium triflorum* (subalpine fir/sweetscented bedstraw) habitat type described by Pfister and others (1977) for Montana. The *Abies lasiocarpa/Galium triflorum* (subalpine fir/sweetscented bedstraw) habitat type from the 1977 document *Forest Habitat Types of Montana* by Pfister and others was redefined with some stands becoming part of either the *Abies lasiocarpa/Actaea rubra* (subalpine fir/baneberry) habitat type or the *Abies lasiocarpa/Streptopus amplexifolius* (subalpine fir/twisted stalk) habitat type described in this document.

Abies lasiocarpa/Streptopus amplexifolius Habitat Type
(Subalpine Fir/Twisted Stalk Habitat Type)

ABILAS/STRAMP (ABLA/STAM2)

Number Of Stands Sampled = 4

LOCATION AND ASSOCIATED LANDFORMS

The *Abies lasiocarpa/Streptopus amplexifolius* (subalpine fir/twisted stalk) habitat type is a minor type at mid to upper elevations in mountains and valleys of Idaho. Elevations of sampled sites range from 1,550 to 2,182 m (5,115 to 7,200 ft). This type occurs along slopes with seeps/springs, on subirrigated alluvial terraces, or may occupy zones along small streams and rivers in U- and V-shaped canyons.

VEGETATION

Abies lasiocarpa (subalpine fir) and *Pseudotsuga menziesii* (Douglas fir) codominate late seral stands sampled in Idaho. At the climax stage, *Abies lasiocarpa* (subalpine fir) may form dense canopies in both the upper and middle structural layers, shading out most understory species. Where the canopy is more open, *Amelanchier alnifolia* (western serviceberry), *Rosa woodsii*(woods rose), and *Rubus parviflorus* (thimbleberry) may dominate the understory. Characteristic herbaceous species include *Thalictrum occidentale* (western meadowrue), *Galium triflorum* (sweetscented bedstraw), *Osmorhiza chilensis* (mountain sweet-cicely), *Geranium viscosissimum* (sticky geranium) and *Arnica cordifolia* (heart-leaf arnica) (Table 3). Although *Streptopus amplexifolius* (twisted stalk) is the signature species and represents one of the main indicator understory species for this type in Montana, it was not observed in any of the sampled stands in Idaho. This discrepancy may be the result of the limited number of stands observed. Additional sites need to be studied to determine if this trend continues, requiring modification to the type description.

Table 3. Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax stands of the *Abies lasiocarpa/Streptopus amplexifolius* (subalpine fir/twisted stalk) habitat type (number = 4 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Trees			
Abies lasiocarpa (subalpine fir)	55	40-80	100
Pinus contorta (lodgepole pine)	<1	0-1	50
Populus tremuloides (quaking aspen)	3	0-10	25
Pseudotsuga menziesii (Douglas fir)	30	0-80	75
Shrubs			
Acer glabrum (Rocky Mountain maple)	10	0-20	50
Acer grandidentatum(bigtooth maple)	<1	0-1	25
Amelanchier alnifolia (western serviceberry)	6	0-10	75
Arctostaphylos uva-ursi (kinnikinnick)	3	0-10	25
Berberis repens (creeping Oregon grape)	2	0-3	50
Chimaphila menziesii (little Prince's pine)	1	0-3	25
Clematis occidentalis (Columbia clematis)	1	0-3	25
Cornus stolonifera (red-osier dogwood)	1	0-3	25
Pachistima myrsinites (mountain-boxwood)	1	0-3	25
Prunus virginiana (common chokecherry)	<1	0-1	25

Ribes lacustre (swamp currant)	2	0-3	50
Ribes viscosissimum (sticky currant)	2	0-3	75
Rosa woodsii (woods rose)	5	0-10	75
Rubus parviflorus (thimbleberry)	8	0-20	75
Sambucus racemosa (red elderberry)	1	0-3	25
Shepherdia canadensis (Canada buffaloberry)	<1	0-1	25
Sorbus scopulina (Cascade mountain-ash)	5	0-20	25
Spiraea betulifolia (shiny-leaf spiraea)	5	0-20	25
Symphoricarpos albus (common snowberry)	5	0-20	25
Symphoricarpos occidentalis (western snowberry)	2	0-3	50
Symphoricarpos oreophilus (mountain snowberry)	<1	0-1	25
Vaccinium membranaceum (big huckleberry)	1	0-3	25
Graminoids			
Agropyron repens (quackgrass)	3	0-10	25
Agrostis stolonifera (redtop)	<1	0-1	25
Calamagrostis rubescens (pinegrass)	5	0-20	25
Calamagrostis stricta (narrow-spiked reedgrass)	1	0-3	25
Carex geyeri (elk sedge)	1	0-3	25
Carex raynoldsii (Raynold's sedge)	<1	0-1	25
Elymus cinerus (basin wildrye)	<1	0-1	25
Elymus glaucus (blue wildrye)	1	0-3	25
Festuca subulata (bearded fescue)	1	0-3	25
Grass perennial (perennial grass)	1	0-3	25
Melica spectabilis (showy oniongrass)	<1	0-1	25
Phleum alpinum (alpine timothy)	<1	0-1	25
Poa pratensis (Kentucky bluegrass)	1	0-3	25
Forbs			
Achillea millefolium (common yarrow)	2	0-3	75
Aconitum columbianum (Columbian monkshood)	<1	0-1	25
Actaea rubra (baneberry)	2	0-3	50
Arnica cordifolia (heart-leaf arnica)	2	0-3	75
Arnica latifolia (broadleaf arnica)	1	0-3	25
Aster engelmannii (Engelmann's aster)	1	0-3	25
Aster modestus (few-flowered aster)	<1	0-1	25
Aster occidentalis (western aster)	<1	0-1	25
Circaea alpina (enchanter's nightshade)	1	0-3	25
Claytonia lanceolata (western springbeauty)	<1	0-1	25
Collinsia parviflora (small-flowered blue-eyed mary)	<1	0-1	25
Delphinium nuttallianum (Nuttall's larkspur)	<1	0-1	25
Disporum trachycarpum (wartberry fairy-bell)	2	0-3	75
Epilobium angustifolium (fireweed)	<1	0-1	25

Epilobium ciliatum (common willow-herb)	<1	0-1	25
Erythronium grandiflorum (glacier-lily)	1	0-3	25
Fragaria virginiana (Virginia strawberry)	2	0-3	75
Galium triflorum (sweetscented bedstraw)	7	0-20	75
Geranium viscosissimum (sticky geranium)	3	0-10	75
Geum macrophyllum (large-leaved avens)	1	0-3	25
Heracleum lanatum (cow-parsnip)	<1	0-1	25
Hydrophyllum capitatum (ballhead waterleaf)	<1	0-1	25
Lithophragma parviflorum (smallflower woodlandstar)	<1	0-1	25
Lomatium ambiguum (swale desert-parsley)	1	0-3	25
Lupinus polyphyllus (many-leaved lupine)	1	0-3	25
Mitella breweri (Brewer's mitrewort)	2	0-3	75
Nepeta cataria (catnip)	<1	0-1	25
Osmorhiza chilensis (mountain sweet-cicely)	6	0-10	75
Osmorhiza occidentalis (western sweet-cicely)	<1	0-1	25
Pedicularis bracteosa (bracted lousewort)	<1	0-1	25
Potentilla gracilis (slender cinquefoil)	1	0-3	25
Pyrola elliptica (white wintergreen)	<1	0-1	25
Ranunculus spp.(buttercup)	1	0-3	25
Senecio foetidus (sweet-marsh butterweed)	<1	0-1	25
Silene menziesii (Menzies' silene)	3	0-10	25
Smilacina racemosa (false spikenard)	2	0-3	50
Smilacina stellata (starry Solomon-plume)	1	0-3	25
Stellaria jamesiana (sticky starwort)	1	0-	25
Taraxacum officinale (common dandelion)	1	0-3	50
Thalictrum occidentale (western meadowrue)	6	3-10	100
Urtica dioica (stinging nettle)	<1	0-1	25
Valeriana occidentalis (western valerian)	<1	0-1	25
Ferns and Allies			
Cystopteris fragilis (brittle bladder-fern)	1	0-3	25
Equisetum arvense (field horsetail)	<1	0-1	25
Gymnocarpium dryopteris (oak-fern)	<1	0-1	25

SUCCESSIONAL INFORMATION

Populus tremuloides (quaking aspen) and *Pinus contorta* (lodgepole pine) occasionally appear with limited coverages in seral stands of *Abies lasiocarpa* (subalpine fir). *Pseudotsuga menziesii* (Douglas fir) represents a codominant in most late seral stands, but eventually declines as the stand succeeds toward climax. Slightly drier sites may contain *Pinus contorta* (lodgepole pine) while wetter sites might be populated with *Populus tremuloides* (quaking aspen) as a seral precursor to *Abies lasiocarpa* (subalpine fir).

SOILS

The typical litter/duff layer, primarily needles and small twigs, may reach a thickness of 10 cm (4 inches) or more, but is generally much thinner. The underlying organic layer, when present, may reach a depth of 15 cm (6 inches) but is often less than 7.5 cm. (3 inches). Boulders and large rocks are typically present near the surface, often underlying a silt layer that ranges from 2.5 to 45 cm (1-18 inches). Clay may or may not be a component; however, alluvial materials in the form of cobbles, gravels, and sands, may comprise 50 percent or more of the substratum. Steele and others (1983) concluded that parent materials are primarily granitics and basalt, but may include quartzite, and rhyolite. Water tables tend to be within 30 cm (1 foot)t of the ground surface for at least part of the year.

ADJACENT COMMUNITIES

Populus tremuloides (quaking aspen) and *Abies lasiocarpa* (subalpine fir) stands may converge where alpine seeps and springs surface. *Wyethia* spp. (mule's-ears) may occupy significant coverage as adjacent open meadows or as an understory component with *Populus tremuloides* (quaking aspen). Adjacent wetter communities include *Salix geyeriana* (Geyer willow) and *Betula occidentalis* (water birch). *Abies lasiocarpa* (subalpine fir), *Pinus contorta* (lodgepole pine) and/or *Pseudotsuga menziesii* (Douglas fir) often persist individually as homogeneous stands, or more often, as mosaics, on the adjacent uplands.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Forage value is high for this habitat type. Adjacent streams may act as another attractive feature for livestock. Grazing during wet periods can churn the wet soil and destroy plant cover as well as limit conifer establishment and should be avoided where possible.

Timber

Timber productivity for *Abies lasiocarpa* (subalpine fir) ranges from moderate, where cold air drainage is impeded and soils are saturated throughout the year, to high on sites with better drainage.

Blow down may be a hazard in this habitat type. Removal of decadent, old growth trees, leaving younger, windfirm species often leaves the Streamside Management Zone in better condition to withstand winds following logging. However, if retention of old growth for fish and wildlife habitat (including cavity dwelling birds) is a primary objective, then prescriptions must be designed to minimize blowdown (Hansen and others 1995). Cooper and others (1991) report that clear cutting will reduce the high probability of windthrow associated with partial cutting, but the resulting rise in water tables may produce herb-dominated meadows that reforest very slowly. Light selection cutting may avoid these problems, but heavy equipment use should be delayed until the late summer. Roads, trails, or other site development should be avoided. Cole (1983) showed trails crossing this habitat type to be in much poorer condition than those located in habitat types with better drainages.

Pseudotsuga menziesii (Douglas fir) is a major seral species while *Pinus contorta* (lodgepole pine) acts only in a

minor capacity. Even aged management offers greater promise for production of seral species. Partial cutting will lead to dominance by the less desirable climax species. Exposure of bare soil may be required for regeneration of *Pseudotsuga menziesii* (Douglas fir) (Hansen and others 1995).

Heavy partial cutting or harvesting of adjacent stands by even aged systems will accelerate windthrow of large trees. If large numbers of uprooted trees lead to water quality problems, then removal may be appropriate. Silvicultural prescriptions must be tempered by clearly defined, obtainable objectives and on site evaluation of existing stands (Hansen and others 1995).

Wildlife

Browse production and cover levels in early successional stages are good to excellent for elk, deer, bear, and moose. Good cover is also provided for upland game and small mammals. Elk and deer may use low elevation stands as winter range if snow depths are low. Overwintering moose can have a tremendous impact on seedlings of *Abies lasiocarpa* (subalpine fir). Reduction or elimination of the seral shrub species tends to hasten succession toward climax with less suitable food being available for big game (Steele and others, 1983). In this case, logging or burning the stand may renew production of the browse species.

Soil Management and Rehabilitation Opportunities

Moist, fine textured soils are subject to compaction and damage in spring and early summer when water tables are high. Heavy equipment should be restricted to this habitat type when soils have dried out or are frozen and snow covered to reduce the danger of soil compaction. Efforts to minimize displacement or disturbance of the soil surface during timber management activities should be made to maintain the high productivity of these sites (Hansen and others 1995).

Heavy equipment use should be delayed until the late summer. Roads, trails, or other site development should be avoided and should be located on adjacent uplands. Cole (1983) showed trails crossing this habitat type to be in much poorer condition than those located in habitat types with better drainage.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = forested wetland; Subclass = needle-leaved evergreen; Water Regime (nontidal) = seasonally flooded to saturated.

OTHER STUDIES

Hansen and others (1995) describe this type in Montana. Two phases are recorded for the *Abies lasiocarpa/ Streptopus amplexifolius* (subalpine fir/twisted stalk) habitat type: *Streptopus amplexifolius* (twisted stalk) phase and the *Menziesia ferruginea* (fool's huckleberry) phase. Neither *Menziesia ferruginea* (fool's huckleberry) nor *Streptopus amplexifolius* (twisted stalk) were observed in any stands in Idaho; therefore, both phases were rejected. Although

both indicator species are absent, stands in Idaho are very similar to those stands from Montana and the name has been preserved until additional sites can be studied to determine whether this type needs to be revised and whether any phases need to be resurrected. Both Cooper and others (1991) and Steele and others (1983) describe a series of *Abies lasiocarpa* (subalpine fir) habitat types for forests of northern and central Idaho, including *Abies lasiocarpa/Streptopus amplexifolius* (subalpine fir/twisted stalk). Only Steele and others (1983) distinguish the *Streptopus amplexifolius* (twisted stalk) phase which is currently used by Hansen and others (1995) and appears to match the type observed in Idaho.

Juniperus osteosperma Community Type
(Utah Juniper Community Type)

JUNOST (JUOS)
Number Of Observations in 1994= 6

LOCATION AND ASSOCIATED LANDFORMS

The *Juniperus osteosperma* (Utah juniper) community type occurs at mid to lower elevations in narrow mountain valleys and foothills of southern Idaho, primarily in the Burley District. Elevations range from 1,480 to 1,880 m (4,900 to 6,200 ft). The type forms narrow bands along streams of V-shaped canyons and adjacent to head water springs, often occupying drier riparian sites.

VEGETATION

The *Juniperus osteosperma* (Utah juniper) community type has a relatively open canopy with widely scattered individuals. The undergrowth is quite variable. Associated species include: *Salix exigua* (sandbar willow), *Artemisia tridentata* (big sagebrush), *Rosa woodsii* (woods rose), *Chrysothamnus nauseosus* (common rabbitbrush), *Bromus tectorum* (cheatgrass) and *Poa pratensis* (Kentucky bluegrass) (Table 4). The type occupies extremely dry regions, where trees and most shrub species persist only along the immediate streambank and channel.

Table 4. This table represents species recorded for stands of the *Juniperus osteosperma* (Utah juniper) community type in Idaho. Information in this table was derived from 1994 surveys of non-homogeneous stands of vegetation where more than one habitat or community type was often present. Coverages for this type could not be calculated due to the collection methods used at this time.

Species
Trees
Juniperus osteosperma (Utah juniper)
Shrubs

Amelanchier alnifolia (western serviceberry)
Artemisia cana (silver sagebrush
Artemisia tridentata (Big sagebrush)
Chrysothamnus nauseosus (common rabbitbrush)
Prunus virginiana (common chokecherry)
Ribes cereum (wax currant)
Ribes lacustre (swamp currant)
Ribes odoratum (buffalo currant)
Rosa woodsii (woods rose)
Salix exigua (sandbar willow)
Sambucus cerulea (blue elderberry)
Symphoricarpos occidentalis (western snowberry)

Graminoids

Agropyron cristatum (crested wheatgrass)
Agropyron spicatum (bluebunch wheatgrass)
Agrostis stolonifera (redtop)
Bromus tectorum (cheatgrass)
Poa pratensis (Kentucky bluegrass)

Forbs

Achillea millefolium (common yarrow)
Cirsium arvense (Canada thistle)
Medicago lupulina (black medic)
Nasturtium officinale (water-cress)
Rumex crispus (curly dock)
Taraxacum officinale (common dandelion)
Urtica dioica (stinging nettle)
Veronica anagallis-aquatica (water speedwell)
Verbascum thapsus (Common mullein)

SUCCESSIONAL INFORMATION

Populus tremuloides (quaking aspen), *Salix lutea* (yellow willow) and *Betula occidentalis* (water birch) may be earlier seral communities within the successional pathways that lead to the *Juniperus osteosperma* (Utah juniper) community type. *Juniperus osteosperma* (Utah juniper) often creates a mosaic patchwork with *Populus tremuloides* (quaking aspen) and various shrubs along stream systems, dominating those portions of the stream reaches that begin to desiccate over to time. As the riparian zone becomes drier and the deciduous trees and shrubs are unable to survive, *Juniperus osteosperma* (Utah juniper) persists as the sole remaining overstory species.

SOILS

Soils of this community type may have high water holding capacities. Alluvial silts, clays and fine sands often predominate (40-80 percent) in the upper soil solum, but fine and coarse gravels may comprise up to 40 percent of the lower substratum, promoting drainage. Boulders and large rocks are frequent, and cobbles are often present on site. This type is probably able to tolerate periodic flooding and high water tables, but may not survive prolonged inundation. It often occupies ephemeral streams where hydrologic flows become subsurface for portions of the year, especially during late summer and fall drought conditions. Fragipan clays may become cracked and split during this time of the year, possibly exposing roots and rhizomes.

ADJACENT COMMUNITIES

Adjacent wetter communities may be dominated by a variety of types including *Salix exigua* (sandbar willow), *Salix lutea* (yellow willow) and *Betula occidentalis* (water birch). Adjacent uplands are often dominated by *Artemisia tridentata* (Big sagebrush) and *Chrysothamnus nauseosus* (common rabbitbrush. *Juniperus osteosperma* (Utah juniper) generally occupies marginally riparian sites that persist along narrow stream corridors. Graminoids and sedges may flourish directly in or adjacent to the stream itself, but the riparian zone ends within a few feet of the streambank where sagebrush dominates.

MANAGEMENT INFORMATION

Livestock

Livestock do not appear to browse *Juniperus osteosperma* (Utah juniper). Although forage potential generally appears low, especially in steep sided canyons where access is precarious, this type receives an inordinate amount of use by cattle. The presence of sedges, grasses and palatable shrubs in a generally xeric environment, combined with a water source, results in significant disturbance to these communities, especially in the form of pugging and bank instability. Livestock use should be restricted where possible.

Timber

Due to the wide spacing of trees scattered throughout this community type, timber harvest activities appear to be uneconomical; however, *Juniperus osteosperma* (Utah juniper) may be the only form of wood in the area and may be of value for round wood products such as pencils and fence posts (Cronquist 1986). Regeneration is probably accomplished through the activity of birds passing seeds.

Wildlife

Deer use this type for forage and cover. *Juniperus osteosperma* (Utah juniper) may constitute the only source of shade where it is found, and represents a haven for birds and small mammals both as a source of food and cover.

Fire

Fire potential is low to moderate in this type. Young juniper trees are easily killed by fire primarily because of their small size, thin bark, and compact crown (Fischer and Bradley 1987). As juniper ages, the bark thickens and the crown develops a bushy, open growth form. A hot fire can kill or severely damage a tree, but the same tree may survive a cool fire. Low, spreading branches can provide a route for fire to enter the crown. Often large ju-

nipers have survived a number of fires (Hansen and others 1995).

Soil Management and Rehabilitation Opportunities

Although sands, gravels and cobbles are present, silts and clays that constitute the main body of soil in the *Juniperus osteosperma* (Utah juniper) type are susceptible to compaction. The type is generally restricted to the immediate streambank and channel, and the general absence of deep-rooted shrubs does little to strengthen bank stability. Destructive floods during the spring may further compound the problem of stability and water quality. Livestock and vehicular traffic should be restricted where possible.

Recreational Uses and Considerations

Stands of this community type are generally too small or too inaccessible to be used as developed campgrounds. However, juniper woodlands do provide excellent opportunities for nature study areas because of the diversity of wildlife associated with them (Hansen and others 1995). *Juniperus osteosperma* (Utah juniper) is also used as an ornamental throughout its native range (Cronquist 1986).

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = forested wetland; Subclass = needle-leaved evergreen; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

OTHER STUDIES

Steele and others (1981) refer to *Juniperus osteosperma* (Utah juniper) woodlands when discussing pinyon-juniper habitat types, but no other riparian or wetland communities for this particular vegetation type have been described elsewhere at this time.

Juniperus scopulorum/Cornus stolonifera Habitat Type
(Rocky Mountain Juniper/Red-Osier Dogwood Habitat Type)

JUNSCO (JUSC2)

Number Of Stands Sampled = 7

LOCATION AND ASSOCIATED LANDFORMS

The *Juniperus scopulorum/Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) habitat type is considered a major type at mid to lower elevations in valleys and foothills of Idaho. Elevations of sampled sites range from 1,030 to 1,940 m (3,400 to 6,400 ft). The type may form narrow, stringer communities paralleling stream bottoms of V-shaped canyons, or clumped stands near head water springs. Where it occurs adjacent to larger streams

and rivers on older alluvial floodplain benches, this type emerges as a matrix with other deciduous tree and shrub species in broad stands . In general, this habitat type is found on drier riparian sites.

VEGETATION

In Idaho, the *Juniperus scopulorum/Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) habitat type characteristically develops an open canopy of widely scattered *Juniperus scopulorum* (Rocky Mountain juniper) on broad alluvial benches. Mid/late seral stands may be dominated by *Populus angustifolia* (narrowleaf cottonwood) and/or *Populus trichocarpa* (black cottonwood). In narrow canyons and draws where *Juniperus scopulorum* (Rocky Mountain juniper) develops a closed canopy, other tree species are essentially absent, except for an occasional *Pseudotsuga menziesii* (Douglas fir). The undergrowth for this habitat type, which varies considerably from site to site, may include: *Cornus stolonifera* (red-osier dogwood), *Rosa woodsii* (woods rose), *Betula occidentalis* (water birch), *Ribes lacustre* (swamp currant), and *Poa pratensis* (Kentucky bluegrass). (Table 5).

Table 5. Average canopy cover, range of canopy cover, and constancy for species in Idaho recorded in mid/late seral to climax stands of the *Juniperus scopulorum/Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) habitat type (number = 7 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Trees			
Juniperus scopulorum (Rocky Mountain Juniper)	43	10-80	100
Populus angustifolia (Narrowleaf Cottonwood)	14	0-60	29
Shrubs			
Acer glabrum (Rocky Mountain Maple)	3	0-20	14
Acer grandidentatum (Bigtooth Maple)	<1	0-3	14
Amelanchier alnifolia (Western Serviceberry)	1	0-3	29
Arctostaphylos uva-ursi (Kinnikinnick)	1	0-10	14
Artemisia tridentata (Big Sagebrush)	<1	0-1	29
Berberis repens (Creeping Oregongrape)	1	0-10	14
Betula occidentalis (Water Birch)	4	0-20	43
Chrysothamnus nauseosus (Common Rabbitbrush)	<1	0-1	14
Chrysothamnus viscidiflorus (Green Rabbitbrush)	<1	0-3	14
Clematis ligusticifolia (Western Virgins-bower)	2	0-10	43
Cornus stolonifera (Red-osier Dogwood)	8	0-20	57
Crataegus douglasii (Black Hawthorn)	<1	0-1	14
Elaeagnus commutata (Silverberry)	3	0-20	14
Prunus virginiana (Common Chokecherry)	9	0-40	43
Purshia tridentata (Antelope Bitter-brush)	<1	0-1	14
Rhus aromatica (Fragrant Sumac)	3	0-20	14

Ribes lacustre (Swamp Currant)	<1	0-1	43
Ribes odoratum (Buffalo Currant)	<1	0-3	14
Rosa woodsii (Woods Rose)	5	0-20	71
Salix exigua (Sandbar Willow)	1	0-3	29
Salix lutea (Yellow Willow)	2	0-10	29
Sambucus cerulea (Blue Elderberry)	<1	0-3	14
Symphoricarpos albus (Common Snowberry)	<1	0-1	14
Symphoricarpos occidentalis (Western Snowberry)	9	0-60	29
Toxicodendron rydbergii (Poison Ivy)	<1	0-1	14
Graminoids			
Agropyron caninum (Bearded Wheatgrass)	1	0-3	43
Agropyron smithii (Western Wheatgrass)	3	0-20	29
Agrostis stolonifera (Redtop)	1	0-10	14
Bromus commutatus (Hairy Brome)	3	0-20	43
Bromus inermis (Smooth Brome)	2	0-10	29
Bromus japonicus (Japanese Brome)	4	0-30	14
Bromus tectorum (Cheatgrass)	9	0-60	43
Carex spp. (Sedge)	1	0-3	29
Dactylis glomerata (Orchard-grass)	10	0-70	14
Elymus cinereus (Basin Wildrye)	1	0-3	43
Elymus glaucus (Blue Wildrye)	<1	0-3	14
Elymus virginicus (Virginia Wildrye)	<1	0-1	14
Phleum pratense (Common Timothy)	<1	0-1	14
Poa palustris (Fowl Bluegrass)	1	0-10	14
Poa pratensis (Kentucky Bluegrass)	8	0-20	86
Forbs			
Achillea millefolium (Common Yarrow)	<1	0-1	14
Apocynum androsaemifolium (Spreading Dogbane)	<1	0-3	14
Arabis spp. (Rockcress)	<1	0-1	14
Arabis hirsuta (Hairy Rockcress)	<1	0-1	14
Arabis holboellii (Holboell's Rockcress)	<1	0-1	14
Arctium minus (Common Burdock)	<1	0-3	14
Arnica longifolia (Longleaf Arnica)	<1	0-1	14
Aster chilensis (Long-leaved Aster)	3	0-20	14
Aster spp. (Aster)	<1	0-1	14
Camelina microcarpa (Littlepod Falseflax)	<1	0-1	14
Cirsium arvense (Canada Thistle)	2	0-10	29
Cirsium spp. (Thistle)	<1	0-1	14
Cirsium vulgare (Bull Thistle)	<1	0-1	14
Collomia linearis (Narrow-leaf Collomia)	<1	0-1	14
Cynoglossum officinale (Common Hound's-tongue)	1	0-3	43

Erigeron glabellus (Smooth Daisy)	<1	0-1	29
Eriogonum heracleoides (Wyeth Buckwheat)	<1	0-1	14
Forb (Forb)	<1	0-1	29
Galium triflorum (Sweetscented Bedstraw)	2	0-10	43
Glycyrrhiza lepidota (American Licorice)	2	0-10	29
Heracleum lanatum (Cow-parsnip)	<1	0-3	14
Lactuca serriola (Prickly Lettuce)	2	0-10	43
Lappula redowskii (Western Stickseed)	<1	0-3	14
Nepeta cataria (Catnip)	<1	0-3	14
Osmorhiza chilensis (Mountain Sweet-cicely)	3	0-10	29
Senecio serra (Tall Butterweed)	<1	0-3	14
Sisymbrium loeselii (Loeselii Tumblemustard)	<1	0-1	14
Smilacina racemosa (False Spikenard)	<1	0-3	14
Smilacina stellata (Starry Solomon-plume)	5	0-30	29
Solidago canadensis (Canada Goldenrod)	1	0-3	29
Solidago missouriensis (Missouri Goldenrod)	<1	0-1	14
Taraxacum officinale (Common Dandelion)	1	0-3	29
Tragopogon dubius (Goat's Beard)	1	0-3	57
Trifolium spp. (Clover)	3	0-20	14
Ferns and Allies			
Equisetum laevigatum (Smooth Scouring-rush)	<1	0-3	14

SUCCESSIONAL INFORMATION

Seral stands of this type may be dominated by the *Populus trichocarpa* (black cottonwood), *Populus angustifolia* (narrowleaf cottonwood), or various shrub species, such as *Salix* spp. (willows) or *Betula occidentalis* (water birch). In these seral stands, *Juniperus scopulorum* (Rocky Mountain juniper) will be present and successfully reproducing, but may only dominate the understory, especially in mature *Populus trichocarpa* (black cottonwood) and *Populus angustifolia* (narrowleaf cottonwood) forests. Stands may persist in this state for decades, but eventually the shade-tolerant *Juniperus scopulorum* (Rocky Mountain juniper) will prevail as the dominant tree species, barring severe disturbance.

SOILS

The *Juniperus scopulorum/Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) habitat type in Idaho appears on a variety of locations across the landscape. On rocky slopes in V-shaped canyons, only a shallow layer of silt/loam 2.5-15 cm (1-6 in) deep may cover the underlying rocky substrate. The litter /duff layer, when present, is shallow, 5 cm (2 inches) or less, and composed primarily of needles. Alluvial floodplains are characterized by silts, clays and sand often 60 cm (24 inches) or more deep, overlying gravels, cobbles or larger rocks. Hansen and others (1995) indicate that this habitat type is intolerant of frequent and prolonged flooding. However, the type is tolerant of periodic flooding and high water tables. Soils of this habitat type, typically Mollisols, Entisols (Fluvents), or Inceptisols, are generally well drained and have a low water holding capacity. Coarse textured soils

and moderate stream gradients provide an environment that produces a rapid movement of highly aerated groundwater.

ADJACENT COMMUNITIES

Pseudotsuga menziesii (Douglas fir), *Juniperus scopulorum* (Rocky Mountain juniper) and *Acer grandidentatum* (bigtooth maple) communities may occupy adjacent uplands. *Artemisia tridentata* (big sagebrush) shrubland/grasslands are often present on plateaus adjacent to canyon sites, or at the edge of secondary riverine floodplains. Adjacent wet-site communities may be dominated by *Salix exigua* (sandbar willow), *Salix lutea* (yellow willow), or *Betula occidentalis* (water birch) types. The *Juniperus scopulorum/Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) habitat type may actually be quite narrow in some locations and may convert to an upland community rapidly. Indicator species are vital for determining the often abrupt transition from riparian to upland communities.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Forage production ranges from low for stands in steep sided canyons, to moderate on sandy floodplains. Stands are typically very droughty, thereby reducing forage production. *Juniperus scopulorum* (Rocky Mountain juniper) is not very palatable to livestock, but young plants can be eliminated by grazing. *Cornus stolonifera* (red-osier dogwood) is considered an "ice cream" plant by livestock and wildlife and its utilization is a direct indication of past and current use levels. In some areas, livestock browsing of *Cornus stolonifera* (red-osier dogwood) may be quite high (Hansen and others 1995). Long term utilization may result in the loss of native species and subsequent replacement by weedy invaders.

Timber

Other than fenceposts and pencils, *Juniperus scopulorum* (Rocky Mountain juniper) is considered primarily an ornamental species and generally unproductive for timber harvest activities (Hitchcock and Cronquist 1973).

Wildlife

Moose and deer use this type for forage and cover. Stands of the *Juniperus scopulorum/Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) habitat type provide good to excellent structural diversity for both thermal and hiding cover. The berry-like cones of *Juniperus scopulorum* (Rocky Mountain juniper) are an excellent source of food for small mammals and birds. Birds often relish this species, especially in the winter (Arno and Hammerly 1984).

Fire

Fire potential is low to moderate in this type. Young juniper trees are easily killed by fire primarily because of their small size, thin bark, and compact crown (Fischer and Bradley 1987). As juniper ages, the bark thickens and the crown develops a bushy, open growth form. A hot fire can kill or severely damage a tree, but the same tree may survive a cool fire. Low, spreading branches can provide a route for fire to enter the crown. Often large ju-

nipers have survived a number of fires (Hansen and others 1995).

Soil Management and Rehabilitation Opportunities

Typically, these soils have weak structures, low organic matter contents, coarse textures, and thus, low water holding capacities. The high component of coarse textured fragments in the soil make it relatively impervious to compaction. Other less drought resistant, more preferred, forage species associated with this habitat type can be easily disturbed with moderate animal use and can cause an increase of *Juniperus scopulorum* and invader species.

Recreational Uses and Considerations

Although stands of this habitat type are often small , especially when occupying steep slopes, they may be developed for the purposes of camping and recreational fishing when growing on flat alluvial benches along rivers and streams. Additionally, they may provide excellent opportunities for nature study because of the diversity of wildlife associated with them. However, fire hazard is a serious consideration because even a light fire can kill stands of *Juniperus scopulorum* (Rocky Mountain juniper).

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = forested wetland; Subclass = needle-leaved evergreen; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

OTHER STUDIES

Similar communities have been described for this type in Montana by Hansen and others (1995).

Picea/Cornus stolonifera Habitat Type
(Spruce/Red-Osier Dogwood Habitat Type)

PICEA/CORSTO (PICEA/COST4)

Number Of Stands Sampled = 3

LOCATION AND ASSOCIATED LANDFORMS

The *Picea/Cornus stolonifera* (red-osier dogwood) habitat type is a minor type at mid to higher elevations in Idaho. Elevations of sampled sites range from 1,848 to 2,303 m (6,100 to 7,600 ft). This type occupies flat alluvial terraces bordering mountain streams or moist toe slopes in U- and V-shaped canyons. In some instances, it may inhabit bogs along lakeshores.

VEGETATION

Stands of the *Picea/Cornus stolonifera* (spruce/red-osier dogwood) habitat type in Idaho are dominated by *Picea* (spruce) in the upper canopy. *Abies lasiocarpa* (subalpine fir), *Pinus contorta* (lodgepole pine), and *Pseudotsuga menziesii* (Douglas fir) represent only minor components when actually present on site. The understory may be dominated by *Ribes lacustre* (swamp currant) and various *Salix* spp. (willows), with *Lonicera involucrata* (Twin-berry) and *Cornus stolonifera* (red-osier dogwood) less well represented. Abundant herbaceous species include *Actaea rubra* (baneberry), *Fragaria virginiana* (Virginia strawberry), *Thalictrum occidentale* (western meadowrue), *Calamagrostis inexpansa* (Northern Reedgrass) and *Senecio triangularis* (arrowleaf groundsel). Where the overstory is dense, the herbaceous component may be sparse and characterized by low vigor. While species richness is relatively high within each of the canopy layers, covers and constancy for the individual species are actually low; however, the low number of sites sampled may account for this phenomenon.

NOTE : The treatment of *Picea* in this classification, which terminates identification at the genus level, derives from the hybridization known to occur within this particular conifer. Most populations of *Picea* in Montana are hybrids derived from *Picea glauca* and *Picea englemanii* (Daubenmire 1974, Habeck and Weaver 1969). The hybrid cross appears to predominate in Idaho forests as well. However, Pfister and others indicate that the extent of hybridization between *Picea glauca* and *Picea englemanii* can be detected according to the size and shape of cone scales and should be noted due to its potential value for silvicultural purposes. A unique community of *Picea glauca* persists along the periphery of Henry's Lake in the northeast corner of Idaho adjacent to the Montana and Wyoming borders. This association persists between bog/floating mat environments and appears as a relict community. It has been included within the *Picea* series because it keys to the *Picea / Corsto* (Spruce/Red-osier Dogwood) Habitat Type, but it may represent a rare community. This site and the surrounding environs should be examined during subsequent inventories to properly define the complex nature of this area.

Table 6. Average canopy cover, range of canopy cover, and constancy for species recorded in sampled stands of the *Picea/Cornus stolonifera* (red-osier dogwood) habitat type (number = 3 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Trees			
Abies lasiocarpa (Subalpine Fir)	1	0-3	33
Juniperus scopulorum (Rocky Mountain Juniper)	<1	0-1	33
Picea spp. (Spruce)	50	50-50	100
Pseudotsuga menziesii (Douglas Fir)	<1	0-1	33
Shrubs			
Amelanchier alnifolia (Western Serviceberry)	1	0-3	33
Berberis repens (Creeping Oregongrape)	1	0-3	33
Cornus stolonifera (Red-osier Dogwood)	2	0-3	67
Linnaea borealis (Twinflower)	1	0-3	33
Lonicera involucrata (Twin-berry)	1	0-3	67
Lonicera utahensis (Utah Honeysuckle)	<1	0-1	33

Ribes lacustre (Swamp Currant)	7	1-10	100
Rosa woodsii (Woods Rose)	1	0-3	33
Rubus parviflorus (Thimbleberry)	7	0-20	33
Salix bebbiana (Bebb Willow)	1	0-3	33
Salix boothii (Booth Willow)	10	0-20	67
Salix geyeriana (Geyer Willow)	1	0-3	33
Sambucus cerulea (Blue Elderberry)	<1	0-1	33
Shepherdia canadensis (Canada Buffaloberry)	3	0-10	33
Spiraea betulifolia (Shiny-leaf Spiraea)	1	0-3	33
Symphoricarpos albus (Common Snowberry)	3	0-10	33
Vaccinium membranaceum (Big Huckleberry)	<1	0-1	33
Graminoids			
Bromus carinatus (Mountain Brome)	<1	0-1	33
Calamagrostis inexpansa (Northern Reedgrass)	8	0-20	67
Carex aquatilis (Water Sedge)	10	0-30	33
Carex disperma (Soft-leaved Sedge)	7	0-20	33
Carex spp. (Sedge)	3	0-10	33
Carex raynoldsii (Raynolds' Sedge)	<1	0-1	33
Carex vesicaria (Inflated Sedge)	7	0-20	33
Elymus canadensis (Canada Wildrye)	3	0-10	33
Festuca scabrella (Rough Fescue)	7	0-20	33
Grass annual (Annual Grass)	1	0-3	33
Poa pratensis (Kentucky Bluegrass)	3	0-10	33
Forbs			
Achillea millefolium (Common Yarrow)	1	0-3	33
Aconitum columbianum (Columbian Monkshood)	<1	0-1	33
Actaea rubra (Baneberry)	8	0-20	67
Allium brevistylum (Short-style Onion)	3	0-10	33
Arenaria lateriflora (Bluntleaf Sandwort)	<1	0-1	33
Arnica cordifolia (Heart-leaf Arnica)	1	0-3	33
Asperula odorata (sweet woodruff)	1	0-3	33
Aster spp. (Aster)	1	0-3	33
Astragalus miser (Weedy Milk-vetch)	1	0-3	33
Cardamine pensylvanica (Pennsylvania Bittercress)	<1	0-1	33
Cicuta maculata (Spotted Water-hemlock)	1	0-3	33
Epilobium ciliatum (Common Willow-herb)	<1	0-1	33
Fragaria virginiana (Virginia Strawberry)	5	3-10	100
Galium boreale (Northern Bedstraw)	1	0-3	33
Galium trifidum (Small Bedstraw)	<1	0-1	33
Geranium richardsonii (White Geranium)	1	0-3	33
Geranium viscosissimum (Sticky Geranium)	4	0-10	67

Geum macrophyllum (Larged-leaved Avens)	1	0-3	67
Heracleum lanatum (Cow-parsnip)	7	0-20	33
Ligusticum filicinum (Fearn-leaf Lovage)	<1	0-1	33
Mertensia ciliata (Mountain Bluebell)	<1	0-1	33
Mitella pentandra (Five-stamened Mitrewort)	3	0-10	33
Osmorhiza purpurea (Purple Sweet-cicely)	1	0-3	33
Parnassia fimbriata (Fringed Grass-of-parnassus)	3	0-10	33
Pedicularis bracteosa (Bracted Lousewort)	<1	0-1	33
Ranunculus gmelinii (Small Yellow Water-buttercup)	<1	0-1	33
Ranunculus spp. (Buttercup)	3	0-10	33
Rudbeckia occidentalis (Black Head)	1	0-3	33
Saxifraga arguta (Brook Saxifrage)	10	0-30	33
Senecio crassulus (Thick-leaved Groundsel)	7	0-20	33
Senecio triangularis (Arrowleaf Groundsel)	4	0-10	67
Smilacina racemosa (False Spikenard)	1	0-3	33
Smilacina stellata (Starry Solomon-plume)	1	0-3	67
Solidago spp. (Goldenrod)	1	0-3	33
Streptopus amplexifolius (Clasping-leaved Twisted-stalk)	3	0-10	33
Taraxacum officinale (Common Dandelion)	8	0-20	67
Thalictrum occidentale (Western Meadowrue)	8	0-20	67
Trifolium repens (White Clover)	7	0-20	33
Veronica americana (American Speedwell)	7	0-10	67
Viola nephrophylla (Northern Bog Violet)	1	0-3	33
Ferns and Allies			
Equisetum arvense (Field Horsetail)	3	0-10	33
Equisetum laevigatum (Smooth Scouring-rush)	1	0-3	33
Equisetum palustre (Marsh Horsetail)	7	0-20	33

SUCCESSIONAL INFORMATION

Pseudotsuga menziesii (Douglas fir), *Populus tremuloides* (quaking aspen) and *Populus trichocarpa* (Black cottonwood) appear to act as seral stages within the *Picea* (spruce) successional pathways. On wetter sites, *Salix* spp. (willows) may represent a major component, if not the dominant vegetation, preceding the eventual occupation by *Picea* (spruce). Hansen and others (1995) indicate that *Picea* (spruce) reestablishes quickly on disturbed sites but assumes dominance slowly. This pattern may result in mixed forested stands dominated by other tree species in which the *Picea* (spruce) cover varies dramatically.

SOILS

Rich, black, organic soils, indicative of Mollisols, may be 60 cm (24 in) or more deep. Due to suspected year round surface and subsurface flows, these soils may exhibit gleying, the reduction of iron under predominantly anaero-

bic conditions producing a bluish- green cast, or mottling, the presence of brown, yellow or reddish flecks of concentrated iron formed through alternating oxidizing/reducing conditions due to fluctuating water tables (Buol and others 1989). Soil textures are predominantly loamy silts and silts, but may exhibit a high component of decomposing woody debris. The presence of the organics and coarser fragments may partially be the result of alluvial transport. Underlying substrates often consist of alluvial cobbles, gravels and sands.

ADJACENT COMMUNITIES

The *Picea/Cornus stolonifera* (spruce/red-osier dogwood) habitat type occupies an intermediate position along a moisture gradient within the *Picea* (spruce) series. The *Picea/Equisetum arvense* (spruce/field horsetail) habitat type indicates saturated or wetter conditions while the *Picea/Galium triflorum* (spruce/sweetscented bedstraw) habitat type occurs on drier sites. Adjacent wetter communities are dominated by *Carex* spp. (sedges), *Salix* species (willow) and *Populus tremuloides* (quaking aspen). *Pseudotsuga menziesii* (Douglas fir) and *Pinus contorta* (lodgepole pine) prevail on the upland slopes.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Herbage production is low to moderate where the overstory is dense, and tends to limit forage availability for livestock. Where stands are more open, especially under late seral conditions, lush undergrowth may provide excellent forage. Seasonally wet conditions, or year round saturation where this type is located adjacent to springs or seeps, may require special restrictions to prevent soil compaction (see the Soil Management and Rehabilitation Opportunities section)(Hansen and others 1995).

Timber

Timber productivity ranges from moderate to high. However, streamside locations and high water tables may restrict timber harvest. Partial cutting will favor *Picea* (spruce) while complete stand removal will result in mixed stands of *Pseudotsuga menziesii* (Douglas fir) and *Pinus contorta* (lodgepole pine) along with *Picea engelmannii* (Engelmann spruce). Uneven aged management should be considered as a possible silvicultural system in this habitat type (Hansen and others 1995).

Wildlife

Hansen and others (1995) indicate that deer and elk appear to use this type as winter range. Some of the broad, flat mountain valleys associated with this type may be prime year-long moose habitat. Some sites may show sustained heavy use by moose and elk. *Cornus stolonifera* (red-osier dogwood) is considered an "ice cream" plant by wildlife and livestock. Its utilization is a direct indication of past and current use levels. In some areas, livestock browsing of *Cornus stolonifera* (red-osier dogwood) may be quite high.

Fisheries

Those stands of the *Picea/Cornus stolonifera* (spruce/red-osier dogwood) habitat type adjacent to streams provide hiding, thermal cover, debris recruitment, and streambank stability for fish. *Cornus stolonifera* (red-osier dog-

wood) is an excellent shrub for controlling erosion along streams. This is particularly important on the higher gradient streams where scouring by seasonal flooding is possible (Hansen and others 1995).

Fire

Fire susceptibility is low. However, *Picea engelmannii* (Engelmann spruce), including hybrids with *Picea glauca* (white spruce), is easily killed by fire (Fischer and Bradley 1987). The dead, dry, flammable lower limbs, low growing canopy, thin bark, and lichen growth in the branches contribute to the species' low resistance. The shallow root system is readily subject to injury from fire burning through the duff. Large older trees may occasionally survive one or more light fires, but deep accumulations of resinous needle litter around their bases usually make them very susceptible to fire damage (Hansen and others 1995).

Cornus stolonifera (red-osier dogwood) and the associated shrub species can survive all but the most severe fires that remove duff and cause extended heating of the upper layer of soil. After a fire, the shrubs sprouts from the surviving rhizomes or stolons (runners) (Fischer and Bradley 1987).

Soil Management and Rehabilitation Opportunities

Machinery and livestock easily compact or otherwise damage the soil during periods with high water tables. Poorly drained sites, stream side locations, or sites with organic soils should also warrant special concern. Roads and trails should be located on the adjacent uplands (Hansen and others 1995).

Recreational Uses and Considerations

Because of high water tables and the problems with road construction, campgrounds should not be located in this type.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = forested wetland; Subclass = needle-leaved evergreen; Water Regime (nontidal) = temporarily flooded.

OTHER STUDIES

Similar communities have been described for eastern Idaho and western Wyoming (Youngblood and others 1985b), for Utah and southeastern Idaho (Padgett and others 1989), and for the state of Montana. (Hansen and other 1995).

Picea/Equisetum arvense Habitat Type
(Spruce/Field Horsetail Habitat Type)

PICEA/EQUARV (PICEA/EQAR)

Number Of Stands Sampled in Montana= 15

NOTE: The *Picea/Equisetum arvense* (spruce/field horsetail) habitat type is suspected to occur in Idaho, although no stands were observed during the 1994 and 1995 field seasons. This description was taken from the Classification and Management of Montana's Riparian and Wetland Sites (Hansen and others 1995).

LOCATION AND ASSOCIATED LANDFORMS

The *Picea/Equisetum arvense* (spruce/field horsetail) habitat type is a minor type at low to mid elevations throughout the mountains and valleys of Montana. It may be locally abundant. Elevations of sampled sites range from 878 to 2,257 m (2,880 to 7,400 ft). This type characteristically occurs on flat sites with poor drainage. It also occurs on gentle toeslopes, seeps, stream terraces, and on high elevation basins adjacent to small lakes, fens, and wet meadows having low gradient meandering streams. Boundaries with adjacent types are often distinct.

VEGETATION

Picea (spruce) is usually the only successful coniferous tree species, and typically forms a closed canopy. *Abies lasiocarpa* (subalpine fir) and *Pinus contorta* (lodgepole pine) are occasionally present on drier microsites such as windthrow hummocks. Shrub species richness is high but their coverage is low. Shrub species present include *Lonicera involucrata* (twin-berry). The canopy coverage of the herbaceous layer is high, dominated by *Equisetum arvense* (field horsetail) and *Smilacina stellata* (starry Solomon-plume). The sometimes extreme micro-relief generated by root crown hummocks and windthrow mounds accounts for a high species richness with a mixture of upland and wetland species (Table 7).

Table 7. Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax stands of the *Picea/Equisetum arvense* (spruce/field horsetail) habitat type (number = 15 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Trees			
Larix occidentalis (western larch)	1	0-1	13
Picea spp. (spruce)	66	40-80	100
Pinus contorta (lodgepole pine)	2	0-3	25
Populus tremuloides (quaking aspen)	2	0-3	25
Populus trichocarpa (black cottonwood)	1	0-1	13
Pseudotsuga menziesii (Douglas fir)	2	0-3	25
Shrubs			
Acer spp. (maple)	1	0-1	13
Amelanchier alnifolia (western serviceberry)	1	0-1	25
Berberis repens (creeping Oregongrape)	1	0-1	38

Cornus canadensis (bunchberry)	3	0-3	13
Cornus stolonifera (red-osier dogwood)	5	0-10	38
Linnaea borealis (twinflower)	2	0-3	25
Lonicera involucrata (twin-berry)	2	0-3	63
Rhamnus alnifolia (alder buckthorn)	3	0-3	13
Ribes lacustre (swamp currant)	1	0-1	13
Ribes spp. (currant)	1	0-1	13
Rosa acicularis (prickly rose)	2	0-3	38
Rosa woodsii (woods rose)	1	0-3	38
Rubus idaeus (red raspberry)	1	0-1	13
Salix drummondiana (Drummond willow)	50	0-50	13
Salix scouleriana (Scouler willow)	1	0-1	13
Salix spp. (willow)	1	0-1	25
Spiraea betulifolia (shiny-leaf spiraea)	3	0-3	13
Symphoricarpos albus (common snowberry)	1	0-3	38
Symphoricarpos occidentalis (western snowberry)	1	0-1	13
Graminoids			
Agropyron spp. (wheatgrass)	3	0-3	13
Agropyron exarata (spike bentgrass)	1	0-1	13
Agrostis scabra (tickle-grass)	1	0-1	13
Agrostis stolonifera (redtop)	1	0-1	13
Agrostis thurberiana (thurber bentgrass)	3	0-3	13
Bromus ciliatus (fringed brome)	1	0-1	38
Bromus vulgaris (Columbia brome)	1	0-1	25
Calamagrostis canadensis (bluejoint reedgrass)	27	0-40	38
Calamagrostis rubescens (pinegrass)	2	0-3	25
Carex canescens (gray sedge)	3	0-3	13
Carex pachystachya (thick-headed sedge)	1	0-1	13
Carex rossii (Ross sedge)	1	0-1	13
Carex rostrata (beaked sedge)	30	0-30	13
Cinna latifolia (drooping woodreed)	1	0-1	25
Elymus glaucus (blue wildrye)	5	0-10	25
Glyceria elata (tall mannagrass)	1	0-1	13
Glyceria striata (fowl mannagrass)	1	0-1	13
Luzula parviflora (small-flowered woodrush)	1	0-1	13
Forbs			
Actaea rubra (baneberry)	1	0-3	38
Allium spp. (onion)	1	0-1	13
Angelica arguta (sharptooth angelica)	1	0-1	13
Aralia nudicaulis (wild sarsaparilla)	20	0-20	13
Arenaria lateriflora (bluntleaf sandwort)	1	0-1	13

Arnica cordifolia (heart-leaf arnica)	1	0-1	25
Arnica latifolia (broadleaf arnica)	3	0-3	13
Aster foliaceus (leafy aster)	9	0-20	38
Aster occidentalis (western aster)	3	0-3	13
Aster perelegans (elegant aster)	1	0-1	13
Aster spp. (aster)	1	0-1	13
Cirsium arvense (Canada thistle)	1	0-1	25
Cirsium foliosum (elk thistle)	1	0-1	13
Cirsium undulatum (wavy-leaved thistle)	1	0-1	13
Epilobium alpinum (alpine willow-herb)	1	0-1	13
Epilobium angustifolium (fireweed)	1	0-3	63
Epilobium glaberrimum (smooth willow-herb)	1	0-1	13
Erigeron peregrinus (subalpine daisy)	1	0-1	13
Erigeron specious (showy fleabane)	1	0-1	13
Fragaria virginiana (Virginia strawberry)	1	0-1	25
Galium boreale (northern bedstraw)	1	0-1	38
Galium trifidum (small bedstraw)	1	0-1	13
Galium triflorum (sweetscented bedstraw)	2	0-3	50
Geranium richardsonii (white geranium)	1	0-3	38
Geum macrophyllum (large-leaved avens)	1	0-1	38
Geum triflorum (old man's whiskers)	1	0-1	13
Habenaria obtusata (blunt-leaf rein-orchid)	1	0-1	13
Heracleum lanatum (cow-parsnip)	1	0-1	25
Mertensia ciliata (mountain bluebell)	3	0-3	13
Mitella spp. (mitrewort)	1	0-1	13
Osmorhiza chilensis (mountain sweet-cicely)	1	0-1	25
Potentilla gracilis (slender cinquefoil)	1	0-1	13
Pyrola asarifolia (pink wintergreen)	1	0-1	38
Pyrola chlorantha (green wintergreen)	1	0-1	13
Pyrola secunda (one-sided wintergreen)	1	0-1	25
Pyrola spp. (wintergreen)	1	0-1	13
Pyrola uniflora (woodnymph)	1	0-1	25
Ranunculus uncinatus (little buttercup)	1	0-1	13
Rubus pubescens (dwarf red blackberry)	3	0-3	13
Senecio pseudaureus (streambank groundsel)	1	0-1	50
Smilacina racemosa (false spikenard)	1	0-1	13
Smilacina stellata (starry Solomon-plume)	4	0-20	63
Streptopus amplexifolius (clasping-leaved twisted stalk)	1	0-1	38
Taraxacum officinale (common dandelion)	1	0-1	25
Thalictrum fendleri (Fendler's meadowrue)	3	0-3	13
Thalictrum occidentale (western meadowrue)	1	0-3	38

Veronica americana (American speedwell)	1	0-1	13
Vicia spp. (vetch)	1	0-1	13
Viola adunca (Hook violet)	1	0-1	38
Viola canadensis (Canada violet)	1	0-1	25
Viola orbiculata (round-leaved violet)	1	0-1	13
Viola spp. (violet)	1	0-1	25
Ferns and Allies			
Equisetum arvense (field horsetail)	50	30-80	100

SUCCESSIONAL INFORMATION

Following disturbance, *Betula occidentalis* (water birch), *Alnus incana* (mountain alder), *Salix bebbiana* (Bebb willow), and *Equisetum arvense* (field horsetail) tend to dominate the site. Seedling and sapling *Picea* (spruce) are also common. *Populus trichocarpa* (black cottonwood) and *Pinus contorta* (lodgepole pine) may be abundant in seral stands.

The *Populus tremuloides/Equisetum arvense* (quaking aspen/field horsetail) community type described by Youngblood and Mueggler (1981) is considered a seral stage of this habitat type.

SOILS

Soils on older terraces can classify to Mollisols (Aquolls or Borolls), yet the majority of sites key to Humic Cryaquepts. Parent material is often coarse textured alluvium with coarse fragment contents varying widely. These soils are usually wet throughout the year, often with standing water. Water tables are usually less than 50 cm (20 in) deep, duff layers average 7 cm (3 in) and exposed rock or mineral soil is rare in this habitat type.

ADJACENT COMMUNITIES

Adjacent wetter communities include sites dominated by *Salix* species (willow), *Carex* species (sedge), or the *Typha latifolia* (common cattail) habitat type. Adjacent drier sites include communities dominated by other *Picea* (spruce) habitat types and by *Abies lasiocarpa* (subalpine fir) or *Pseudotsuga menziesii* (Douglas fir) habitat types.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Herbage production is moderate to high. However, these sites have little or no value for livestock other than shading. Soils are relatively sensitive to disturbance and cattle can easily churn the wet soil and destroy plant cover as well as limit conifer establishment (Youngblood and others 1985b).

Timber

Timber productivity is moderate (Pfister and others 1977, Steele and others 1983) but offers limited potential due to the extremely fragile conditions of the sites. Due to high water tables, the trees are extremely susceptible to

windthrow and soil loss may follow all forms of timber harvesting. Possible options for timber harvesting includes winter logging with at least 60 cm (around 24 in) of snow on the ground, designated skid trails, and winching (Pfister and Sherwood 1989). However, according to Steele and others (1983), even if logged when the ground is frozen to reduce equipment impacts, water tables can rise, creating additional problems in site management. High water tables resulting from harvesting activity may cause regeneration problems. *Picea* (spruce) is generally the only conifer to successfully occupy these sites, although other species may occasionally occupy drier raised hummocks.

Wildlife

Deer, elk, and moose show moderate winter use of this type. *Equisetum arvense* (field horsetail) is an important food source for grizzly bears (Knight and Blanchard 1983). During the summer months, black bear use these sites for wallows. Big game may use this habitat type, especially during the rutting season (Youngblood and others 1985b). Other wildlife, especially small mammals and avian species, may make high use of these sites because of their structural diversity. Big game may use this habitat type, especially during the rutting season (Youngblood and others 1985b). Great blue herons are known to nest in *Picea* (spruce) stands in Montana, if a high degree of isolation during nesting is possible (Parker 1980). Osprey will nest in old growth *Picea* (spruce) (Snow 1973).

Fisheries

Those stands of the *Picea/Equisetum arvense* (spruce/field horsetail) habitat type adjacent to streams provide hiding, thermal cover, and streambank stability for fish.

Fire

Fire susceptibility is low. However, *Picea engelmannii* (Engelmann spruce), including hybrids with *Picea glauca* (white spruce), is easily killed by fire (Fischer and Bradley 1987). The dead, dry, flammable lower limbs, low growing canopy, thin bark, and lichen growth in the branches contribute to the species low resistance. The shallow root system is readily subject to injury from fire burning through the duff. Large older trees may occasionally survive one or more light fires, but deep accumulations of resinous needle litter around their bases usually make them very susceptible to fire damage.

Soil Management and Rehabilitation Opportunities

Road construction and development severely degraded sites along stream sides and sites with high water tables, poor drainage, or organic soils. Roads and trails should be located on the adjacent uplands.

Recreational Uses and Considerations

Because of high water tables and the problems with road construction, campgrounds should not be located in this type.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = forested wetland; Subclass = needle-leaved evergreen; Water Regime (nontidal) = seasonally flooded to saturated.

OTHER STUDIES

This discussion is an expanded description of this habitat type as defined by Pfister and others (1977). Similar habitat types were described for central Idaho (Steele and others 1981), eastern Idaho and western Wyoming (Steele and others 1983), northern Utah (Mauk and Henderson 1984), and central and southern Idaho (Youngblood and Mauk 1985). Kovalchik (1987) described a similar type (*Picea engelmannii/Equisetum arvense-Streptopus* (Engelmann spruce/field horsetail clasping-leaved twisted stalk) association for central Oregon. A similar community type has been described for western Wyoming (Norton and others 1981), eastern Idaho and western Wyoming (Youngblood and others 1985b), and for Utah and southeastern Idaho (Padgett and others 1989).

Picea/Galium triflorum Habitat Type
(Spruce/Sweetscented Bedstraw Habitat Type)

PICEA/GALTRI (PICEA/GATR)
Number Of Stands Sampled = 1

LOCATION AND ASSOCIATED LANDFORMS

The *Picea/Galium triflorum* (spruce/sweetscented bedstraw) habitat type is an incidental type at moderately high elevations, 2115 m (6980 ft), in the mountains of northeastern Idaho. This type generally borders streams, occupying moist alluvial benches/terraces and narrow floodplains of U-shaped canyons.

VEGETATION

Mature *Picea* (spruce) may form a continuous, dense overstory, or may develop as clustered stands with scattered openings. *Abies lasiocarpa* (subalpine fir), *Populus tremuloides* (quaking aspen) and *Pinus flexilis* (limber pine) may frequent these sites, but with limited coverages. *Symphoricarpos oreophilus* (mountain snowberry) and *Lonicera involucrata* (twin-berry) occur as components of the inconsequential shrub understory. A diversity of herbaceous species may include: *Calamagrostis rubescens* (Pinegrass), *Arnica cordifolia* (Heart-leaf Arnica), *Erythronium grandiflorum* (Glacier-lily), *Osmorhiza chilensis* (mountain sweet-cicely) and *Thalictrum occidentale* (western meadowrue) (Table 8) . The herbaceous layer is sparse under the dense *Picea* (spruce) canopy, but may be quite lush where the sporadic openings allow more light. Mosses may be prevalent on the ground surface under the graminoids and forbs. Although the signature species, *Galium triflorum* (sweetscented bedstraw), was not observed on site, the type matches the description for Montana by Hansen and others (1995) in most other respects. Additional sites should be recorded to determine whether this type description requires modification.

Table 8. Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax

stands of the *Picea/Galium triflorum* (spruce/sweetscented bedstraw) habitat type (number = 1 stands)

Species	% Canopy Cover
Trees	
Abies lasiocarpa (Subalpine Fir)	3
Picea spp (Spruce)	70
Pinus flexilis (Limber Pine)	3
Populus tremuloides (Quaking Aspen)	3
Pseudotsuga menziesii (Douglas Fir)	1
Shrubs	
Berberis repens (Creeping Oregongrape)	1
Juniperus communis (Common Juniper)	1
Lonicera involucrata (Twin-berry)	3
Symphoricarpos oreophilus (Mountain Snowberry)	10
Graminoids	
Calamagrostis rubescens (Pinegrass)	30
Carex geyeri (Elk Sedge)	1
Carex praticola (Meadow Sedge)	1
Elymus glaucus (Blue Wildrye)	3
Forbs	
Achillea millefolium (Common Yarrow)	3
Actaea rubra (Baneberry)	1
Allium geyeri (Geyer's Onion)	1
Arenaria lateriflora (Bluntleaf Sandwort)	1
Arnica cordifolia (Heart-leaf Arnica)	10
Aster engelmannii (Engelmann's Aster)	3
Astragalus miser (Weedy Milk-vetch)	1
Erythronium grandiflorum (Glacier-lily)	20
Fragaria virginiana (Virginia Strawberry)	10
Geranium viscosissimum (Sticky Geranium)	3
Hydrophyllum capitatum (Ballhead Waterleaf)	1
Lomatium dissectum (Fern-leaved Desert-parsley)	1
Myosotis sylvatica (Wood Forget-me-not)	1
Osmorhiza chilensis (Mountain Sweet-cicely)	10
Smilacina racemosa (False Spikenard)	1
Taraxacum officinale (Common Dandelion)	3
Thalictrum occidentale (Western Meadowrue)	20
Valeriana occidentalis (Western Valerian)	1

SUCCESSIONAL INFORMATION

Pseudotsuga menziesii (Douglas fir), *Populus tremuloides* (quaking aspen), and *Pinus flexilis* (limber pine) are commonly associated with seral stands of *Picea* (spruce). Where gaps occur in the canopy due to windfall, infestations or other disturbances, *Picea* (spruce) establish quickly, out competing other species to form essentially homogeneous stands. Youngblood and others (1985b) suggest that on extremely well drained sites supporting the *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) or *Populus angustifolia*/Herbaceous (narrowleaf cottonwood/Herbaceous) community types, the *Picea/Galium triflorum* (spruce/sweetscented bedstraw) habitat type may represent the site's potential.

SOILS

Surface soil textures of this habitat type range from sands to silts, although a minor clay component may be present. Gravels and cobbles are generally absent from the upper 30 cm (12 in). This type customarily occupies drier sites; therefore, soils do not display gleyed or mottled characteristics. Overlying leaf/needle litter and duff may be 2.5 cm (1 in) or more deep. Hansen and others (1995) indicate that these soils commonly develop from noncalcareous parent alluvium. Most soils have mollic epipedons, although those less developed are commonly Entisols. Some sites have histic characteristics, such as organic layers often exceeding 50 cm (20 in). Water tables are commonly within 1 m (39 in) of the surface throughout the growing season.

ADJACENT COMMUNITIES

Salix spp.(willow) and *Carex* spp.(sedge) types occupy wet sites adjacent to the *Picea/Galium triflorum* (spruce/sweetscented bedstraw) habitat type. *Populus tremuloides* (quaking aspen) may also form stringer communities paralleling the stream bottoms or broader stands on moist slopes. Upland sites are dominated by *Abies lasiocarpa* (subalpine fir), *Pseudotsuga menziesii* (Douglas fir) and *Picea* (spruce).

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Herbage production under dense *Picea* (spruce) canopies is low to nonexistent. Where openings form due to windthrow, disease or selective logging, forage availability may be better.

Timber

Timber productivity ranges from moderate to very high. This type represents one of the most productive habitat types for *Picea* (spruce) and *Pinus contorta* (lodgepole pine) east of the Continental Divide in Montana. However, streamside locations and high water tables may restrict timber harvest. Partial cutting will favor *Picea* (spruce) while complete stand removal will result in mixed stands of *Pseudotsuga menziesii* (Douglas fir),*Pinus contorta* (lodgepole pine) and *Picea engelmannii* (Engelmann spruce). Uneven aged management should be considered as a possible silvicultural system in this habitat type (Hansen and others 1995).

Wildlife

Deer and elk use this type as winter range. Some of the broad, flat mountain valleys associated with this type may

be prime year-long moose habitat. Some sites may show sustained heavy use by moose and elk. Great blue herons are known to nest in *Picea* species (spruce) stands in Montana, if a high degree of isolation during nesting is possible (Parker 1980). Osprey will nest in old growth *Picea* spp. (spruce) (Snow 1973).

Fisheries

When associated with stream corridors, this habitat type may provide bank stability, enhance fish habitat requirements as windfall and deadfall trees offer cover and create plunge pools, and protect against thermal heating during summer months.

Fire

Fire susceptibility is low. However, *Picea engelmannii* (Engelmann spruce), including hybrids with *Picea glauca* (white spruce), is easily killed by fire (Fischer and Bradley 1987). The dead, dry, flammable lower limbs, low growing canopy, thin bark, and lichen growth in the branches contribute to the species' low resistance. The shallow root system is readily subject to injury from fire burning through the duff. Large older trees may occasionally survive one or more light fires, but deep accumulations of resinous needle litter around their bases usually make them very susceptible to fire damage (Hansen and others 1995).

Soil Management and Rehabilitation Opportunities

Machinery and livestock easily compact or otherwise damage the soil during periods with high water tables. Poorly drained sites, stream side locations, or sites with organic soils should also warrant special concern. Roads and trails should be located on the adjacent uplands (Hansen and others 1995).

Recreational Uses and Considerations

Because of high water tables and the problems with road construction, campgrounds should not be located in this type.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = forested wetland; Subclass = needle-leaved evergreen; Water Regime (nontidal) = temporarily flooded.

OTHER STUDIES

The *Picea/Galium triflorum* (spruce/sweetscented bedstraw) habitat type was first described by Pfister and others in their 1977 publication for Montana. Hansen and others (1995) also document this type for the state of Montana. A similar habitat type was described by Steele and others (1981) for central Idaho, Steele and others (1983). Somewhat similar community types were also described by Youngblood and others (1985b) for eastern Idaho and western Wyoming and by Padgett and others (1989) for Utah and southeastern Idaho.

Pinus flexilis Community Type
(Limber Pine Type)

PINFLE (PIFL)
Number Of Stands Sampled = 2

LOCATION AND ASSOCIATED LANDFORMS

The *Pinus flexilis* (limber pine) community type is an incidental type at mid elevations in mountain valleys of Idaho . Elevations of sampled sites range from 1,940 to 2,050 m (6,400 to 6,765 ft). The type occupies alluvial benches along streams and rivers in U- and V-shaped canyons, or may be found on hillsides below seeps and springs. It is often found on drier, marginally riparian sites.

VEGETATION

Pinus flexilis (limber pine) represents the dominate tree in the the tallest layer; however, lower growing species, such as *Populus tremuloides* (quaking aspen) and *Juniperus scopulorum* (Rocky Mountain juniper), may also be present with significant coverages. The *Pinus flexilis* (limber pine) community type forms open stands of scattered individuals in the overstory, but may be characterized by a well developed shrub layer of *Betula occidentalis* (water birch), *Symphoricarpos occidentalis* (western snowberry) or *Prunus virginiana* (common chokecherry). The herbaceous understory may be dominated by *Poa pratensis* (Kentucky bluegrass), *Bromus inermis* (Smooth Brome), *Equisetum arvense* (field horsetail), *Osmorhiza chilensis* (mountain sweet-cicely), and *Fragaria virginiana* (Virginia strawberry).

Table 9. Average canopy cover, range of canopy cover, and constancy for indicator species of the sampled stands of the *Pinus flexilis* (limber pine) community type (number = 2 stands).

Species	% Canopy Cover		
	Average	Range	Constancy
Trees			
Juniperus scopulorum (Rocky Mountain Juniper)	17	3-30	100
Pinus flexilis (Limber Pine)	40	30-50	100
Populus tremuloides (Quaking Aspen)	15	0-30	50
Pseudotsuga menziesii (Douglas Fir)	5	0-10	50
Shrubs			
Amelanchier alnifolia (Western Serviceberry)	5	0-10	50
Artemisia tridentata (Big Sagebrush)	2	1-3	100
Berberis repens (Creeping Oregongrape)	2	0-3	50
Betula occidentalis (Water Birch)	20	0-40	50

Chrysothamnus nauseosus (Common Rabbitbrush)	<1	0-1	50
Prunus virginiana (Common Chokecherry)	15	0-30	50
Ribes setosum (Missouri Gooseberry)	5	0-10	50
Rosa woodsii (Woods Rose)	5	1-10	100
Symphoricarpos occidentalis (Western Snowberry)	20	0-40	50
Graminoids			
Agropyron caninum (Bearded Wheatgrass)	2	0-3	50
Agropyron spicatum (Bluebunch Wheatgrass)	<1	0-1	50
Agrostis exarata (Spike Bentgrass)	2	0-3	50
Agrostis stolonifera (Redtop)	<1	0-1	50
Bromus inermis (Smooth Brome)	5	0-10	50
Carex leptalea (Bristle-stalked Sedge)	<1	0-1	50
Carex microptera (Small-winged Sedge)	2	0-3	50
Carex rostrata (Beaked Sedge)	<1	0-1	50
Dactylis glomerata (Orchard-grass)	2	0-3	50
Elymus flavescens (Yellow Wildrye)	<1	0-1	50
Elymus glaucus (Blue Wildrye)	2	0-3	50
Glyceria striata (Fowl Mannagrass)	<1	0-1	50
Juncus balticus (Baltic Rush)	2	0-3	50
Poa pratensis (Kentucky Bluegrass)	7	3-10	100
Forbs			
Achillea millefolium (Common Yarrow)	2	1-3	100
Antennaria microphylla (Rosy Pussy-toes)	<1	0-1	50
Aquilegia formosa (Sitka Columbine)	5	0-10	50
Arnica longifolia (Longleaf Arnica)	<1	0-1	50
Aster eatonii (Eaton's Aster)	5	0-10	50
Aster occidentalis (Western Aster)	<1	0-1	50
Cicuta maculata (Spotted Water-hemlock)	2	0-3	50
Collomia linearis (Narrow-leaf Collomia)	<1	0-1	50
Cynoglossum officinale (Common Hound's-tongue)	<1	0-1	50
Fragaria virginiana (Virginia Strawberry)	5	0-10	50
Geranium viscosissimum (Sticky Geranium)	2	0-3	50
Lupinus spp. (Lupine)	2	0-3	50
Nepeta cataria (Catnip)	2	0-3	50
Osmorhiza chilensis (Mountain Sweet-cicely)	5	-10	50
Oxytropis viscida (Sticky Crazyweed)	<1	0-1	50
Rudbeckia occidentalis (Black Head)	2	0-3	50
Silene menziesii (Menzies' Silene)	<1	0-1	50
Smilacina racemosa (False Spikenard)	<1	0-1	50
Smilacina stellata (Starry Solomon-plume)	2	0-3	50
Taraxacum officinale (Common Dandelion)	2	0-3	50

Tragopogon dubius (Goat's Beard)	<1	0-1	50
Urtica dioica (Stinging Nettle)	2	0-3	50
Viola orbiculata (Round-leaved Violet)	<1	0-1	50
Ferns and Allies			
Equisetum arvense (Field Horsetail)	10	0-20	50

SUCCESSIONAL INFORMATION

Seral stands of this type may be dominated by *Populus tremuloides* (quaking aspen), *Juniperus scopulorum* (Rocky Mountain juniper), or *Betula occidentalis* (water birch); however, *Pinus flexilis* (limber pine) will eventually surpass these species in the upper canopy layers to dominate the sites. When *Abies lasiocarpa* (subalpine fir) is present, *Pinus flexilis* (limber pine) may act as a seral stage within the successional pathway of this climax species. Pfister and others (1977) indicate that on upland sites *Pinus flexilis* (limber pine) is a codominant with *Pseudotsuga menziesii* (Douglas fir) and appears to continue to reproduce and flourish even under the presence of this taller species. The relationship between these two species in riparian zones is unknown at this time.

SOILS

Approximately 2.5 cm (1 in) or more of needle/leaf litter may cover the ground surface. Where this type occurs along stream and river channels, substrates are predominantly alluvial. Mineral soils are composed of silts and sands with moderate clay components, and are probably classified as Entisols. River cobbles and gravels become prevalent at a depth of 30 cm (12 in) or more. Where this type occurs on hillsides below subsurface seeps, silts and clays tend to be occupy the upper soil layers. Gravels and cobbles are absent and larger rocks are uncommon.

ADJACENT COMMUNITIES

Slightly wetter adjacent communities may include the *Betula occidentalis* (water birch) type. Adjacent uplands are dominated by *Pseudotsuga menziesii* (Douglas fir) or *Juniperus scopulorum* (Rocky Mountain juniper) forests, shrubland communities such as *Artemisia tridentata* (big sagebrush), or mixed grasslands. *Populus tremuloides/Wyethia* spp.(quaking aspen/mule's-ears) communities may occupy nearby depressional areas as well.

MANAGEMENT INFORMATION

Livestock

Pfister and others (1973) indicate that forage production ranges from low to moderate for the *Pinus flexilis* (limber pine) series on upland sites. Characteristically sparse herbaceous understories observed on sites adjacent to stream corridors suggest low forage value in these locations. However, due to the presence of water and the xeric conditions of the surrounding upland communities, the *Pinus flexilis* (limber pine) community type may receive more use than suspected. Where this type occurs on hillsides below seeps and springs, the herbaceous understory may be more lush and might provide moderate forage for livestock.

Timber

Timber productivity is marginal. *Pinus flexilis* (limber pine) seldom obtain heights over 50 feet, and basal areas are

considered to be low. Sites should be managed for uses other than timber (Pfister and others 1977).

Wildlife

Big game use may be moderate to high during winter months for certain types of the *Pinus flexilis* (limber pine) series on upland sites (Pfister and others 1973). As a riparian community, this type may provide cover and moderate forage for deer or elk, although little evidence was observed to support this hypothesis. The *Pinus flexilis* (limber pine) community type may offer cover and nest sites for a variety of birds and mammals as well due to the 3-tiered structure of the canopy.

Fisheries

This type may be suitable for fisheries management. The overstory tree and shrub component should protect against elevated summer temperatures, offer bank stability and debris recruitment. However, bare ground may constitute 15 percent or more of the streambanks and compromise water quality during high flows. Individual site analysis is recommended.

Fire

Fire hazard is moderate to low for the *Pinus flexilis* (limber pine) series on upland sites (Pfister and others 1973). Mature *Pinus flexilis* (limber pine) appear able to withstand low intensity ground fires although fuel loading may promote more destructive, stand recycling fires. Fire frequency appears to be partially dependent on the understory species composition and density on site.

Soil Management and Rehabilitation Opportunities

Coarse textured substrates on sites adjacent to stream corridors are not susceptible to compaction. Streambank stabilization is dependent on a well developed shrub and herbaceous understory and should be managed accordingly.

Recreational Uses and Considerations

The recreational status of this type is currently undetermined. It is unsuitable for camping or hiking where it occupies steep side slopes along narrow stream corridors, but may offer opportunities for wildlife observation or possibly fishing.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = forested wetland; Subclass = needle-leaved evergreen; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

OTHER STUDIES

This type has not been previously described for riparian communities. However, Pfister and others (1977, 1973)

described a *Pinus flexilis* (limber pine) series for upland forests in Montana east of the Continental Divide.

Pseudotsuga menziesii/Cornus stolonifera Habitat Type (Douglas Fir/Red-Osier Dogwood Habitat Type)

PSEMEN/CORSTO (PSME/COST4)
Number Of Stands Sampled = 6

LOCATION AND ASSOCIATED LANDFORMS

The *Pseudotsuga menziesii/Cornus stolonifera* (Douglas fir/red-osier dogwood) habitat type is a major type from mid to higher elevations throughout the mountains and valleys of Idaho. Elevations of sampled sites range from 1,550 to 2,250 m (5,115 to 7,425 ft). This habitat type often occupies drier sites on alluvial benches of streams and rivers, and on sideslopes of narrow V-shaped drainages.

VEGETATION

Sites in Idaho are typically dominated by *Pseudotsuga menziesii* (Douglas fir), with *Populus tremuloides* (quaking aspen) and *Juniperus scopulorum* (Rocky Mountain juniper) occasionally associated as minor components. Where *Pseudotsuga menziesii* (Douglas fir) forms a dense canopy, the understory may be relatively sparse. Open stands of this type are often characterized by a more lush undergrowth. The shrub layer usually consists of *Acer glabrum* (Rocky Mountain maple), *Rosa woodsii* (woods rose), *Cornus stolonifera* (red-osier dogwood), and *Prunus virginiana* (common chokecherry). The herbaceous layer is characterized by a variety of graminoids and forbs, including *Poa pratensis* (Kentucky bluegrass), *Arnica cordifolia* (heart-leaf arnica), *Geranium viscosissimum* (sticky geranium), *Thalictrum occidentale* (western meadowrue) and *Smilacina racemosa* (false spikenard). While species richness is relatively high within the lower canopy layers, covers and constancy for the individual species are actually nominal. This pattern appears to be consistent for many of the conifer dominated types in riparian zones.

Table 10. Average canopy cover, range of canopy cover, and constancy for indicator species of the sampled stands of the *Pseudotsuga menziesii/Cornus stolonifera* (Douglas fir/red-osier dogwood) habitat type (number = 6 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Trees			
Juniperus scopulorum (Rocky Mountain Juniper)	3	0-10	50
Populus tremuloides (Quaking Aspen)	3	0-10	33
Pseudotsuga menziesii (Douglas Fir)	68	40-90	100
Shrubs			
Acer glabrum (Rocky Mountain Maple)	12	0-20	83

Acer grandidentatum (Bigtooth Maple)	2	0-10	17
Alnus incana (Mountain Alder)	2	0-10	17
Amelanchier alnifolia (Western Serviceberry)	2	0-10	67
Berberis repens (Creeping Oregongrape)	3	0-10	50
Betula occidentalis (Water Birch)	3	0-20	17
Clematis ligusticifolia (Western Virgins-bower)	1	0-3	33
Cornus stolonifera (Red-osier Dogwood)	10	0-40	50
Pachistima myrsinites (Mountain-boxwood)	2	0-10	17
Prunus virginiana (Common Chokecherry)	11	0-30	83
Ribes lacustre (Swamp Currant)	1	0-3	17
Ribes odoratum (Buffalo Currant)	2	0-10	17
Ribes viscosissimum (Sticky Currant)	1	0-3	17
Rosa woodsii (Woods Rose)	3	0-10	83
Rubus idaeus (Red Raspberry)	<1	0-1	17
Rubus parviflorus (Thimbleberry)	1	0-3	33
Salix bebbiana (Bebb Willow)	1	0-3	17
Sambucus racemosa (Red Elderberry)	1	0-3	17
Spiraea betulifolia (Shiny-leaf Spiraea)	3	0-20	17
Symphoricarpos albus (Common Snowberry)	3	0-20	17
Symphoricarpos occidentalis (Western Snowberry)	1	0-3	50
Symphoricarpos oreophilus (Mountain Snowberry)	5	0-20	33
Graminoids			
Agropyron caninum (Bearded Wheatgrass)	2	0-10	50
Bromus carinatus (Mountain Brome)	<1	0-1	33
Calamagrostis rubescens (Pinegrass)	10	0-30	33
Carex crawfordii (Crawford's Sedge)	<1	0-1	17
Carex disperma (Soft-leaved Sedge)	1	0-3	17
Carex geyeri (Elk Sedge)	<1	0-1	17
Carex microptera (Small-winged Sedge)	1	0-3	17
Carex petasata (Liddon's Sedge)	2	0-10	17
Elymus cinereus (Basin Wildrye)	1	0-3	17
Elymus glaucus (Blue Wildrye)	3	0-20	17
Festuca scabrella (Rough Fescue)	<1	0-1	17
Glyceria striata (Fowl Mannagrass)	2	0-10	33
Grass perennial (Perennial Grass)	<1	0-1	17
Melica bulbosa (Oniongrass)	<1	0-1	17
Poa pratensis (Kentucky Bluegrass)	4	0-20	50
Poa scabrella (Pine Bluegrass)	<1	0-1	17
Stipa occidentalis (Western Needlegrass)	<1	0-1	17
Forbs			
Achillea millefolium (Common Yarrow)	1	0-3	50

Aconitum columbianum (Columbian Monkshood)	<1	0-1	17
Actaea rubra (Baneberry)	1	0-3	17
Antennaria parvifolia (Nuttall's Pussy-toes)	<1	0-1	17
Apocynum androsaemifolium (Spreading Dogbane)	3	0-20	17
Aquilegia formosa (Sitka Columbine)	3	0-20	33
Arabis spp. (Rockcress)	<1	0-1	17
Arctium minus (Common Burdock)	1	0-3	17
Arnica cordifolia (Heart-leaf Arnica)	4	0-20	67
Artemisia ludoviciana (Prairie Sagewort)	<1	0-1	17
Aster spp. (Aster)	2	0-10	50
Cicuta maculata (Spotted Water-hemlock)	<1	0-1	17
Cirsium arvense (Canada Thistle)	2	0-10	33
Cirsium vulgare (Bull Thistle)	<1	0-1	17
Collomia linearis (Narrow-leaf Collomia)	<1	0-1	17
Collinsia parviflora (Small-flowered Blue-eyed Mary)	1	0-3	33
Crepis acuminata (Tapertip Hawksbeard)	<1	0-1	17
Cynoglossum officinale (Common Hound's-tongue)	1	0-3	33
Disporum trachycarpum (Wartberry Fairy-bell)	1	0-3	17
Epilobium ciliatum (Common Willow-herb)	1	0-3	17
Epilobium minutum (Small-flowered Willow-herb)	<1	0-1	17
Erigeron speciosus (Showy Fleabane)	<1	0-1	17
Fragaria virginiana (Virginia Strawberry)	1	0-3	50
Galium aparine (Goose-grass)	3	0-10	50
Galium triflorum (Sweetscented Bedstraw)	1	0-3	33
Geranium viscosissimum (Sticky Geranium)	7	1-20	100
Geum macrophyllum (Larged-leaved Avens)	1	0-3	50
Habenaria unalascensis (Alaska Rein-orchid)	<1	0-1	17
Heuchera grossulariifolia (Gooseberry-leaved Alumroot)	<1	0-1	17
Hydrophyllum capitatum (Ballhead Waterleaf)	1	0-3	17
Lactuca oblongifolia (Blue Lettuce)	<1	0-1	17
Lactuca serriola (Prickly Lettuce)	<1	0-1	33
Lupinus argenteus (Silvery Lupine)	<1	0-1	17
Mentha arvensis (Field Mint)	1	0-3	17
Mertensia ciliata (Mountain Bluebell)	<1	0-1	17
Mimulus guttatus (Common Monkey-flower)	<1	0-1	17
Nepeta cataria (Catnip)	1	0-3	50
Osmorhiza chilensis (Mountain Sweet-cicely)	3	0-10	50
Osmorhiza depauperata (Blunt-fruit Sweet-cicely)	1	0-3	17
Osmorhiza occidentalis (Western Sweet-cicely)	<1	0-1	17
Rumex crispus (Curly Dock)	1	0-3	17
Senecio canus (Woolly Groundsel)	1	0-3	33

Senecio cymbalarioides (Few-leaved Groundsel)	<1	0-1	17
Senecio spp. (Groundsel; Ragwort; Butterweed)	<1	0-1	17
Senecio serra (Tall Butterweed)	3	0-10	83
Silene menziesii (Menzies' Silene)	1	0-3	50
Smilacina racemosa (False Spikenard)	7	0-10	83
Solidago canadensis (Canada Goldenrod)	1	0-3	17
Taraxacum officinale (Common Dandelion)	1	0-3	50
Thalictrum occidentale (Western Meadowrue)	3	0-10	83
Tragopogon dubius (Goat's Beard)	<1	0-1	17
Urtica dioica (Stinging Nettle)	1	0-3	33
Veronica americana (American Speedwell)	<1	0-1	17
Verbascum thapsus (Common Mullein)	<1	0-1	17
Viola adunca (Hook Violet)	<1	0-1	17
Ferns and Allies			
Cystopteris fragilis (Brittle Bladder-fern)	1	0-3	17
Equisetum arvense (Field Horsetail)	1	0-3	17
Equisetum laevigatum (Smooth Scouring-rush)	<1	0-1	17

SUCCESSIONAL INFORMATION

Stands of *Populus tremuloides* (quaking aspen), and a variety of shrub-dominated communities, typically *Salix* spp. (willow), *Alnus incana* (mountain alder), or *Betula occidentalis* (water birch), represent seral stages of this habitat type. *Pseudotsuga menziesii* (Douglas fir) will be present and successfully reproducing, although only as an understory component, often as seedlings or saplings, in the initial phases of this type. Pole-sized and mature individuals become more prevalent as the site shifts toward climax. On slightly drier riparian sites, *Juniperus scopulorum* (Rocky Mountain juniper) may function as a seral stage.

The degree of disturbance on a particular site can often be determined by the composition of the understory species present. *Cornus stolonifera* (red-osier dogwood), *Acer glabrum* (Rocky Mountain maple), and *Prunus virginiana* (common chokecherry) may be preferentially browsed by livestock and big game. As grazing intensifies, these species may be replaced by more disturbance tolerant shrubs such as *Symphoricarpos* spp. (snowberry) and *Rosa* spp. (rose). Continued grazing pressure may result in the loss of the shrub constituency altogether and the invasion of disturbance induced herbaceous species such as *Poa pratensis* (Kentucky bluegrass). This shift from a shrub-dominated to a herbaceous-dominated understory may cause desiccation of the soil solum. Once the shrub layer disappears from an area, it may be difficult and costly to recover. Management should consider strategies to avoid this advanced state before irreversible conditions prevail (Hansen and others 1995).

SOILS

The overlying litter/duff layer is variable and may be moderately extensive or practically non-existent depending on the particular site. The texture of soils in the upper layers range from fine sands to silts and clays. When present, an organic horizon, often with distinguishable Oa, Oe, and Oi subhorizons, may be 30 cm (12 in) deep, but is generally not more than 5-10 cm (2-4 in) in depth. Loams are often dominant in the upper 25 cm (10 in). The un-

derlying substrate is generally alluvium, composed of coarse sands, gravels and cobbles. Large rocks may be present where this type occupies locations at the base of scree slopes. Sites tend to be well-drained due to this unconsolidated layer.

ADJACENT COMMUNITIES

Adjacent riparian communities may be dominated by *Salix* spp. (willow), *Betula occidentalis* (water birch), *Alnus incana* (mountain alder) and *Populus tremuloides* (quaking aspen). Upland *Pseudotsuga menziesii* (Douglas fir) or *Juniperus scopulorum* (Rocky Mountain juniper) forests may border the riparian *Pseudotsuga menziesii/Cornus stolonifera* (Douglas fir/red-osier dogwood) habitat type. *Artemisia tridentata* (big sagebrush) shrublands and grasslands may occupy the plateaus above riverine canyons.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Forage production is low to moderate. *Cornus stolonifera* (red-osier dogwood) is considered an "ice cream" plant by livestock and wildlife. Its utilization is a direct indication of past and current use levels. In some areas, livestock browsing of *Cornus stolonifera* (red-osier dogwood) may be quite high (Hansen and others 1995).

Access to this type by livestock may be limited due to steep canyon walls, narrow riparian zones and unstable scree slopes. Where access is available, livestock may remain in the riparian zone for extended periods of time where water and forage are available. Managers should attempt to limit full access to to these areas in order to avoid the depletion of the shrub layer (see Successional Information section).

Timber

Limited information is available on this type. Timber productivity is estimated to be moderate. Because of at least seasonally high water tables, these sites probably represent some of the better timber producing sites for *Pseudotsuga menziesii* (Douglas fir). Clearcutting will set the site back to seral shrub stages and new regeneration of *Pseudotsuga menziesii* (Douglas fir) may be slow due to increased competition from forbs, graminoids, and shrubs. A three step shelterwood cut may be the best method to use in achieving harvest regeneration (Hansen and others 1995).

Wildlife

The *Pseudotsuga menziesii/Cornus stolonifera* (Douglas fir/red-osier dogwood) habitat type provides valuable hiding cover and shade for a variety of species. Big game use may be high, depending upon the time of year. Whitetail deer may use this type year round as cover, while other big game species may use this type as cover only in the winter (Hansen and others 1995)

Cornus stolonifera (red-osier dogwood) is favored by moose (Costain 1989) and beaver (Allen 1983) when present. Canada geese occasionally use the nests previously built in *Pseudotsuga menziesii* (Douglas fir) by bald eagles and osprey. In Montana, if a high degree of isolation during nesting is possible, great blue herons also nest in *Pseudot-*

suga menziesii (Douglas fir) stands (Parker 1980). A variety of birds and mammals, such as woodpeckers, wood ducks, and raccoons, nest in the trunk cavities.

Fisheries

The stream side location of this type is important in providing thermal cover, debris recruitment, and streambank stability. *Cornus stolonifera* (red-osier dogwood) is an excellent shrub for controlling erosion along streams. This is particularly important on the higher gradient streams where scouring by seasonal flooding is possible (Hansen and others 1995).

Fire

Fire potential is moderate, especially in late summer or during open, dry winters. Mature *Pseudotsuga menziesii* (Douglas fir) is a relatively fire resistant tree (Fischer and Bradley 1987). However, seedlings and saplings are vulnerable to surface fires because of their thin, photosynthetically active bark, resin blisters, closely spaced flammable needles, and thin twigs and bud scales. The moderately low and dense branching characteristic of saplings allows surface fires to be carried into the crown layer. Older trees develop a relatively unburnable, thick layer of insulative corky bark that provides protection against cool to moderately severe fires. Fire resistant bark takes about 40 years to develop on moist sites. *Pseudotsuga menziesii* (Douglas fir) regeneration is favored by fire which eliminates competition and creates favorable seedbeds (Hansen and others 1995).

Cornus stolonifera (red-osier dogwood) and the associated shrub species can survive all but the most severe fires that remove duff and cause extended heating of the upper layer of soil. After a fire, the shrubs sprouts from the surviving rhizomes or stolons (runners) (Fischer and Bradley 1987).

Soil Management and Rehabilitation Opportunities

Coarse textured substrates are not susceptible to compaction, yet this type is subject to infrequent flooding. Soils are relatively stable due to the strong rooting action of the associated species. Management should emphasize the importance of the understory shrub layer for streambank stabilization.

Where revegetation with woody species is desired, *Cornus stolonifera* (red-osier dogwood), *Amelanchier alnifolia* (western serviceberry), *Prunus virginiana* (common chokecherry), and various species of *Salix* (willow) and *Ribes* (currants and gooseberries) may be well adapted to planting on disturbed sites. Rooted cuttings or nursery grown seedlings are easily established on moist, well drained soils. Growth rates are rapid and the roots of established seedlings are effective stabilizers of alluvial soil deposits (Hansen and others 1995).

Recreational Uses and Considerations

Because of its proximity to streams and rivers and its flat topography, recreational developments and transportation corridors are common within this type. Recreational opportunities are excellent for fishing, big game and waterfowl hunting, and bird watching (Hansen and others 1995)

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is list-

ed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

U.S. DI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = forested wetland; Subclass = needle-leaved evergreen; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

OTHER STUDIES

The *Pseudotsuga menziesii/Cornus stolonifera* (Douglas fir/red-osier dogwood) habitat type was described by Hansen and others (1995) for the state of Montana.

Acer negundo /Prunus virginiana Habitat Type
(Box-Elder/ Common Chokecherry Habitat Type)

ACENEG(ACNE2)
Number Of Stands Sampled = 2

LOCATION AND ASSOCIATED LANDFORMS

The *Acer negundo/Prunus virginiana* (box-elder/common chokecherry) habitat type, a minor type in central and eastern Idaho, is recorded at elevations of 1,450 to 1600 m (4,785 to 5,280 ft). This type occurs on active and secondary (upper) floodplains along streams and rivers in ravines and broader U-shaped canyons. Sites may be occasionally flooded by overland flows during spring runoff.

VEGETATION

Stands of the *Acer negundo/Prunus virginiana* (box-elder/common chokecherry) habitat type in Idaho are dominated by *Acer negundo* (box-elder) in the overstory, but may contain *Juniperus scopulorum* (Rocky Mountain juniper) or *Fraxinus pennsylvanica* (green ash) as minor components. *Acer grandidentatum*(bigtooth maple) or *Betula occidentalis* (water birch) are present in the upper shrub layer while *Cornus stolonifera* (red-osier dogwood) and *Rosa woodsii* (woods rose) occupy the lower shrub levels. The signature species, *Prunus virginiana* (common chokecherry), may occur in the general area, but is often dead/decadent or present only in trace amounts. Additional sites need to be surveyed to determine whether this type in Idaho matches the type described by Hansen and others (1995) in Montana, or whether it needs modification. Where mature *Acer negundo* (box-elder) and taller shrubs form a dense canopy, the understory may be sparse and exhibit low vigor. Where stands are more open, prominent understory herbaceous species consist of *Poa pratensis* (Kentucky bluegrass), *Osmorhiza chilensis* (mountain sweet-cicely), and *Arctium minus* (Common Burdock).

The predominance of certain disturbance-induced understory species indicates that these sampled sites have undergone disturbance historically, probably from grazing. Users of this classification should consider this when comparing species composition between sampled sites and this text, and examine their stands for indications of disturbance, or lack there of, where discrepancies occur.

Table 1. Average canopy cover, range of canopy cover, and constancy for species recorded in mid to late seral stands of the *Acer negundo/Prunus virginiana* (box-elder/common chokecherry) habitat type (number = 2 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Trees			
Acer negundo (Box-elder)	80	70-90	100
Shrubs			
Acer grandidentatum (Bigtooth Maple)	5	0-10	50
Betula occidentalis (Water Birch)	10	0-20	50
Clematis ligusticifolia (Western Virgins-bower)	5	0-10	50
Cornus stolonifera (Red-osier Dogwood)	12	3-20	100
Crataegus douglasii (Black Hawthorn)	10	0-20	50
Ribes lacustre (Swamp Currant)	<1	0-1	50
Ribes odoratum (Buffalo Currant)	2	0-3	50
Rosa spp. (Rose)	5	0-10	50
Rosa woodsii (Woods Rose)	<1	0-1	50
Salix bebbiana (Bebb Willow)	2	0-3	50
Salix exigua (Sandbar Willow)	5	0-10	50
Graminoids			
Agrostis stolonifera (Redtop)	2	0-3	50
Bromus tectorum (Cheatgrass)	2	0-3	50
Poa pratensis (Kentucky Bluegrass)	12	3-20	100
Forbs			
Arctium minus (Common Burdock)	27	3-50	100
Brassica kaber (Charlock)	<1	0-1	50
Cirsium arvense (Canada Thistle)	2	0-3	50
Cynoglossum officinale (Common Hound's-tongue)	2	1-3	100
Galium triflorum (Sweetscented Bedstraw)	2	0-3	50
Geum macrophyllum (Larged-leaved Avens)	<1	0-1	50
Lactuca serriola (Prickly Lettuce)	2	0-3	50
Osmorhiza chilensis (Mountain Sweet-cicely)	5	0-10	50
Osmorhiza occidentalis (Western Sweet-cicely)	<1	0-1	50
Rumex occidentalis (Western Dock)	<1	0-1	50
Smilacina racemosa (False Spikenard)	2	0-3	50
Solidago canadensis (Canada Goldenrod)	2	0-3	50
Taraxacum officinale (Common Dandelion)	<1	0-1	50

SUCCESSIONAL INFORMATION

*Acer grandidentat*um(bigtooth maple), *Salix exigua* (sandbar willow) and *Betula occidentalis* (water birch) may represent seral stages of the *Acer negundo/Prunus virginiana* (box-elder/common chokecherry) habitat type in Idaho. The presence of small, intermittent stands of *Populus tremuloides* (quaking aspen) and *Populus acuminata* (lanceleaf cottonwood) associated with this type suggest that either of these communities could act as a seral stage as well.

Hansen and others (1995) indicate that primary successional stages of the *Acer negundo/Prunus virginiana* (box-elder/common chokecherry) habitat type in Montana may be dominated by a variety of types including cottonwoods, *Salix exigua* (sandbar willow), or *Salix amygdaloides* (peach-leaf willow) community types. As a cottonwood stand dies, primary succession toward other communities will occur unless flooding deposits new sediments suitable for cottonwood seedlings. In the absence of sediment deposition, primary succession will continue from the *Populus* spp./*Cornus stolonifera* (cottonwood/red-osier dogwood) community type to the *Acer negundo/Prunus virginiana* (box-elder/common chokecherry) habitat type.

Hansen and others (1995) have noted that under heavy grazing pressures in Montana, tree reproduction is either severely restricted or completely eliminated. At this stage, most of the saplings and pole sized trees have either been eliminated by trampling and/or rubbing, or browsed back until they are dead. High levels of grazing cause the stand to open up allowing the more sun tolerant, less desirable species such as *Symphoricarpos occidentalis* (western snowberry), *Rosa woodsii* (woods rose), *Crataegus succulenta* (succulent hawthorn), and *Poa pratensis* (Kentucky bluegrass) to dominate. In fact, many of the sites that support the *Acer negundo/Prunus virginiana* (box-elder/common choke-cherry) habitat type in the northern Great Plains of Montana are in this state or in the severe overgrazed state.

When a stand is at this stage, the prospect of returning the site to its former state is very difficult if not impossible. (Restoration would be extremely expensive in terms of both labor and money.) Therefore, if a manager wants to maintain the stand of trees, the most cost effective method is to change the management on the site ***BEFORE*** the site is too degraded (Hansen and others 1995).

SOILS

Soils of this habitat type are characteristic of floodplains, with the upper horizon dominated by alluvial sands, silts and clays. Surface soils, 7.5 to 13 cm (3 to 5 in) deep, are generally silt loams or sandy clay loams. Fine or coarse sands, often intermixed with bands or pockets of small, medium and large gravels and cobbles, are present in underlying layers 45 cm (18 in) or more deep, and occasionally reaching depths of 1.5 m (5 ft). Gravels, cobbles and rocks form a matrix at the lowest level. Soils tend to be well drained and may be exposed to infrequent flooding. Hansen and others (1995) note that *Acer negundo* (box-elder) is very tolerant to prolonged flooding.

ADJACENT COMMUNITIES

Acer negundo (box-elder) often forms a mosaic pattern along stream corridors with the *Betula occidentalis* (water birch), *Acer grandidentatum* (bigtooth maple), and *Salix exigua* (sandbar willow) community types. When present, *Acer negundo* (box-elder) is the dominant species on the site, but one or more of these associated shrub communi-

ties may occur in the understory with significant canopy coverage. *Artemisia tridentata* (big sagebrush) steppe and *Juniperus scopulorum* (Rocky Mountain juniper) savannas occupy adjacent uplands.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

If the long term management objective is the maintenance of the tree stand on the site, then managers need to key in on the seedling reproduction by *Acer negundo* (box-elder) or the stand will eventually be eliminated (Hansen and others 1995).

On relatively undisturbed sites, dense stands of the *Acer negundo/Prunus virginiana* (box-elder/common choke-cherry) habitat type limit access by livestock. As the stands open up, livestock use may go up proportionally. This habitat type is valuable to livestock managers because of the following benefits they provide: 1) thermal cover (shade), 2) water source, 3) palatable forage, 4) protection from seasonal storms, and 5) calving grounds. Because the *Acer negundo/Prunus virginiana* (box-elder/common choke-cherry) habitat type covers a small portion of the landscape and because of their high wildlife value (see the Wildlife section), these sites are becoming focal points for livestock and wildlife management conflicts in this region (Hansen and others 1995).

Livestock managers should reduce or eliminate hot season use in this type. This can be accomplished by placing salt blocks on the uplands away from the woody draws, moving water sources out of the draws, and in some instances, by using cross fences (or drift fences) that are placed perpendicular to the linear stand at appropriate intervals. This method is most appropriate for those stands located in V-shaped draws or ravines. These short fences will discourage livestock from trailing down the center of the stand. In disturbed sites, it may be necessarily to fence out a portion of the stand for a period of five or more years in order to allow regeneration by the tree and shrub species. After the appropriate time frame, the fence could be moved to a different portion of the stand (Hansen and others 1995).

The use of these sites as winter feeding grounds can have a variety of results. In many instances, proper winter use will have minimal impacts on the stand. However, if livestock numbers are high, trampling and rubbing can have a detrimental impact on the woody species. If livestock use is high when the frost melts, softening the ground, a great deal of soil churning and compaction can occur (Hansen and others 1995).

Over the years there has been some debate whether *Prunus virginiana* (common chokecherry) leaves are poisonous to livestock. The leaves and seeds do have sugars that contain cyanide. These cyanide sugars are not poisonous themselves, but when plant material is crushed, eaten or decomposed, enzymes cause hydrogen cyanide to be released (Hansen and others 1995). In high concentrations hydrogen cyanide is a metabolic poison to most animals, including humans. It has recently been shown that livestock can acquire the ability to detoxify hydrogen cyanide if they consume limited amounts of it over an extended period of time. Therefore, *Prunus virginiana* (common chokecherry) will poison livestock only if it is consumed in large quantities without prior exposure (Hansen and others 1995).

The high values associated with the *Acer negundo/Prunus virginiana* (box-elder/common chokecherry) habitat type should elicit special consideration by livestock operators.

Wildlife

In the arid portions of southeastern and central Idaho, woody draws are very important to wildlife even though they represent a very small fraction of the total area (around 1-2 percent of the total landscape). Located in areas of greater than normal moisture, they are more productive than the surrounding upland vegetation (Thomas and others 1979). Woody draws attract wildlife for thermal cover, nesting habitat, water source, late summer and winter forage, travel corridors, and hiding cover (Ames 1977, Hansen and others 1984, Hansen and Hoffman 1988, Severson and Boldt 1978). Woody draws are an important year round habitat for mule deer, provides critical winter habitat for whitetail deer (Severson and Carter 1978, Swenson 1981), and is an important fawning area for both whitetail and mule deer. During fall and winter, woody draws provide critical habitat for sharptailed grouse (Hansen and others 1995).

Woody draws provide essential habitat for a large number of non-game species. Grosz and others (1981) found that this habitat type is the center of activity for many species and is of critical importance to many species during the stressful winter months. They also found that these sites support a greater diversity and density of birds when compared to adjacent uplands. In northwestern North Dakota, Hopkins (1985) censused species of birds nesting in woody draws and found that although they had lower species diversity than cottonwood forests, the *Acer negundo/Prunus virginiana* (box-elder/common chokecherry) habitat type supported a much higher density of breeding pairs. Finally, these woody draws provide important habitat for such nongame mammals as coyote, weasel, bobcat, and red fox (Swenson 1981, Sieg and others 1985).

If the long term management objective is the maintenance of the tree stand on the site, then managers need to key in on the seedling reproduction by *Acer negundo* (box-elder) or the stand will eventually be eliminated.

Fisheries

The woody species associated with the *Acer negundo/Prunus virginiana* (box-elder/common chokecherry) habitat type provide valuable streambank stability and thermal cover (Hansen and others 1995).

Fire

Acer negundo (box-elder) and most of the important shrub species in the *Acer negundo/Prunus virginiana* (box-elder/common chokecherry) habitat type produce sprouts from the root crown when the main trunk is damaged. The ability of the woody species to sprout prolifically suggests that this habitat type is adapted to fire and perhaps to periodic stand regeneration by fire. However, the role of fire in this habitat type is not well known (Hansen and others 1995).

Soil Management and Rehabilitation Opportunities

Sites adjacent to streams are extremely vulnerable to streambank sloughing, particularly when soils are moist. Excessive livestock use will increase levels of soil compaction and decrease stability. Management should emphasize

the importance of the understory shrub communities for streambank stabilization (Hansen and others 1995).

Where revegetation with woody species is desired, *Acer negundo* (box-elder), *Prunus virginiana* (common chokecherry), and *Ribes odoratum* (buffalo currant) are well adapted to planting on disturbed sites. Rooted cuttings or nursery grown seedlings are easily established on moist, well drained soils. Growth rates are moderate to rapid and the roots of established seedlings are effective stabilizers of alluvial soil deposits (Hansen and others 1995).

Recreational Uses and Considerations

Because of its proximity to streams, recreational developments and transportation corridors are common within this type. Recreational opportunities are excellent for fishing, big game and waterfowl hunting, and observing a variety of bird species (Hansen and others 1995).

The fruit of *Prunus virginiana* (common chokecherry) is highly regarded for making wine and jelly, but one must harvest ahead of the birds (Johnson and Nichols 1982). Indians ate the fruit fresh or preserved it by drying. In addition they combined it with venison and buffalo meat to make mincemeat. They also used the berries for medicinal purposes.

Care must be taken when locating structures within this type due to flood hazard.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = forested wetland; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

OTHER STUDIES

Hansen and others (1995) document this habitat type for the northern great plains of Montana. A somewhat similar community type was described by Szaro (1989) for riparian and wetland sites in Arizona and New Mexico.

Elaeagnus angustifolia Community Type
(Russian Olive Community Type)

ELAANG (ELAN)

Number Of Stands Sampled = 1

LOCATION AND ASSOCIATED LANDFORMS

The *Elaeagnus angustifolia* (Russian olive) community type is an incidental type at low elevations in southern and

eastern Idaho. Sites range in elevation from 909 to 1,340 m (3,000 to 4,422 ft). This type typically forms stringer communities on upper floodplain terraces adjacent to streams and rivers at the bottom of deep canyons. It may also be found in low depressional areas capable of retaining water near the surface for much of the year, especially potholes and abandoned river oxbows.

VEGETATION

Elaeagnus angustifolia (Russian olive), a tree native to southern Europe and western Asia, was introduced into North America during colonial times (Elias 1980). *Elaeagnus angustifolia* (Russian olive) was planted in shelterbelts throughout the prairie states and provinces due to its dense growth form, hardiness, and adaptability to a wide range of soil and moisture conditions (Olson and Knopf 1986). It has also been used for ornamental and wildlife habitat plantings, erosion control, and highway beautification (Christensen 1963). Currently, *Elaeagnus angustifolia* (Russian olive) has naturalized throughout the 17 western states bounded on the east by North and South Dakota, Nebraska, Kansas, Oklahoma, and Texas. Personal observations and a review of the literature indicates that *Elaeagnus angustifolia* (Russian olive) naturalization is rapidly increasing, especially in the riparian zone. The potential impacts of the spread of *Elaeagnus angustifolia* (Russian olive) to floodplain forests are substantial. Even though *Elaeagnus angustifolia* (Russian olive) has a high value for wildlife, it can interfere with agricultural practices and has the potential to displace native riparian or wetland vegetation. In fact, the displacement of native floodplain forests by *Elaeagnus angustifolia* (Russian olive) can result in a 30 percent reduction of breeding bird species (Knopf 1991).

Elaeagnus angustifolia (Russian olive) spreads from introduced plantings with the help of birds, and to a lesser degree, small mammals (Olson and Knopf 1986). The seeds, ingested with the fruits, pass through the digestive tract of birds and may be deposited in new locations. Small mammals help spread the seeds by building food caches, sometimes up to 150 m (ca. 450 ft) from the original sources.

Two conditions that tend to favor the establishment of *Elaeagnus angustifolia* (Russian olive) are spring moisture and slightly alkaline soil (Olson and Knopf 1986). Carmen and Brotherson (1982) reported that *Elaeagnus angustifolia* (Russian olive) preferred sites with low to medium concentrations (100-3,500 ppm) of soluble salts, whereas *Tamarix chinensis* (salt cedar) occurred on sites of higher (700-15,000 ppm) salt concentrations.

Elaeagnus angustifolia (Russian olive) has a dense growth form and tolerates a wide range of temperature, soil, and moisture conditions (Borell 1976, Elias 1980). Stands in Idaho may be associated with *Populus trichocarpa* (Black cottonwood) and establish open communities with widely spaced individuals. The shrub component may be sparse or robust depending on local site factors, and may include *Salix* spp.(willow), *Rosa woodsii* (woods rose), *Crataegus* spp.(hawthorn) and *Ribes* spp. (currant). Graminoids, particularly *Agropyron repens* (Quackgrass), *Hordeum jubatum* (Foxtail Barley), and *Poa pratensis* (Kentucky Bluegrass), may dominate the herbaceous understory, forming a dense root network at the surface. The forb component, which may be poorly represented, includes *Scirpus* (bulrush) and *Typha* spp.(cattail) on wet sites and *Iris missouriensis* (Rocky Mountain Iris) and *Aster eatonii* (Eaton's Aster) on drier sites.

Table 2. Canopy cover for species recorded in mid to late seral stands of the *Elaeagnus angustifolia* (Russian olive) community type (number = 1 stand).

Species	% Canopy Cover
Trees	
Elaeagnus angustifolia (Russian Olive)	80
Shrubs	
Rosa woodsii (Woods Rose)	1
Graminoids	
Agropyron repens (Quackgrass)	80
Elymus cinereus (Basin Wildrye)	3
Hordeum jubatum (Foxtail Barley)	20
Juncus balticus (Baltic Rush)	3
Poa pratensis (Kentucky Bluegrass)	10
Forbs	
Achillea millefolium (Common Yarrow)	1
Arctium minus (Common Burdock)	3
Aster eatonii (Eaton's Aster)	3
Chenopodium album (Lambsquarter)	3
Cirsium vulgare (Bull Thistle)	3
Descurainia richardsonii (Richardson's Tansymustard)	1
Glycyrrhiza lepidota (American Licorice)	1
Grindelia squarrosa (Curlycup Gumweed)	3
Iris missouriensis (Rocky Mountain Iris)	3

SUCCESSIONAL INFORMATION

The *Elaeagnus angustifolia* (Russian olive) community type may represent a seral stage of the *Acer negundo/Prunus virginiana* (box-elder/common choke-cherry) habitat type (Hansen and others 1995). *Populus trichocarpa* (Black cottonwood), *Salix* spp.(willow), and *Crataegus* spp.(hawthorn) may act as seral communities for the *Elaeagnus angustifolia* (Russian olive) community type. Due to the limited number of observations in Idaho, the successional status of this community type needs to be explored more fully.

SOILS

Soils are generally Entisols (Torrifluvents) or Mollisols (Haploborolls and Argiborolls). Soil texture ranges from clay loam to sandy loam. Water tables are generally near the soil surface during spring runoff or after storm events, but may fall below 1 m (39 in) during dry periods. These sites experience periodic flooding but duration is usually brief (Hansen and others 1995).

As discussed earlier, two situations that appear to favor the establishment of *Elaeagnus angustifolia* (Russian olive) seedlings are favorable spring moisture and slightly alkaline soils (Olson and Knopf 1986). Carmen and Brotherson (1982) reported that *Elaeagnus angustifolia* (Russian olive) preferred sites with low to medium concentrations (100-3,500 ppm) of soluble salts, whereas *Tamarix chinensis* (salt cedar) occurred on sites of higher (700-15,000

ppm) salt concentrations.

ADJACENT COMMUNITIES

Populus trichocarpa (Black cottonwood), *Salix* spp.(willow) or *Crataegus* spp. (hawthorn) communities often occupy associated riparian zones. Saturated sites may be dominated by *Typha* spp.(cattail), *Scirpus* spp. (bulrush), and *Phalaris arundinacea* (reed canarygrass). Adjacent upland communities include grasslands, *Ribes* spp. (currant) hedgerows, or *Artemisia tridentata* (big sagebrush) steppe.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Open stands of *Elaeagnus angustifolia* (Russian olive) may offer moderate to high grazing potential for livestock, especially where the the understory is dominated by graminoids; however, spines prevalent on branches throughout the canopy may act as a deterrent where stands are more densely clustered (Hansen and others 1995).

Wildlife

The high structural diversity of the *Elaeagnus angustifolia* (Russian olive) community type provides excellent thermal and hiding cover, but provides only limited forage for wildlife species. The fruits of *Elaeagnus angustifolia* (Russian olive) are eaten by pheasants, sharp-tailed grouse, squirrels, raccoons, whitetail deer, and a variety of nongame birds such as flickers, grosbeaks, warblers, and flycatchers. In southeastern Oregon, beaver have used *Elaeagnus angustifolia* (Russian olive) for dam material (Olson and Knopf 1986). However, the displacement of native floodplain forests by *Elaeagnus angustifolia* (Russian olive) can result in a 30 percent reduction of breeding bird species (Knopf 1991).

Elaeagnus angustifolia (Russian olive) stands can interfere with farming operations. They also hinder management activities on national wildlife refuges and occasionally block irrigation canals (Olson and Knopf 1986). Once established, *Elaeagnus angustifolia* (Russian olive) is difficult to control and nearly impossible to eradicate. Efforts to control unwanted stands have included mowing seedlings, cutting, burning, spraying, girdling, and bulldozing. Considering its adaptability and resistance to control efforts, *Elaeagnus angustifolia* (Russian olive) has become a management concern for both public agencies and private landowners (Hansen and others 1995).

Fisheries

Elaeagnus angustifolia (Russian olive) enhance fisheries by stabilizing streambanks, providing cover and moderating temperature highs during summer months.

Soil Management and Rehabilitation Opportunities

During spring runoff or after storm events when water tables are high, these soils are most susceptible to compaction by vehicular traffic or livestock. Sites with well drained soils and coarse textures are less susceptible to compaction, yet activities should be scheduled to avoid high water periods (Hansen and others 1995).

Considering its adaptability and resistance to control efforts, *Elaeagnus angustifolia* (Russian olive) has become a major management concern for both public agencies and private landowners. As indicated earlier, once established *Elaeagnus angustifolia* (Russian olive) is difficult to control and nearly impossible to eradicate. Efforts to control unwanted stands have included mowing seedlings, cutting, burning, spraying, girdling, and bulldozing. Therefore the planting of *Elaeagnus angustifolia* (Russian olive) should be eliminated due to the aggressive nature of *Elaeagnus angustifolia* (Russian olive) and the inevitable costs that will be associated with the long term control of this species (Hansen and others 1995).

Recreational Uses and Considerations

The *Elaeagnus angustifolia* (Russian olive) community type provides excellent opportunities for observing a variety of wildlife including big game, small mammals, songbirds and upland game birds. In the spring, the flowers of *Elaeagnus angustifolia* (Russian olive) are quite fragrant (Hansen and others 1995).

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = forested wetland; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

OTHER STUDIES

The *Elaeagnus angustifolia* (Russian olive) community type was described by Hansen and others (1995) for the state of Montana.

Populus angustifolia/Cornus stolonifera Community Type (Narrowleaf Cottonwood/Red-Osier Dogwood Community Type)

POPANG/CORSTO (POAN3/COST4)

Number Of Stands Sampled = 4

LOCATION AND ASSOCIATED LANDFORMS

The *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type is a major type at low to mid elevations in eastern Idaho, ranging from 1,455 to 2,061 m (4,800 to 6,800 ft). *Populus angustifolia* (narrowleaf cottonwood) tends to occupy broad, level floodplains and islands associated with major stream and river systems. While stands often occur on point bars, side bars, mid channel bars, and delta bars, they may be located well away from the river on drier secondary floodplains as a result of channel migration over time. Hansen and others indicate that *Populus angustifolia* (narrowleaf cottonwood) generally occurs at lower elevations than *Populus trichocarpa* (Black cottonwood) in Montana. Additional samples need to be collected to deter-

mine if this trend holds true in Idaho.

VEGETATION

Populus angustifolia (narrowleaf cottonwood) forms a thick canopy over a dense shrub understory in Idaho. Affiliated tree species, *Elaeagnus angustifolia* (Russian olive), *Acer negundo* (box-elder), and *Populus trichocarpa* (Black cottonwood), are present in trace amounts in the overstory. The shrub understory may be extensive, and is generally dominated by *Cornus stolonifera* (red-osier dogwood), *Rosa woodsii* (woods rose), and *Salix spp.* (willow). Common herbaceous species include *Agrostis stolonifera* (redtop), *Poa pratensis* (Kentucky bluegrass), and *Dactylis glomerata* (Orchard-grass); however, the herbaceous layer may be sparse and exhibit low vigor due to the substantial shrub component.

Table 3. Average canopy cover, range of canopy cover, and constancy for species recorded in stands of the *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type that are relatively undisturbed by livestock or wildlife (number = 4 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Trees			
Elaeagnus angustifolia (Russian Olive)	1	0-3	50
Populus angustifolia (Narrowleaf Cottonwood)	65	50-80	100
Populus trichocarpa (Black Cottonwood)	<1	0-1	25
Shrubs			
Clematis ligusticifolia (Western Virgins-bower)	8	0-20	75
Cornus stolonifera (Red-osier Dogwood)	45	10-80	100
Elaeagnus commutata (Silverberry)	3	0-10	50
Ribes lacustre (Swamp Currant)	<1	0-1	25
Rosa woodsii (Woods Rose)	23	0-40	75
Salix exigua (Sandbar Willow)	8	0-30	25
Salix lutea (Yellow Willow)	8	0-20	75
Graminoids			
Aegilops cylindrica (Goatgrass)	<1	0-1	25
Agrostis stolonifera (Redtop)	20	0-40	75
Alopecurus pratensis (Meadow Foxtail)	3	0-10	25
Bromus anomalus (Nodding Brome)	<1	0-1	25
Bromus spp. (Brome)	3	0-10	25
Dactylis glomerata (Orchard-grass)	10	0-40	25
Phalaris arundinacea (Reed Canarygrass)	5	0-20	50
Poa pratensis (Kentucky Bluegrass)	10	0-20	50
Forbs			
Arctium minus (Common Burdock)	<1	0-1	25

Cirsium arvense (Canada Thistle)	3	0-10	75
Cirsium vulgare (Bull Thistle)	1	0-3	25
Medicago sativa (Alfalfa)	3	0-10	25
Rumex crispus (Curly Dock)	<1	0-1	25
Smilacina stellata (Starry Solomon-plume)	3	0-10	50
Taraxacum officinale (Common Dandelion)	3	0-10	50

SUCCESSIONAL INFORMATION

The *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type represents a mid-seral stage of primary succession (Hansen and others 1995).

Primary Successional Stages

Cottonwoods are a pioneering species that requires moist, barren, newly deposited alluvium that is exposed to full sunlight. In general, these sites represent point bars, side bars, mid channel bars, delta bars, and islands. Since cottonwoods do not regenerate in their own shade and require moist, barren, fully exposed, newly deposited alluvial material as a suitable seedbed, they are considered a seral species and do not represent the climax community (PNC) for the site. Many stands may appear to have limited regeneration, especially in the open areas. However, it is important to understand that these young seedlings and saplings represent sprouts (asexual reproduction) and not establishment by seeds (sexual reproduction). These sprouts may help prolong the life span of the stand, but will not perpetuate or maintain the stand. In time the cottonwood stand will be replaced by a later successional stage (Hansen and others 1995).

The erosional and depositional pattern of a river helps maintain the diversity of plant communities on the floodplain. The distribution of various communities depends on the way the river meanders. In turn, the rate of meandering determines the proportion of floodplain communities considered to be in the pioneer or early seral, mid-seral, late seral, or climax (PNC) stage of succession. Where the river meanders frequently, few stands progress to later successional stages. Near the outer edges of the floodplain, the effect of the river is less pronounced, allowing later successional stages to develop. Typically, rivers meander like a whip or snake across their floodplain. Lateral movement of the river initiates a dynamic series of vegetation events. As water moves downstream, it erodes established banks, typically covered with riparian or wetland vegetation in different stages of development, on outside curves and deposits fresh alluvial materials on the point bars of inside curves. Each new deposit of alluvium forms a distinct band or terrace with each band being even aged and with gaps in ages between the bands. The ages of the bands are progressively older on older terraces. As the river moves away from sites of previous deposition and continues to downcut, the amount of soil water recharge from channel seepages decreases, making these sites (terraces) drier. If certain portions of the floodplain remain undisturbed for a long enough period of time, their relief with respect to the river may increase to a point where they are only rarely flooded, if at all. These terraces are considered old or mature alluvial terraces and can continue development toward climax (PNC) without the modifying influences of floods (Hansen 1989).

Early Seral Stage—The *Populus angustifolia*/Recent Alluvial Bar (narrowleaf cottonwood/ Recent Alluvial Bar)

community type is an early seral stage (Hansen and others 1995).

Mid-Seral Stage—If disturbance (either human-caused or natural) does not eliminate the stand, the *Populus angustifolia*/Recent Alluvial Bar (narrowleaf cottonwood/Recent Alluvial Bar) community type will progress to the relatively undisturbed mid-seral stage called the *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type. Normally, the understory of a pole to mature *Populus angustifolia* (narrowleaf cottonwood) stand is dominated by conifers such as *Picea* (spruce), *Pseudotsuga menziesii* (Douglas fir) or *Juniperus scopulorum* (Rocky Mountain juniper). Near the foothills, the understory may be dominated by *Fraxinus pennsylvanica* (green ash) or *Acer negundo* (box-elder). As the *Populus angustifolia* (narrowleaf cottonwood) overstory matures, becomes open, and finally, becomes decadent, conifers, *Fraxinus pennsylvanica* (green ash) or *Acer negundo* (box-elder) are ready to replace them (Hansen and others 1995).

Late Seral to Climax (PNC) Stage—As the cottonwood stand dies, primary succession toward other communities will occur unless flooding deposits new sediments suitable for cottonwood seedlings. In the absence of sediment deposition, at lower elevations succession continues from the *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type to the *Pseudotsuga menziesii/Cornus stolonifera* (Douglas fir/red-osier dogwood) habitat type, or the *Juniperus scopulorum/Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) habitat type. At higher elevations, succession may progress to the *Picea/Cornus stolonifera* (spruce/red-osier dogwood) habitat type. In the foothills, succession continues to the *Fraxinus pennsylvanica/Prunus virginiana* (green ash/common chokecherry), the *Acer negundo/Prunus virginiana* (box-elder/common chokecherry) habitat type, or the *Juniperus scopulorum/Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) habitat type. In other instances, this community type may be successional to the *Salix geyeriana/Calamagrostis canadensis* (Geyer willow/bluejoint reedgrass) habitat type or the *Salix lutea/Calamagrostis canadensis* (yellow willow/bluejoint reedgrass) habitat type, depending upon elevation (Hansen and others 1995).

Secondary Successional Stages

The presence or absence of a particular understory community may aid in determining the degree of disturbance (both present and historical disturbance) on a particular site. On sites that are relatively undisturbed, the understory of the *Populus angustifolia* (narrowleaf cottonwood) community will contain a diverse, dense shrub layer dominated by *Cornus stolonifera* (red-osier dogwood), *Amelanchier alnifolia* (western serviceberry), *Prunus virginiana* (common choke-cherry), and various species of *Salix* (willows) and *Ribes* (currants and gooseberries). This represents the *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type. With moderate levels of grazing or browsing, there will be an increase in *Symphoricarpos occidentalis* (western snowberry) and *Rosa* species (rose), with a corresponding decrease in both the abundance and canopy cover of *Cornus stolonifera* (red-osier dogwood), *Amelanchier alnifolia* (western serviceberry), *Prunus virginiana* (common chokecherry), and various species of *Ribes* (currants and gooseberries). If grazing or browsing pressures continue, the more desirable shrubs will be eliminated leaving *Symphoricarpos occidentalis* (western snowberry) and *Rosa* species (rose) which can form a nearly impenetrable understory. This stage of disturbance-caused secondary succession is called the *Populus angustifolia/Symphoricarpos occidentalis* (narrowleaf cottonwood/western snowberry) community type. If the disturbance is severe enough, *ALL* shrubs can be eliminated and the understory will be converted to a herbaceous one dominated by species such as *Poa pratensis* (Kentucky bluegrass), *Phleum pratensis*

(common timothy), *Bromus inermis* (smooth brome), and a variety of "weedy" forbs (e.g., the *Populus angustifolia*/Herbaceous [narrowleaf cottonwood/ Herbaceous] community type). During the process of converting from a diverse, dense shrub understory to a herbaceous understory, the stand will open up resulting in a drier site. Finally the stand becomes decadent with the stand's appearance becoming one of widely spaced, dying cottonwoods. The site now has become so open and dry that the site's potential may have changed to one capable of supporting a variety of upland types. The presence of conifers and upland shrub species will usually indicate the site's potential. However, conversion may be slow due to heavy grazing pressures and the sod forming characteristic of herbaceous species. Remnant shrubs and grasses, if present will help indicate the potential undergrowth composition (Hansen and others 1995).

Once the stand has converted from a shrub-dominated understory to one that is dominated by a variety of introduced herbaceous species, the ability to return the site to its former state (shrub-dominated) is very difficult. (It may be possible, but it will require a drastic change in management and may be very costly in terms of both labor and money.) Therefore, if a manager wants to maintain the stand in a shrub-dominated understory state, the most cost effective method is to change the management on the site ***BEFORE*** the site is too degraded (Hansen and others 1995).

SOILS

Alluvial soils are generally fine textured, primarily silt but with moderate quantities of clay and fine grain sand. This layer may be as shallow as 5 cm (2 in) but may extend to depths of 60 cm (24 in) or more. A matrix of gravels and cobbles occupies the zone below this horizon. Although neither mottled nor gleyed soil characteristics were observed, fluctuating water tables increase the potential for oxidation/reduction processes. Substrates tend to be well-drained, and are prone to flooding where sites occur on the active floodplain and islands. Water tables are high in the immediate vicinity of the channel, but drop proportionally for sites further removed from the active floodplain. *Populus angustifolia* (narrowleaf cottonwood) stands located on secondary (upper) floodplains may be 2 m (6.5 ft) or more above the water table, although moisture may be present closer to the surface due to capillary action. These sites may be characterized by moderate soil development due to the accumulation of leaf litter and absence of regular disturbance, and may be classified as Inceptisols, Entisols or Mollisols.

ADJACENT COMMUNITIES

Saturated sites may be dominated by *Typha* spp.(cattail), *Scirpus* spp. (bulrush), and *Phalaris arundinacea* (reed canarygrass). The *Populus angustifolia*/Herbaceous (narrowleaf cottonwood/ Herbaceous) community type or the *Populus angustifolia/Symphoricarpos occidentalis* (narrowleaf cottonwood/western snowberry) community type may occur on adjacent disturbed sites, while the *Populus angustifolia*/Recent Alluvial Bar (narrowleaf cottonwood/Recent Alluvial Bar) community type may be present on newly deposited alluvium. Nearby uplands are dominated by *Juniperus scopulorum* (Rocky Mountain juniper), *Artemisia tridentata* (big sagebrush) and *Poa pratensis* (Kentucky bluegrass).

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Forage production ranges from low to moderate due to the dense nature of the stands. Stands in good to excellent health (condition) often support dense thickets of shrubs, limiting the amount of available forage. *Cornus stolonifera* (red-osier dogwood) is considered an "ice cream" plant by livestock and wildlife. Its utilization is a direct indication of past and current use levels. In some areas, livestock browsing of *Cornus stolonifera* (red-osier dogwood) may be quite high (Hansen and others 1995).

Most sites are presently subjected to heavy grazing pressures because of their topographic location and ease of access. With moderate to heavy prolonged grazing pressures, most shrubs will be eliminated leaving the shrubs *Symphoricarpos occidentalis* (western snowberry) and *Rosa woodsii* (woods rose) as the dominate understory. At this point, the stand has been converted to the *Populus angustifolia/Symphoricarpos occidentalis* (narrowleaf cottonwood/western snowberry) disturbance-caused community type. If disturbance is severe, the shrubs will also be eliminated and the stand has converted to the *Populus angustifolia*/Herbaceous (narrowleaf cottonwood/Herbaceous) disturbance-caused community type (Hansen and others 1995).

Timber

Timber productivity for the associated cottonwoods and conifers ranges from low to moderate. Complete stand removal may result in a shrub-dominated community with extremely limited cottonwood regeneration except for occasional sprouting from stumps (Hansen and others 1995). Unless sites receive new alluvial deposits with spring flooding to act as seedbeds for the next generation of cottonwoods, the future timber potential is lost.

Wildlife

Ungulates, especially moose and whitetail deer, are common residents of these communities. Songbirds, raptors, and small mammals are also common, due to the high structural diversity and abundant food sources. *Populus angustifolia* (narrowleaf cottonwood) and *Cornus stolonifera* (red-osier dogwood) are often eaten by moose (Costain 1989) and used by beaver for food and building materials (Allen 1983). Understory species provide food and cover for waterfowl, small birds, and mammals (Dittberner and Olson 1983).

Fisheries

The stream-side location of this *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type is important in providing thermal cover, debris recruitment, and streambank stability. Its importance can not be emphasized enough (see discussion in the Soil Management and Rehabilitation Opportunities section). *Cornus stolonifera* (red-osier dogwood) and associated shrub species are excellent in controlling erosion along streams. This is particularly important on the higher gradient streams where scouring by seasonal flooding is possible (Hansen and others 1995).

Fire

The *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type is susceptible to fire during the late summer and fall. *Populus angustifolia* (narrowleaf cottonwood) and other shrubs of this type are adapted to light and in some instances to moderate intensity fires and may produce new sprouts following burns. The ability of cottonwoods to produce new sprouts following fire seems to be dependent upon

three criteria: 1) The particular species of cottonwood present in the stand. In general, *Populus angustifolia* (narrowleaf cottonwood) has a greater sprouting capability than *Populus trichocarpa* (black cottonwood) . 2) The age of the trees in the stand. As the trees mature, the sprouting potential tends to decrease proportionally. As the trees reach the decadent stage of development, the sprouting potential is severely limited. 3) The location of the water table. In general, the higher the water table throughout the growing season, the greater the ability for sprouts to survive. Therefore, if a manager wants to extend the life span of a stand of cottonwoods, fire ***MAY BE*** used as a tool in the pole to early mature stage of development. If fire is used to rehabilitate a stand, it is imperative that the stand be excluded from all livestock grazing for at least five years and that browsing by wildlife be closely monitored (Hansen and others 1995).

Cornus stolonifera (red-osier dogwood) and the associated shrub species can survive all but the most severe fires that remove duff and cause extended heating of the upper layer of soil. After a fire, the shrubs sprout from the surviving rhizomes or stolons (runners) (Fischer and Bradley 1987).

Soil Management and Rehabilitation Opportunities

Coarse textured soils are not as susceptible to compaction problems. This community type is subject to recurring scouring by floods and alluvium deposition. However, stands are relatively stable because of the strong rooting action of the associated species. Management should emphasize the importance of the understory shrub layer in streambank stabilization. This is particularly important on higher gradient stream channels where scouring by seasonal flooding occurs (Hansen and others 1995).

Managers should maintain a buffer strip of the *Populus angustifolia* (narrowleaf cottonwood) dominated community types adjacent to rivers and streams. These buffer strips reduce sedimentation, stabilize streambanks, and slow flood waters (Hansen and others 1995).

If the site still has a fairly high water table, a dramatic change in management (i.e. elimination of livestock grazing and close monitoring of wildlife impacts) ***MAY*** allow the remnant shrub population to sprout and re-invade the site. However, if the water table has dropped dramatically and the shrubs have been completely eliminated, the opportunity to reestablish a shrub understory dominated by desirable shrubs may be lost (Hansen and others 1995).

Where revegetation with woody species is wanted, desirable shrubs such as *Cornus stolonifera* (red-osier dogwood), *Amelanchier alnifolia* (western serviceberry), *Prunus virginiana* (common chokecherry), and various species of *Salix* (willows) and *Ribes* (currants and gooseberries) may be well adapted to planting on disturbed sites. Rooted cuttings or nursery grown seedlings are easily established on moist, well drained soils. Growth rates are rapid and the roots of established seedlings effectively stabilize recent bare alluvium. Remember: If the canopy cover of the trees in the stand has opened up too much and/or the water table has been lowered dramatically, the success of revegetation with desirable woody species will be low (Hansen and others 1995).

For rehabilitation of stands by the use of fire, see the discussion in the Fire Management section about the limitations of fire as a tool for rehabilitation. If fire is to be used to rehabilitate a stand, it is imperative that the stand be

excluded from all livestock grazing for at least five years and that browsing by wildlife be closely monitored (Hansen and others 1995).

The following guidelines should be followed when attempting to revegetate sites with cuttings from cottonwoods (Swenson 1988): 1) Do not plant cottonwoods in saline or alkaline sites. 2) Select sites with substrates of sand, gravel, or small cobbles. Avoid sites that are classified as clays or have a thick clay layer. 3) Make cuttings from stands of open, young, rapidly growing trees, using only cuttings that are four years old or less. Remove the side branches, leaving only the tip and next two lower side branches. 4) Make the cuttings when the plants are completely dormant. 5) Soak the cuttings in water for 10 to 14 days. 6) Auger holes to a depth of the lowest anticipated growing season water table. 7) Place the cuttings in the augered holes the same day they are removed from the soak. Set the butt at the lowest anticipated growing season groundwater depth. Select cuttings of a length which provides 1 to 2 m (3 to 6 ft) of cutting to remain above the soil surface. 8) Back fill the holes carefully to avoid air pockets. 9) Place tree guards around the cuttings if rodent or rabbit damage is anticipated. 10) As buds begin to swell along the cuttings, wipe them off the lower two-thirds of the cutting. 11) Plantings must be excluded from livestock grazing and big game browsing for two to three growing seasons. Some beaver control may be needed.

Recreational Uses and Considerations

Because of its proximity to streams and rivers and its flat topography, recreational developments and transportation corridors are common within this type. Recreational opportunities are excellent for fishing, big game and waterfowl hunting, and observing a variety of bird species (Hansen and others 1995).

Care must be taken when locating structures on active floodplains due to flood hazard.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = forested wetland; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

OTHER STUDIES

A similar community type was described by Youngblood and others (1985b) for eastern Idaho and western Wyoming, and by Padgett and others (1989) for Utah and southeastern Idaho. Major undergrowth shrubs were *Cornus stolonifera* (red-osier dogwood), *Betula occidentalis* (water birch), and *Salix bebbiana* (Bebb willow). A somewhat similar community type was described by Szaro (1989) for Arizona and New Mexico.

Populus angustifolia/Herbaceous Community Type
(Narrowleaf Cottonwood/Herbaceous Community Type)

POPANG (POAN3)

Number Of Stands Sampled = 9

LOCATION AND ASSOCIATED LANDFORMS

The *Populus angustifolia*/Herbaceous (narrowleaf cottonwood/Herbaceous) community type is a major type at low to mid elevations in eastern Idaho, ranging from 1,455 to 2,061 m (4,800 to 6,800 ft). *Populus angustifolia* (narrowleaf cottonwood) tends to occupy broad, level floodplains and islands associated with major stream and river systems. While stands often occur on point bars, side bars, mid channel bars, and delta bars, they may be located well away from the river on drier secondary floodplains as a result of channel migration over time. Hansen and others indicate that *Populus angustifolia* (narrowleaf cottonwood) generally occurs at lower elevations than *Populus trichocarpa* (Black cottonwood) in Montana. Additional samples need to be collected to determine if this trend holds true in Idaho.

VEGETATION

The *Populus angustifolia*/Herbaceous (narrowleaf cottonwood/Herbaceous) community type is a grazing or browsing disclimax of the *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type. Stands are two-tiered, characterized by mature, widely spaced *Populus angustifolia* (narrowleaf cottonwood) in the overstory and herbaceous species, such as *Poa pratensis* (Kentucky bluegrass), *Agropyron smithii* (western wheatgrass) and *Dactylis glomerata*(orchard-grass), dominating the understory. The sparse forb component may be represented by *Tragopogon dubius* (Goat's Beard) and *Erigeron glabellus* (Smooth Daisy). Disturbance tolerant shrub species, commonly *Crataegus douglasii* (Black Hawthorn) or *Rosa woodsii* (Woods Rose), are essentially absent or present with low coverages

Table 4. Provides the average canopy cover, the range of canopy cover, and the constancy of the sampled stands of the grazing or browsing disclimax for the *Populus angustifolia*/ Herbaceous (narrowleaf cottonwood/ Herbaceous) community type in Idaho (number = 9 stands).

Species	% Canopy Cover		
	Average	Range	Constancy
Trees			
Juniperus scopulorum (Rocky Mountain Juniper)	<1	0-1	11
Populus angustifolia (Narrowleaf Cottonwood)	41	10-80	100
Shrubs			
Clematis ligusticifolia (Western Virgins-bower)	<1	0-1	11
Crataegus douglasii (Black Hawthorn)	4	0-20	22
Elaeagnus commutata (Silverberry)	2	0-20	11
Ribes lacustre (Swamp Currant)	<1	0-1	11
Rosa woodsii (Woods Rose)	2	0-20	22
Graminoids			

Agropyron repens (Quackgrass)	3	0-30	11
Agropyron smithii (Western Wheatgrass)	12	0-40	44
Agrostis stolonifera (Redtop)	5	0-40	44
Dactylis glomerata (Orchard-grass)	12	0-40	44
Eleocharis palustris (Common Spikesedge)	2	0-20	11
Elymus spp. (Wildrye)	<1	0-1	11
Grass (Grass)	<1	0-1	11
Muhlenbergia asperifolia (Alkali Muhly)	1	0-10	11
Phleum pratense (Common Timothy)	<1	0-3	11
Poa pratensis (Kentucky Bluegrass)	33	0-90	78
Sporobolus airoides (Alkali Sacaton)	<1	0-3	11
Stipa comata (Needle-and-thread)	1	0-10	11
Stipa spp. (Needlegrass)	1	0-10	11
Forbs			
Arctium minus (Common Burdock)	<1	0-1	11
Artemisia ludoviciana (Prairie Sagewort)	<1	0-3	22
Bidens vulgata (Tall Beggar-ticks)	<1	0-1	11
Cynoglossum officinale (Common Hound's-tongue)	<1	0-1	11
Erigeron glabellus (Smooth Daisy)	2	0-10	78
Forb (Forb)	<1	0-1	11
Glycyrrhiza lepidota (American Licorice)	3	0-30	11
Gnaphalium chilense (Cotton-batting Plant)	<1	0-3	11
Lupinus argenteus (Silvery Lupine)	<1	0-3	11
Melilotus alba (White Sweet-clover)	2	0-20	11
Melilotus spp. (Sweet-clover)	<1	0-1	11
Rorippa palustris (Marsh Yellowcress)	<1	0-1	11
Solidago canadensis (Canada Goldenrod)	<1	0-1	11
Solidago occidentalis (Western Goldenrod)	2	0-10	33
Taraxacum officinale (Common Dandelion)	<1	0-1	22
Tragopogon dubius (Goat's Beard)	<1	0-1	67
Trifolium dubium (Least Hop Clover)	1	0-10	11
Equisetum laevigatum (Smooth Scouring-rush)	<1	0-3	22

SUCCESSIONAL INFORMATION

The *Populus angustifolia*/Herbaceous (narrowleaf cottonwood/Herbaceous) community type represents a severely disturbed secondary successional stage of the mid-seral *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type (Hansen and others 1995).

Primary Successional Stages

Cottonwoods are a pioneering species that requires moist, barren, newly deposited alluvium that is exposed to full sunlight. In general, these sites represent point bars, side bars, mid channel bars, delta bars, and islands. Since cottonwoods do not regenerate in their own shade and require moist, barren, fully exposed, newly deposited alluvial material as a suitable seedbed, they are considered a seral species and do not represent the climax community (PNC) for the site. Many stands may appear to have limited regeneration, especially in the open areas. However, it is important to understand that these young seedlings and saplings represent sprouts (asexual reproduction) and not establishment by seeds (sexual reproduction). These sprouts may help prolong the life span of the stand, but will not perpetuate or maintain the stand. In time the cottonwood stand will be replaced by a later successional stage (Hansen and others 1995).

The erosional and depositional pattern of a river helps maintain the diversity of plant communities on the floodplain. The distribution of various communities depends on the way the river meanders. In turn, the rate of meandering determines the proportion of floodplain communities considered to be in the pioneer or early seral, mid-seral, late seral, or climax (PNC) stage of succession. Where the river meanders frequently, few stands progress to later successional stages. Near the outer edges of the floodplain, the effect of the river is less pronounced, allowing later successional stages to develop. Typically, rivers meander like a whip or snake across their floodplain. Lateral movement of the river initiates a dynamic series of vegetation events. As water moves downstream, it erodes established banks, typically covered with riparian or wetland vegetation in different stages of development, on outside curves and deposits fresh alluvial materials on the point bars of inside curves. Each new deposit of alluvium forms a distinct band or terrace with each band being even aged and with gaps in ages between the bands. The ages of the bands are progressively older on older terraces. As the river moves away from sites of previous deposition and continues to downcut, the amount of soil water recharge from channel seepages decreases, making these sites (terraces) drier. If certain portions of the floodplain remain undisturbed for a long enough period of time, their relief with respect to the river may increase to a point where they are only rarely flooded, if at all. These terraces are considered old or mature alluvial terraces and can continue development toward climax (PNC) without the modifying influences of floods (Hansen 1989).

Early Seral Stage—The *Populus angustifolia*/Recent Alluvial Bar (narrowleaf cottonwood/ Recent Alluvial Bar) community type is an early seral stage (Hansen and others 1995).

Mid-Seral Stage—If disturbance (either human-caused or natural) does not eliminate the stand, the *Populus angustifolia*/Recent Alluvial Bar (narrowleaf cottonwood/Recent Alluvial Bar) community type will progress to the relatively undisturbed mid-seral stage called the *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type. Normally, the understory of a pole to mature *Populus angustifolia* (narrowleaf cottonwood) stand is dominated by conifers such as *Picea* (spruce), *Pseudotsuga menziesii* (Douglas fir) or *Juniperus scopulorum* (Rocky Mountain juniper). Near the foothills, the understory may be dominated by *Fraxinus pennsylvanica* (green ash) or *Acer negundo* (box-elder). As the *Populus angustifolia* (narrowleaf cottonwood) overstory matures, becomes open, and finally, becomes decadent, conifers, *Fraxinus pennsylvanica* (green ash) or *Acer negundo* (box-elder) are ready to replace them (Hansen and others 1995).

Late Seral to Climax (PNC) Stage—As the cottonwood stand dies, primary succession toward other communities

will occur unless flooding deposits new sediments suitable for cottonwood seedlings. In the absence of sediment deposition, at lower elevations succession continues from the *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type to the *Pseudotsuga menziesii/Cornus stolonifera* (Douglas fir/red-osier dogwood) habitat type, or the *Juniperus scopulorum/Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) habitat type. At higher elevations, succession may progress to the *Picea/Cornus stolonifera* (spruce/red-osier dogwood) habitat type. In the foothills, succession continues to the *Fraxinus pennsylvanica/Prunus virginiana* (green ash/common chokecherry), the *Acer negundo/Prunus virginiana* (box-elder/common chokecherry) habitat type, or the *Juniperus scopulorum/Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) habitat type. In other instances, this community type may be successional to the *Salix geyeriana/Calamagrostis canadensis* (Geyer willow/bluejoint reedgrass) habitat type or the *Salix lutea/Calamagrostis canadensis* (yellow willow/bluejoint reedgrass) habitat type, depending upon elevation (Hansen and others 1995).

Secondary Successional Stages

The presence or absence of a particular understory community may aid in determining the degree of disturbance (both present and historical disturbance) on a particular site. On sites that are relatively undisturbed, the understory of the *Populus angustifolia* (narrowleaf cottonwood) community will contain a diverse, dense shrub layer dominated by *Cornus stolonifera* (red-osier dogwood), *Amelanchier alnifolia* (western serviceberry), *Prunus virginiana* (common choke-cherry), and various species of *Salix* (willows) and *Ribes* (currants and gooseberries). This represents the *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type. With moderate levels of grazing or browsing, there will be an increase in *Symphoricarpos occidentalis* (western snowberry) and *Rosa* species (rose), with a corresponding decrease in both the abundance and canopy cover of *Cornus stolonifera* (red-osier dogwood), *Amelanchier alnifolia* (western serviceberry), *Prunus virginiana* (common chokecherry), and various species of *Ribes* (currants and gooseberries). If grazing or browsing pressures continue, the more desirable shrubs will be eliminated leaving *Symphoricarpos occidentalis* (western snowberry) and *Rosa* species (rose) which can form a nearly impenetrable understory. This stage of disturbance-caused secondary succession is called the *Populus angustifolia/Symphoricarpos occidentalis* (narrowleaf cottonwood/western snowberry) community type. If the disturbance is severe enough, *ALL* shrubs can be eliminated and the understory will be converted to a herbaceous one dominated by species such as *Poa pratensis* (Kentucky bluegrass), *Phleum pratensis* (common timothy), *Bromus inermis* (smooth brome), and a variety of "weedy" forbs (e.g., the *Populus angustifolia*/Herbaceous [narrowleaf cottonwood/ Herbaceous] community type). During the process of converting from a diverse, dense shrub understory to a herbaceous understory, the stand will open up resulting in a drier site. Finally the stand becomes decadent with the stand's appearance becoming one of widely spaced, dying cottonwoods. The site now has become so open and dry that the site's potential may have changed to one capable of supporting a variety of upland types. The presence of conifers and upland shrub species will usually indicate the site's potential. However, conversion may be slow due to heavy grazing pressures and the sod forming characteristic of herbaceous species. Remnant shrubs and grasses, if present will help indicate the potential undergrowth composition (Hansen and others 1995).

Once the stand has converted from a shrub-dominated understory to one that is dominated by a variety of introduced herbaceous species, the ability to return the site to its former state (shrub-dominated) is very difficult. (It may be possible, but it will require a drastic change in management and may be very costly in terms of both labor

and money.) Therefore, if a manager wants to maintain the stand in a shrub-dominated understory state, the most cost effective method is to change the management on the site *BEFORE* the site is too degraded (Hansen and others 1995).

SOILS

Alluvial soils are generally fine textured, primarily silt but with moderate quantities of clay and fine grain sand. This layer may be as shallow as 5 cm (2 in) but may extend to depths of 60 cm (24 in) or more. A matrix of gravels and cobbles occupies the zone below this horizon. Although neither mottled nor gleyed soil characteristics were observed, fluctuating water tables increase the potential for oxidation/reduction processes. Substrates tend to be well-drained, and are prone to flooding where sites occur on the active floodplain and islands. Water tables are high in the immediate vicinity of the channel, but drop proportionally for sites further removed from the active floodplain. *Populus angustifolia* (narrowleaf cottonwood) stands located on secondary (upper) floodplains may be 2 m (6.5 ft) or more above the water table, although moisture may be present closer to the surface due to capillary action. These sites may be characterized by moderate soil development due to the accumulation of leaf litter and absence of regular disturbance, and may be classified as Inceptisols, Entisols or Mollisols.

ADJACENT COMMUNITIES

Saturated sites may be dominated by *Typha* spp.(cattail), *Scirpus* spp. (bulrush), and *Phalaris arundinacea* (reed canarygrass). The *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type may occupy adjacent relatively undisturbed sites while the *Populus angustifolia/Symphoricarpos occidentalis* (narrowleaf cottonwood/western snowberry) community type may occur on moderately disturbed sites. The *Populus angustifolia*/Recent Alluvial Bar (narrowleaf cottonwood/Recent Alluvial Bar) community type may be present on locally deposited alluvium. Nearby uplands are dominated by *Juniperus scopulorum* (Rocky Mountain juniper), *Artemisia tridentata* (big sagebrush) and *Poa pratensis* (Kentucky bluegrass).

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

The *Populus angustifolia*/Herbaceous (narrowleaf cottonwood/Herbaceous) community type provides moderate levels of spring and summer forage. Heavy grazing and trampling tend to maintain the open structure of this community type and continued dominance of the undergrowth by *Poa pratensis* (Kentucky bluegrass), *Agrostis stolonifera* (redtop), *Agropyron repens* (quackgrass), *Phleum pratense* (common timothy), and a variety of "weedy" forbs. This community type is commonly used as a winter feed ground by ranchers. *Poa pratensis* (Kentucky bluegrass), *Agrostis stolonifera* (redtop), *Agropyron repens* (quackgrass), and *Phleum pratense* (common timothy) are palatable and moderately productive grasses, especially when soil moisture levels are high, and tolerates a high degree of defoliation. Herbage production is moderate. *Poa pratensis* (Kentucky bluegrass) is well adapted to grazing and is considered an increaser or an invader, especially if grazing intensities and durations are severe (Wasser 1982). This species can produce new shoots from both existing tillers or rhizomes. Grazing practices influence the type of growth form present (Volland 1978). A high density of weak, low vigor tillers results under season long grazing. Stem densities are emphasized over aboveground biomass. Grazing practices incorporating early season

rest increase the vigor of individual plants. Fewer shoots may be produced, but total aboveground biomass tends to be greater (Hansen and others 1995).

Timber

Timber productivity for the associated cottonwoods and conifers ranges from low to moderate. Complete stand removal may result in a shrub-dominated community with extremely limited cottonwood regeneration except for occasional sprouting from stumps (Hansen and others 1995). Unless sites receive new alluvial deposits with spring flooding to act as seedbeds for the next generation of cottonwoods, the future timber potential is lost.

Wildlife

This type is a source of early spring forage for moose, deer and elk. Cover value is limited because of the typically open, two layered structure. Birds are common, and larger cottonwoods provide nest sites. Large accipiters and cavity nesters may inhabit this type (Youngblood and others 1985b). Great blue herons nest in large cottonwood stands if isolation during the nesting period is possible Colonial nest sites are used for many years if left undisturbed (Parker 1980). Osprey will also use this type for nesting (Zarn 1974).

Fisheries

The stream side location of this type is important in providing thermal cover, debris recruitment, and streambank stability. However, the reestablishment of the shrub layer will offer greater bank stability and cover, further enhancing the existing conditions (Hansen and others 1995).

Fire

This type will burn when conditions are dry, such as fall or in late winter if snow accumulations are minimal. The ability of cottonwoods to produce new sprouts following fire seems to be dependent upon three criteria: 1) The particular species of cottonwood present in the stand. In general, *Populus angustifolia* (narrowleaf cottonwood) has a greater sprouting capability than *Populus trichocarpa* (black cottonwood). 2) The age of the trees in the stand. As the trees mature, the sprouting potential tends to decrease proportionally. As the trees reach the decadent stage of development, the sprouting potential is severely limited. 3) The location of the water table. In general, the higher the water table throughout the growing season, the greater the ability for sprouts to survive. Therefore, if a manager wants to extend the life span of a stand of cottonwoods, fire *MAY BE* used as a tool in the pole to early mature stage of development. If fire is used to rehabilitate a stand, it is imperative that the stand be excluded from all livestock grazing for at least five years and that browsing by wildlife be closely monitored (Hansen and others 1995).

Poa pratensis (Kentucky bluegrass) is damaged only by a hot, intense fire. Cool burns will have little effect on *Poa pratensis* (Kentucky bluegrass) (Volland and Dell 1981), but spring burns may lower tiller densities (Dix and Smeins 1967). Intense burns during active growing periods can be used to control stands of *Poa pratensis* (Kentucky bluegrass) (Wasser 1982).

Soil Management and Rehabilitation Opportunities

Coarse textured soils are not as susceptible to compaction problems. However, this community type is subject to

recurring scouring by floods and alluvium deposition. Management should emphasize the importance of restoring the deep-rooted understory shrub layer along streambanks for stabilization purposes. This is particularly important on higher gradient stream channels where scouring by seasonal flooding occurs (Hansen and others 1995).

Managers should maintain a buffer strip of the *Populus angustifolia* (narrowleaf cottonwood) dominated community types adjacent to rivers and streams. These buffer strips reduce sedimentation, stabilize streambanks, and slow flood waters.

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RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

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Populus angustifolia/ Recent Alluvial Bar Community Type (Narrowleaf Cottonwood/Recent Alluvial Bar Community Type)

POPANG (POAN3)

Number Of Stands Sampled in Montana= 7

NOTE: The *Populus angustifolia*/Recent Alluvial Bar (narrowleaf cottonwood/Recent Alluvial Bar) community type has been documented in Idaho according to field surveys conducted in 1994. However, due to time constraints during the 1995 field season, homogeneous stand data could not be collected for this type. In the subsequent discussion, any references to physical site location or vegetation characteristics for this type in Idaho were interpreted from 1994 field surveys. The remainder of this description was taken from the Classification and Management of Montana's Riparian and Wetland Sites (Hansen and others 1995).

LOCATION AND ASSOCIATED LANDFORMS

The *Populus angustifolia*/Recent Alluvial Bar (narrowleaf cottonwood/Recent Alluvial Bar) community type is a major type at low to mid elevations in eastern Idaho, ranging from 1,455 to 2,061 m (4,800 to 6,800 ft). *Populus angustifolia* (narrowleaf cottonwood) tends to occupy broad, level floodplains and islands associated with major stream and river systems. Seedlings germinate on point bars, side bars, mid channel bars, and delta bars, requir-

ing unvegetated, barren sites composed of sands, cobbles, and /or gravels, and water levels at or near the surface. Hansen and others indicate that *Populus angustifolia* (narrowleaf cottonwood) generally occurs at lower elevations than *Populus trichocarpa* (Black cottonwood) in Montana. Additional samples need to be collected to determine if this trend holds true in Idaho.

VEGETATION

In Montana, this type is characterized by a stand dominated by seedlings or saplings of *Populus angustifolia* (narrowleaf cottonwood), or a stand codominated by cottonwoods and *Salix exigua* (sandbar willow). *Populus deltoides* (Great Plains cottonwood) and *Populus trichocarpa* (black cottonwood) may be present, but are subordinate to *Populus angustifolia* (narrowleaf cottonwood). The understory is dominated by an assortment of grasses such as *Agrostis stolonifera* (redtop) and *Phleum pratense* (common timothy) (Table 5). Vegetation characteristics could not be adequately addressed for stands of this type in Idaho due to the collection field methods in 1994. Table 5 reflects vegetation surveyed on sites in Montana exclusively, and may not accurately portray species composition and canopy cover for sites identified in Idaho.

Table 5. Average canopy cover, range of canopy cover, and constancy for species recorded in stands of the *Populus angustifolia*/Recent Alluvial Bar (narrowleaf cottonwood/Recent Alluvial Bar) community type in Montana that are relatively undisturbed by livestock or wildlife (number = 7 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Trees			
Pinus contorta (lodgepole pine)	1	0-1	14
Pinus flexilis (limber pine)	1	0-1	14
Populus angustifolia (narrowleaf cottonwood)	26	20-40	100
Pseudotsuga menziesii (Douglas fir)	1	0-1	14
Shrubs			
Arctostaphylos uva-ursi (kinnikinnick)	1	0-1	14
Artemisia tridentata (big sagebrush)	1	0-1	29
Betula occidentalis (water birch)	3	0-3	14
Dryas drummondii (yellow mountain-avens)	30	0-40	29
Potentilla fruticosa (shrubby cinquefoil)	1	0-1	14
Salix exigua (sandbar willow)	34	0-80	43
Salix lutea (yellow willow)	1	0-1	29
Graminoids			
Agropyron caninum (bearded wheatgrass)	1	0-3	57
Agropyron spp. (wheatgrass)	1	0-1	14
Agrostis stolonifera (redtop)	8	0-20	71
Bromus ciliatus (fringed brome)	1	0-1	14
Carex spp. (sedge species)	1	0-1	14

Koeleria cristata (prairie junegrass)	1	0-1	14
Phleum pratense (common timothy)	2	0-3	71
Poa palustris (fowl bluegrass)	1	0-1	14
Poa pratensis (Kentucky bluegrass)	1	0-1	14
Poa spp. (bluegrass)	3	0-3	14
Sitanion hystrix (bottlebrush squirreltail)	1	0-1	14
Trisetum wolfii (Wolf's trisetum)	1	0-1	29
Forbs			
Achillea millefolium (common yarrow)	1	0-1	29
Antennaria anaphaloides (tall pussy-toes)	1	0-1	14
Antennaria spp. (pussy-toes)	1	0-1	14
Arabis spp. (rockcress)	1	0-1	29
Artemisia dracunculus (tarragon)	3	0-3	29
Aster chilensis (long-leaved aster)	2	0-3	29
Aster occidentalis (western aster)	1	0-1	29
Aster spp. (aster)	1	0-1	14
Astragalus spp. (milk-vetch)	1	0-1	29
Chrysopsis villosa (hairy golden-aster)	1	0-1	14
Comandra umbellata (bastard toad-flax)	1	0-1	14
Epilobium angustifolium (fireweed)	1	0-1	14
Epilobium suffruticosum (shrubby willow-herb)	20	0-20	14
Eriogonum umbellatum (sulfur buckwheat)	3	0-3	14
Fragaria virginiana (Virginia strawberry)	3	0-3	14
Gentianella detonsa (smaller fringed gentian)	1	0-1	14
Lupinus argenteus (silvery lupine)	20	0-20	14
Lupinus spp. (lupine)	3	0-3	14
Melilotus alba (white sweet-clover)	1	0-1	14
Melilotus officinalis (yellow sweet-clover)	1	0-1	14
Oxytropis spp. (crazyweed)	3	0-3	14
Sedum lanceolatum (lance-leaved stonecrop)	1	0-1	29
Solidago canadensis (Canada goldenrod)	1	0-1	43
Solidago missouriensis (Missouri goldenrod)	3	0-3	29
Taraxacum officinale (common dandelion)	1	0-1	14
Trifolium repens (white clover)	7	0-20	43
Ferns and Allies			
Equisetum arvense (field horsetail)	20	0-20	14
Equisetum laevigatum (smooth scouring-rush)	1	0-1	14

SUCCESSIONAL INFORMATION

The *Populus angustifolia*/Recent Alluvial Bar (narrowleaf cottonwood/Recent Alluvial Bar) community type rep-

resents an early seral (pioneer) stage of primary succession.

Primary Successional Stages

Cottonwoods are a pioneering species that requires moist, barren, newly deposited alluvium that is exposed to full sunlight. In general, these sites represent point bars, side bars, mid channel bars, delta bars, and islands. Since cottonwoods do not regenerate in their own shade and require moist, barren, fully exposed, newly deposited alluvial material as a suitable seedbed, they are considered a seral species and do not represent the climax community (PNC) for the site. Many stands may appear to have limited regeneration, especially in the open areas. However, it is important to understand that these young seedlings and saplings represent sprouts (asexual reproduction) and not establishment by seeds (sexual reproduction). These sprouts may help prolong the life span of the stand, but will not perpetuate or maintain the stand. In time the cottonwood stand will be replaced by a later successional stage.

The erosional and depositional pattern of a river helps maintain the diversity of plant communities on the floodplain. The distribution of various communities depends on the way the river meanders. In turn, the rate of meandering determines the proportion of floodplain communities considered to be in the pioneer or early seral, mid-seral, late seral, or climax (PNC) stage of succession. Where the river meanders frequently, few stands progress to later successional stages. Near the outer edges of the floodplain, the effect of the river is less pronounced, allowing later successional stages to develop. Typically, rivers meander like a whip or snake across their floodplain. Lateral movement of the river initiates a dynamic series of vegetation events. As water moves downstream, it erodes established banks, typically covered with riparian or wetland vegetation in different stages of development, on outside curves and deposits fresh alluvial materials on the point bars of inside curves. Each new deposit of alluvium forms a distinct band or terrace with each band being even aged and with gaps in ages between the bands. The ages of the bands are progressively older on older terraces. As the river moves away from sites of previous deposition and continues to downcut, the amount of soil water recharge from channel seepages decreases, making these sites (terraces) drier. If certain portions of the floodplain remain undisturbed for a long enough period of time, their relief with respect to the river may increase to a point where they are only rarely flooded, if at all. These terraces are considered old or mature alluvial terraces and can continue development toward climax (PNC) without the modifying influences of floods (Hansen 1989).

Early Seral Stage—The *Populus angustifolia*/Recent Alluvial Bar (narrowleaf cottonwood/Recent Alluvial Bar) community type is an early seral stage.

Mid-Seral Stage—If disturbance (either human-caused or natural) does not eliminate the stand, the *Populus angustifolia*/Recent Alluvial Bar (narrowleaf cottonwood/Recent Alluvial Bar) community type will progress to the relatively undisturbed mid-seral stage called the *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type. Normally, the understory of a pole to mature *Populus angustifolia* (narrowleaf cottonwood) stand is dominated by conifers such as *Picea* (spruce), *Pseudotsuga menziesii* (Douglas fir) or *Juniperus scopulorum* (Rocky Mountain juniper). Near the foothills, the understory may be dominated by *Fraxinus pennsylvanica* (green ash) or *Acer negundo* (box-elder). As the *Populus angustifolia* (narrowleaf cottonwood) overstory matures, becomes open, and finally, becomes decadent, conifers, *Fraxinus pennsylvanica*

(green ash) or *Acer negundo* (box-elder) are ready to replace them.

Late Seral to Climax (PNC) Stage—As the cottonwood stand dies, primary succession toward other communities will occur unless flooding deposits new sediments suitable for cottonwood seedlings. In the absence of sediment deposition, at lower elevations succession continues from the *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type to the *Pseudotsuga menziesii/Cornus stolonifera* (Douglas fir/red-osier dogwood) habitat type, or the *Juniperus scopulorum/Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) habitat type. At higher elevations, succession may progress to the *Picea/Cornus stolonifera* (spruce/red-osier dogwood) habitat type. In the foothills, succession continues to the *Fraxinus pennsylvanica/Prunus virginiana* (green ash/common chokecherry), the *Acer negundo/Prunus virginiana* (box-elder/common choke-cherry) habitat type, or the *Juniperus scopulorum/Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) habitat type. In other instances, this community type may be successional to the *Salix geyeriana/Calamagrostis canadensis* (Geyer willow/bluejoint reedgrass) habitat type or the *Salix lutea/Calamagrostis canadensis* (yellow willow/bluejoint reedgrass) habitat type, depending upon elevation.

Secondary Successional Stages

The normal primary successional sequence (described above) may be altered due to varying degrees of grazing and browsing pressures. Moderate, prolonged grazing and browsing pressures will cause a stand to progress to the disturbance-caused *Populus angustifolia/Symphoricarpos occidentalis* (narrowleaf cottonwood/western snowberry) community type. Severe, prolonged grazing and browsing pressures may eliminate all conifer and/or deciduous seedlings and may eliminate the undergrowth of shrub species as well. This severely disturbed stage of secondary succession is called the *Populus angustifolia*/Herbaceous (narrowleaf cottonwood/herbaceous) community type. In this situation, the overstory of *Populus angustifolia* (narrowleaf cottonwood) still matures and becomes open with an understory dominated by herbaceous species. Finally the stand becomes decadent with the stand's appearance becoming one of widely spaced, dying cottonwoods. The site now has become so open and dry that the site's potential may have changed to one capable of supporting a variety of upland types.

Stands of the *Populus angustifolia*/Recent Alluvial Bar (narrowleaf cottonwood/Recent Alluvial Bar) community type are very susceptible to the natural dynamics of a river system and may be flooded and eliminated after just a year or two of growth. Ice can also have a dramatic impact on these recently deposited alluvial bars. Ice can influence the floodplain landscape by either one of two ways: 1) mechanical damage, or 2) flooding (inundation). Mechanical damage generally involves the following: a) the laying down or bending over of the younger cottonwoods, b) the physical shearing off of the stems, c) the actual pulling out of the ground by the ice that surrounds the main stems, and d) the tilting or pushing over of mature trees. Young cottonwood seedlings and saplings are very susceptible to defoliation by livestock. If livestock pressures are too great, the stand can be either partially or totally eliminated. In many situations, excessive livestock pressure has completely eliminated the establishment of new cottonwood stands. Beaver and big game species can also have a dramatic impact on newly established cottonwood stands.

SOILS

Populus angustifolia (narrowleaf cottonwood) generally occurs along streams with large amounts of coarse sub-

strates such as cobbles and gravels. Soils are typically Entisols (Fluvents) with up to 1 m (39 in) of mineral soil overlying river gravel and/or cobbles. Soil texture varies from loam to coarse sand. Water tables are generally at or near the soil surface. In late summer water tables may drop below 50 cm (20 in) of the soil surface but surface horizons remain moist due to capillary action. Soils are well drained with low available water. Coarse textured soils, moderate stream gradients, and high coarse fragment contents throughout the soil profile provide an environment that produces a rapid movement of highly aerated groundwater. This type of substrate is important to many floodplain communities.

ADJACENT COMMUNITIES

Adjacent wetter communities are often the *Salix exigua* (sandbar willow) community type. Stands of *Salix amygdaloides* (peach-leaf willow) and *Salix lasiandra* (Pacific willow) may border this type. Adjacent undisturbed sites may have the *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type. The *Populus angustifolia/* Herbaceous (narrowleaf cottonwood/Herbaceous) community type or the *Populus angustifolia/ Symphoricarpos occidentalis* (narrowleaf cottonwood/western snowberry) community type may be adjacent on disturbed sites. Nearby uplands are dominated by *Artemisia tridentata* (big sagebrush), *Agropyron spicatum* (bluebunch wheatgrass), and *Poa pratensis* (Kentucky bluegrass).

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Forage production is low to moderate. Stands in good to excellent health (condition) often support dense thickets of cottonwoods and associated shrub species thereby limiting the amount of available forage. These stands are very susceptible to defoliation by livestock. If establishment of new cottonwood stands is a management objective, livestock impacts should be closely monitored. In some situations it may be advisable to eliminate livestock use until the cottonwoods are of sufficient height to preclude defoliation by livestock.

Wildlife

The *Populus angustifolia*/Recent Alluvial Bar (narrowleaf cottonwood/Recent Alluvial Bar) community type provides valuable cover, shade, and food for a variety of species. Big game use may be high, depending upon the time of year. *Populus angustifolia* (narrowleaf cottonwood) is used by beaver for food and building materials (Allen 1983). Understory species provide food and cover for waterfowl, small birds, and mammals (Dittberner and Olson 1983).

Fisheries

The stream side location of the *Populus angustifolia*/Recent Alluvial Bar (narrowleaf cottonwood/Recent Alluvial Bar) community type is valuable for fisheries by providing for streambank stability.

Fire

The *Populus angustifolia*/Recent Alluvial Bar (narrowleaf cottonwood/Recent Alluvial Bar) community type is susceptible to fire. In general, cottonwood seedlings, and to a lesser degree cottonwood saplings, do not have an

extensive root system or thick bark and may be severely damaged (or eliminated) by fire.

Soil Management and Rehabilitation Opportunities

The coarse textured substrates are not susceptible to compaction problems. This community type is subject to recurring scouring by floods and alluvium deposition. Managers should maintain a buffer strip of the *Populus angustifolia* (narrowleaf cottonwood) dominated community types adjacent to rivers and streams. These buffer strips reduce sedimentation, stabilize streambanks, and slow flood waters.

The following guidelines should be followed when attempting to revegetate sites with cuttings from cottonwoods (Swenson 1988): 1) Do not plant cottonwoods in saline or alkaline sites. 2) Select sites with substrates of sand, gravel, or small cobbles. Avoid sites that are classified as clays or have a thick clay layer. 3) Make cuttings from stands of open, young, rapidly growing trees, using only cuttings that are four years old or less. Remove the side branches, leaving only the tip and next two lower side branches. 4) Make the cuttings when the plants are completely dormant. 5) Soak the cuttings in water for 10 to 14 days. 6) Auger holes to a depth of the lowest anticipated growing season water table. 7) Place the cuttings in the augered holes the same day they are removed from the soak. Set the butt at the lowest anticipated growing season groundwater depth. Select cuttings of a length which provides 1 to 2 m (3 to 6 ft) of cutting to remain above the soil surface. 8) Back fill the holes carefully to avoid air pockets. 9) Place tree guards around the cuttings if rodent or rabbit damage is anticipated. 10) As buds begin to swell along the cuttings, wipe them off the lower two-thirds of the cutting. 11) Plantings must be excluded from livestock grazing and big game browsing for two to three growing seasons. Some beaver control may be needed.

Recreational Uses and Considerations

Recreational opportunities are excellent for fishing, big game and waterfowl hunting, and observing a variety of bird species. However, the dense nature of many of these stands may preclude various types of recreational activities such as fly fishing.

Care must be taken when locating structures within this type. Some campgrounds in Montana have been seriously damaged by floods or lost altogether.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = forested wetland; Subclass = broad-leaved deciduous; Water Regime (nontidal) = seasonally flooded.

OTHER STUDIES

This type has been documented in the Classification and Management of Montana's Riparian and Wetland Sites (Hansen and others 1995).

Populus angustifolia/Symphoricarpos occidentalis Community Type
(Narrowleaf Cottonwood/Western Snowberry Community Type)

POPANG/SYMOCC (POAN3/SYOC)
Number Of Stands Sampled = 1

LOCATION AND ASSOCIATED LANDFORMS

The *Populus angustifolia/Symphoricarpos occidentalis* (narrowleaf cottonwood/western snowberry) community type is a minor type at low to mid elevations in eastern Idaho, ranging from 1,455 to 2,061 m (4,800 to 6,800 ft). *Populus angustifolia* (narrowleaf cottonwood) tends to occupy broad, level floodplains and islands associated with major stream and river systems. While stands often occur on point bars, side bars, mid channel bars, and delta bars, they may be located well away from the river on drier secondary floodplains as a result of channel migration over time. Hansen and others indicate that *Populus angustifolia* (narrowleaf cottonwood) generally occurs at lower elevations than *Populus trichocarpa* (Black cottonwood) in Montana. Additional samples need to be collected to determine if this trend holds true in Idaho.

VEGETATION

The *Populus angustifolia/Symphoricarpos occidentalis* (narrowleaf cottonwood/western snowberry) community type is a grazing disclimax. *Populus angustifolia* (narrowleaf cottonwood) dominates the overstory, with the occasional presence of *Juniperus scopulorum* (Rocky Mountain juniper) and *Populus trichocarpa* (Black cottonwood). The shrub component consists of *Rosa woodsii* (woods rose), *Prunus virginiana* (Common Chokecherry), *Crataegus douglasii* (Black Hawthorn) and other disturbance tolerant shrubs. The herbaceous understory generally consists of disturbance induced species as well, notably *Poa pratensis* (Kentucky bluegrass), *Bromus inermis* (smooth brome) *Agrostis stolonifera* (redtop), and *Smilacina stellata* (starry Solomon-plume). Although *Symphoricarpos occidentalis* (western snowberry) is the signature species and represents one of the main indicator understory species for this type, it was not observed in any of the sampled stands in Idaho. This discrepancy may be the result of the limited number of stands observed. Additional sites need to be surveyed to determine if this trend continues, requiring modification to the type description developed by Hansen and others (1995).

Table 6. Canopy cover for species sampled in stands of the grazing disclimax *Populus angustifolia/Symphoricarpos occidentalis* (narrowleaf cottonwood/western snowberry) community type (number = 1 stands).

Species	% Canopy Cover
Trees	
Juniperus scopulorum (Rocky Mountain Juniper)	3
Populus angustifolia (Narrowleaf Cottonwood)	98
Shrubs	
Artemisia cana (Silver Sagebrush)	1

Artemisia tridentata (Big Sagebrush)	1
Clematis ligusticifolia (Western Virgins-bower)	10
Cornus stolonifera (Red-osier Dogwood)	1
Prunus virginiana (Common Chokecherry)	20
Rosa woodsii (Woods Rose)	3
Graminoids	
Agrostis stolonifera (Redtop)	3
Bromus inermis (Smooth Brome)	30
Glyceria grandis (American Mannagrass)	1
Phleum pratense (Common Timothy)	3
Poa pratensis (Kentucky Bluegrass)	10
Forbs	
Arctium minus (Common Burdock)	3
Epilobium ciliatum (Common Willow-herb)	3
Lactuca serriola (Prickly Lettuce)	1
Melilotus officinalis (Yellow Sweet-clover)	1
Nasturtium officinale (Water-cress)	1
Nepeta cataria (Catnip)	3
Rumex crispus (Curly Dock)	1
Smilacina stellata (Starry Solomon-plume)	10
Solidago canadensis (Canada Goldenrod)	3
Tanacetum vulgare (Common Tansy)	3
Veronica anagallis-aquatica (Water Speedwell)	1

SUCCESSIONAL INFORMATION

Hansen and others (1995) indicate that the *Populus angustifolia/Symphoricarpos occidentalis* (narrowleaf cottonwood/western snowberry) community type represents a moderately disturbed secondary successional stage of the mid-seral *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type.

Primary Successional Stages

Cottonwoods are a pioneering species that requires moist, barren, newly deposited alluvium that is exposed to full sunlight. In general, these sites represent point bars, side bars, mid channel bars, delta bars, and islands. Since cottonwoods do not regenerate in their own shade and require moist, barren, fully exposed, newly deposited alluvial material as a suitable seedbed, they are considered a seral species and do not represent the climax community (PNC) for the site. Many stands may appear to have limited regeneration, especially in the open areas. However, it is important to understand that these young seedlings and saplings represent sprouts (asexual reproduction) and not establishment by seeds (sexual reproduction). These sprouts may help prolong the life span of the stand, but will not perpetuate or maintain the stand. In time the cottonwood stand will be replaced by a later successional stage (Hansen and others 1995).

The erosional and depositional pattern of a river helps maintain the diversity of plant communities on the floodplain. The distribution of various communities depends on the way the river meanders. In turn, the rate of meandering determines the proportion of floodplain communities considered to be in the pioneer or early seral, mid-seral, late seral, or climax (PNC) stage of succession. Where the river meanders frequently, few stands progress to later successional stages. Near the outer edges of the floodplain, the effect of the river is less pronounced, allowing later successional stages to develop. Typically, rivers meander like a whip or snake across their floodplain. Lateral movement of the river initiates a dynamic series of vegetation events. As water moves downstream, it erodes established banks, typically covered with riparian or wetland vegetation in different stages of development, on outside curves and deposits fresh alluvial materials on the point bars of inside curves. Each new deposit of alluvium forms a distinct band or terrace with each band being even aged and with gaps in ages between the bands. The ages of the bands are progressively older on older terraces. As the river moves away from sites of previous deposition and continues to downcut, the amount of soil water recharge from channel seepages decreases, making these sites (terraces) drier. If certain portions of the floodplain remain undisturbed for a long enough period of time, their relief with respect to the river may increase to a point where they are only rarely flooded, if at all. These terraces are considered old or mature alluvial terraces and can continue development toward climax (PNC) without the modifying influences of floods (Hansen 1989).

Early Seral Stage—The *Populus angustifolia*/Recent Alluvial Bar (narrowleaf cottonwood/ Recent Alluvial Bar) community type is an early seral stage (Hansen and others 1995).

Mid-Seral Stage—If disturbance (either human-caused or natural) does not eliminate the stand, the *Populus angustifolia*/Recent Alluvial Bar (narrowleaf cottonwood/Recent Alluvial Bar) community type will progress to the relatively undisturbed mid-seral stage called the *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type. Normally, the understory of a pole to mature *Populus angustifolia* (narrowleaf cottonwood) stand is dominated by conifers such as *Picea* (spruce), *Pseudotsuga menziesii* (Douglas fir), or *Juniperus scopulorum* (Rocky Mountain juniper). Near the foothills, the understory may be dominated by *Fraxinus pennsylvanica* (green ash) or *Acer negundo* (box-elder). As the *Populus angustifolia* (narrowleaf cottonwood) overstory matures, becomes open, and finally, becomes decadent, conifers, *Fraxinus pennsylvanica* (green ash) or *Acer negundo* (box-elder) are ready to replace them (Hansen and others 1995).

Late Seral to Climax (PNC) Stage—As the cottonwood stand dies, primary succession toward other communities will occur unless flooding deposits new sediments suitable for cottonwood seedlings. In the absence of sediment deposition, at lower elevations succession continues from the *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type to the *Pseudotsuga menziesii/Cornus stolonifera* (Douglas fir/red-osier dogwood) habitat type, or the *Juniperus scopulorum/Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) habitat type. At higher elevations, succession may progress to the *Picea/Cornus stolonifera* (spruce/red-osier dogwood) habitat type. In the foothills of Montana, succession continues to the *Fraxinus pennsylvanica/Prunus virginiana* (green ash/common chokecherry), the *Acer negundo/Prunus virginiana* (box-elder/common chokecherry) habitat type, or the *Juniperus scopulorum/Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) habitat type. In other instances, this community type may be successional to the *Salix geyeriana/Calamagrostis canadensis* (Geyer willow/bluejoint reedgrass) habitat type or the *Salix lutea/Calamagrostis*

canadensis (yellow willow/bluejoint reedgrass) habitat type, depending upon elevation (Hansen and others 1995).

Secondary Successional Stages

The presence or absence of a particular understory community may aid in determining the degree of disturbance (both present and historical disturbance) on a particular site. On sites that are relatively undisturbed, the understory of the *Populus angustifolia* (narrowleaf cottonwood) community will contain a diverse, dense shrub layer dominated by *Cornus stolonifera* (red-osier dogwood), *Amelanchier alnifolia* (western serviceberry), *Prunus virginiana* (common choke-cherry), and various species of *Salix* (willows) and *Ribes* (currants and gooseberries). This represents the *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type. With moderate levels of grazing or browsing, there will be an increase in *Symphoricarpos occidentalis* (western snowberry) and *Rosa* species (rose), with a corresponding decrease in both the abundance and canopy cover of *Cornus stolonifera* (red-osier dogwood), *Amelanchier alnifolia* (western serviceberry), *Prunus virginiana* (common chokecherry), and various species of *Ribes* (currants and gooseberries). If grazing or browsing pressures continue, the more desirable shrubs will be eliminated leaving *Symphoricarpos occidentalis* (western snowberry) and *Rosa* species (rose) which can form a nearly impenetrable understory. This stage of disturbance-caused secondary succession is called the *Populus angustifolia/Symphoricarpos occidentalis* (narrowleaf cottonwood/western snowberry) community type. If the disturbance is severe enough, ***ALL*** shrubs can be eliminated and the understory will be converted to a herbaceous one dominated by species such as *Poa pratensis* (Kentucky bluegrass), *Phleum pratensis* (common timothy), *Bromus inermis* (smooth brome), and a variety of "weedy" forbs (e.g., the *Populus angustifolia*/Herbaceous [narrowleaf cottonwood/Herbaceous] community type). During the process of converting from a diverse, dense shrub understory to a herbaceous understory, the stand will open up resulting in a drier site. Finally the stand becomes decadent with the stand's appearance becoming one of widely spaced, dying cottonwoods. The site now has become so open and dry that the site's potential may have changed to one capable of supporting a variety of upland types. The presence of conifers and upland shrub species will usually indicate the site's potential. However, conversion may be slow due to heavy grazing pressures and the sod forming characteristic of herbaceous species. Remnant shrubs and grasses, if present, will help indicate the potential undergrowth composition (Hansen and others 1995).

Once the stand has converted from a shrub-dominated understory to one that is dominated by a variety of introduced herbaceous species, the ability to return the site to its former state (shrub-dominated) is very difficult. (It may be possible, but it will require a drastic change in management and may be very costly in terms of both labor and money.) Therefore, if a manager wants to maintain the stand in a shrub-dominated understory state, the most cost effective method is to change the management on the site ***BEFORE*** the site is too degraded (Hansen and others 1995).

SOILS

Alluvial soils are generally fine textured, primarily silt but with moderate quantities of clay and fine grain sand. This layer may be as shallow as 5 cm (2 in) but may extend to depths of 60 cm (24 in) or more. A matrix of gravels and cobbles occupies the zone below this horizon. Although neither mottled nor gleyed soil characteristics were observed, fluctuating water tables increase the potential for oxidation/reduction reactions. Substrates tend to be well-drained, and are prone to flooding where sites occur on the active floodplain and islands. Water tables are

high in the immediate vicinity of the channel, but drop proportionally for sites further removed from the active floodplain. *Populus angustifolia* (narrowleaf cottonwood) stands located on secondary (upper) floodplains may be 2 m (6.5 ft) or more above the water table, although moisture may be present closer to the surface due to capillary action. These sites may be characterized by moderate soil development due to the accumulation of leaf litter and absence of regular disturbance, and may be classified as Inceptisols, Entisols or Mollisols.

ADJACENT COMMUNITIES

Saturated sites may be dominated by *Typha* spp.(cattail), *Scirpus* spp. (bulrush), and *Phalaris arundinacea* (reed canarygrass). Associated riparian shrub communities may be dominated by *Betula occidentalis* (water birch), *Salix exigua* (sandbar willow), *Crataegus douglasii* (Black Hawthorn and *Salix spp.* (willow). The *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type may occupy adjacent relatively undisturbed sites while the *Populus angustifolia/* Herbaceous (narrowleaf cottonwood/Herbaceous) community type may occur on severely disturbed sites. The *Populus angustifolia/* Recent Alluvial Bar (narrowleaf cottonwood/Recent Alluvial Bar) community type may be present on locally deposited alluvium. Nearby uplands are often dominated by *Juniperus scopulorum* (Rocky Mountain juniper), *Artemisia tridentata* (big sagebrush) and *Poa pratensis* (Kentucky bluegrass).

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Forage production ranges from low to moderate due to the dense shrub understory within the stands. Forage production from dense thickets of *Symphoricarpos occidentalis* (western snowberry), when present, and *Rosa woodsii* (woods rose) is low. Stands may be so dense that they exclude most livestock use. As the shrub understory is eliminated by continual prolonged heavy grazing or browsing, stands open and forage production increases accordingly due to the presence and amount of *Poa pratensis* (Kentucky bluegrass), *Phleum pratense* (common timothy), or *Bromus inermis* (smooth brome). The palatability of *Symphoricarpos occidentalis* (western snowberry) ranges from low to fair for cattle and sheep (Wasser 1982, Johnson and Nichols 1982), and the leaves of *Rosa woodsii* (woods rose) are considered fair to fairly good livestock forage, particularly for sheep (Johnson and Nichols 1982).

Timber

Timber productivity for the associated cottonwoods and conifers ranges from low to moderate. Complete stand removal may result in a shrub-dominated community with extremely limited cottonwood regeneration except for occasional sprouting from stumps (Hansen and others 1995). Unless sites receive new alluvial deposits with spring flooding to act as seedbeds for the next generation of cottonwoods, the future timber potential is lost.

Wildlife

Ungulates, especially moose and whitetail deer, are common residents of these communities. Songbirds, raptors, and small mammals are also common, due to the high structural diversity and abundant food sources. *Populus angustifolia* (narrowleaf cottonwood) and *Rosa woodsii* (woods rose) are used by beaver for food and building materi-

als (Allen 1983). Understory species provide food and cover for waterfowl, small birds, and mammals (Dittberner and Olson 1983).

The moderate structural understory diversity of *Symphoricarpos occidentalis* (western snowberry) and *Rosa woodsii* (woods rose) provides thermal and hiding cover for big game and upland bird species. The palatability of *Symphoricarpos occidentalis* (western snowberry) is rated as good for deer and elk (Wasser 1982, Johnson and Nichols 1982). Deer and elk may browse heavily on *Rosa woodsii* (woods rose), while the persistent fruit (rose hips) provides fall and winter food for birds, small mammals, and bears, which disperse the seeds. *Rosa woodsii* (woods rose) is strongly grazing tolerant but can be dwarfed and thinned by intense browsing or defoliation by season long use (Hansen and others 1995).

Fisheries

The stream side location of this *Populus angustifolia/Symphoricarpos occidentalis* (narrowleaf cottonwood/western snowberry) community type is important in providing thermal cover, debris recruitment, and streambank stability. Its importance can not be emphasized enough (see discussion in the Soil Management and Rehabilitation Opportunities section). *Symphoricarpos occidentalis* (western snowberry) and *Rosa woodsii* (woods rose) are excellent in controlling erosion along streams due to their rhizomatous nature. This is particularly important on the higher gradient streams where scouring by seasonal flooding is possible (Hansen and others 1995).

Fire

The *Populus angustifolia/Symphoricarpos occidentalis* (narrowleaf cottonwood/western snowberry) community type is susceptible to fire during the late summer and fall. *Populus angustifolia* (narrowleaf cottonwood) and other shrubs of this type are adapted to light and in some instances to moderate intensity fires and may produce new sprouts following burns. The ability of cottonwoods to produce new sprouts following fire seems to be dependent upon three criteria: 1) The particular species of cottonwood present in the stand. In general, *Populus angustifolia* (narrowleaf cottonwood) has a greater sprouting capability than *Populus trichocarpa* (black cottonwood). 2) The age of the trees in the stand. As the trees mature, the sprouting potential tends to decrease proportionally. As the trees reach the decadent stage of development, the sprouting potential is severely limited. 3) The location of the water table. In general, the higher the water table throughout the growing season, the greater the ability for sprouts to survive. Therefore, if a manager wants to extend the life span of a stand of cottonwoods, fire ***MAY BE*** used as a tool in the pole to early mature stage of development. If fire is used to rehabilitate a stand, it is imperative that the stand be excluded from all livestock grazing for at least five years and that browsing by wildlife be closely monitored (Hansen and others 1995).

Symphoricarpos occidentalis (western snowberry) is tolerant of fire. It can be injured by fire but usually sprouts, with stands becoming denser afterward. It is such a strong competitor, particularly in dense colonies, that it is not very compatible with most herbaceous vegetation. *Rosa woodsii* (woods rose) is strongly fire tolerant, except for smoldering fires with heavy volumes of surface fuel. The species has a shallow and much branched rhizomatous root system that will readily sprout and sucker. This sprouting capability of *Rosa woodsii* (woods rose) make it a good soil stabilizer (Hansen and others 1995).

Soil Management and Rehabilitation Opportunities

Coarse textured soils are not as susceptible to compaction problems. This community type is subject to recurring scouring by floods and alluvium deposition. However, stands are relatively stable because of the strong rooting action of the associated species. Management should emphasize the importance of the understory shrub layer in streambank stabilization. This is particularly important on higher gradient stream channels where scouring by seasonal flooding occurs (Hansen and others 1995).

Managers should maintain a buffer strip of the *Populus angustifolia* (narrowleaf cottonwood) dominated community types adjacent to rivers and streams. These buffer strips reduce sedimentation, stabilize streambanks, and slow flood waters (Hansen and others 1995).

If the stand still has a fairly high water table, a dramatic change in management (i.e. elimination of livestock grazing and close monitoring of wildlife impacts) *MAY* allow the remnant shrub population to sprout and re-invade the stand. However, if the water table has dropped dramatically and the shrubs have been completely eliminated, the opportunity to reestablish a shrub understory dominated by desirable shrubs may be lost (Hansen and others 1995).

Where revegetation with woody species is wanted, desirable shrubs such as *Cornus stolonifera* (red-osier dogwood), *Amelanchier alnifolia* (western serviceberry), *Prunus virginiana* (common chokecherry), and various species of *Salix* (willows) and *Ribes* (currants and gooseberries) may be well adapted to planting on disturbed sites. Rooted cuttings or nursery grown seedlings are easily established on moist, well drained soils. Growth rates are rapid and the roots of established seedlings effectively stabilize recent bare alluvium. Remember: If the canopy cover of the trees in the stand has opened up too much and/or the water table has been lowered dramatically, the success of revegetation with desirable woody species will be low (Hansen and others 1995).

For rehabilitation of stands by the use of fire, see the discussion in the Fire Management section about the limitations of fire as a tool for rehabilitation. If fire is to be used to rehabilitate a stand, it is imperative that the stand be excluded from all livestock grazing for at least five years and that browsing by wildlife be closely monitored (Hansen and others 1995).

The following guidelines should be followed when attempting to revegetate sites with cuttings from cottonwoods (Swenson 1988): 1) Do not plant cottonwoods in saline or alkaline sites. 2) Select sites with substrates of sand, gravel, or small cobbles. Avoid sites that are classified as clays or have a thick clay layer. 3) Make cuttings from stands of open, young, rapidly growing trees, using only cuttings that are four years old or less. Remove the side branches, leaving only the tip and next two lower side branches. 4) Make the cuttings when the plants are completely dormant. 5) Soak the cuttings in water for 10 to 14 days. 6) Auger holes to a depth of the lowest anticipated growing season water table. 7) Place the cuttings in the augered holes the same day they are removed from the soak. Set the butt at the lowest anticipated growing season groundwater depth. Select cuttings of a length which provides 1 to 2 m (3 to 6 ft) of cutting to remain above the soil surface. 8) Back fill the holes carefully to avoid air pockets. 9) Place tree guards around the cuttings if rodent or rabbit damage is anticipated. 10) As buds begin to swell along the cuttings, wipe them off the lower two-thirds of the cutting. 11) Plantings must be excluded from

livestock grazing and big game browsing for two to three growing seasons. Some beaver control may be needed.

Symphoricarpos occidentalis (western snowberry) is well adapted for revegetating sites. Commonly growing in dense colony stands makes it suitable for disturbed land stabilization. It does best on moist, well drained soils which have not been excessively disturbed. Once established, it grows at a moderate rate and spreads rapidly by root sprouts. Nursery grown seedlings, rooted cuttings, or wildlings are the preferred planting materials. Critical, erosive sites may need complete exclusion from grazing during establishment, and animal populations and stacking rates should be balanced with forage supply on noncritical sites after establishment (Wasser 1982).

Rosa woodsii (woods rose) is valuable for revegetating disturbed sites along streambanks and seeps. It is easily established from nursery grown stock, root cuttings, or transplanted materials (Hansen and others 1995).

Recreational Uses and Considerations

Because of its proximity to streams and rivers and its flat topography, recreational developments and transportation corridors are common within this type. Recreational opportunities are excellent for fishing, big game and waterfowl hunting, and observing a variety of bird species (Hansen and others 1995).

Care must be taken when locating structures within this type due to flood hazard.

Symphoricarpos occidentalis (western snowberry) is an important food source for upland birds due to fruits that persist into the winter. Native Americans made extensive use of *Rosa woodsii* (woods rose) roots, stems, leaves, flowers, and rose hips for food and therapeutic materials (US Forest Service 1975). The persistent rose hips are edible, and are one of the best natural sources of vitamin C. They can be dried for use in flavoring teas, jellies, fruitcakes, and puddings.

Nature trails should be routed around dense stands of the *Rosa woodsii* (woods rose) community type. However, *Rosa woodsii* (woods rose) is useful for planting in recreation areas as a biological barrier to protect physical structures, young and delicate plants, and to direct traffic (Hansen and others 1995).

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = forested wetland; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

OTHER STUDIES

This type has been documented for the state of Montana (Hansen and others 1995). A similar community type was described by Youngblood and others (1985b) for eastern Idaho and western Wyoming, and by Padgett and others (1989) for Utah and southeastern Idaho. Major undergrowth shrubs were *Cornus stolonifera* (red-osier

dogwood), *Betula occidentalis* (water birch), and *Salix bebbiana* (Bebb willow). A somewhat similar community type was described by Szaro (1989) for Arizona and New Mexico.

Populus tremuloides/Calamagrostis canadensis Habitat Type (Quaking Aspen/Bluejoint Reedgrass Habitat Type)

POPTRE/CALCAN (POTR10/CACA4)
Number Of Stands Sampled in Montana = 6

NOTE: The *Populus tremuloides/Calamagrostis canadensis* (quaking aspen/bluejoint reedgrass) habitat type has been documented in Idaho according to field surveys conducted in 1994. However, due to time constraints during the 1995 field season, homogeneous stand data could not be collected for this type. In the subsequent discussion, any references to physical site location or vegetation characteristics for this type in Idaho were interpreted from 1994 field surveys. The remainder of this description was taken from the Classification and Management of Montana's Riparian and Wetland Sites (Hansen and others 1995).

LOCATION AND ASSOCIATED LANDFORMS

The *Populus tremuloides/Calamagrostis canadensis* (quaking aspen/bluejoint reedgrass) habitat type is an incidental type at mid to high elevations throughout the mountains and valleys of Idaho. Elevations of sampled sites are recorded in the neighborhood of 2,121 m (7,000 ft). This type typically occupies locales adjacent to streams and rivers on alluvial terraces.

VEGETATION

Populus tremuloides/Calamagrostis canadensis (quaking aspen/bluejoint reedgrass) habitat types in Idaho are dominated solely by *Populus tremuloides* (quaking aspen), to the exclusion of other tree species. *Rosa woodsii* (woods rose), *Salix boothii*(Booth willow) and *Salix geyeriana* (Geyer willow) may constitute a diffuse shrub layer with minimal coverages. *Calamagrostis canadensis* (bluejoint reedgrass), the diagnostic herbaceous species, is also present along with *Agrostis stolonifera* (redtop), *Phleum pratense* (common timothy), *Poa pratensis* (Kentucky bluegrass) and *Castilleja spp.* (Paintbrush).

Populus tremuloides (quaking aspen) dominates the overstory in Montana. *Rosa woodsii* (woods rose), *Symphoricarpos albus* (common snowberry), and *Alnus incana* (mountain alder) occur often in substantial amounts in the understory. *Calamagrostis canadensis* (bluejoint reedgrass) is the dominant herbaceous species. Other herbaceous species include *Fragaria virginiana* (Virginia strawberry), *Phleum pratense* (common timothy), *Aster occidentalis* (western aster), *Geranium* spp. (geranium), and *Equisetum arvense* (field horsetail) (Table 7). Table 7 reflects vegetation surveyed on sites restricted to Montana, and may not accurately portray species composition and canopy cover for sites identified in Idaho.

Table 7. Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax

stands of the *Populus tremuloides/Calamagrostis canadensis* (quaking aspen/bluejoint reedgrass) habitat type (number = 6 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Trees			
Populus tremuloides (quaking aspen)	63	40-90	100
Shrubs			
Alnus incana (mountain alder)	20	0-20	33
Amelanchier alnifolia (western serviceberry)	1	0-1	33
Arctostaphylos uva-ursi (kinnikinnick)	3	0-3	33
Potentilla fruticosa (shrubby cinquefoil)	3	0-3	33
Ribes spp. (currant)	3	0-3	33
Rosa acicularis (prickly rose)	10	0-10	33
Rosa woodsii (woods rose)	20	0-20	67
Salix bebbiana (Bebb willow)	1	0-1	33
Symphoricarpos albus (common snowberry)	30	0-30	33
Graminoids			
Agropyron caninum (bearded wheatgrass)	3	0-3	33
Agropyron spp. (wheatgrass)	3	0-3	33
Bromus ciliatus (fringed brome)	3	0-3	67
Calamagrostis canadensis (bluejoint reedgrass)	60	40-80	100
Carex spp. (sedge)	3	0-3	33
Elymus canadensis (Canada wildrye)	3	0-3	33
Elymus glaucus (blue wildrye)	3	0-3	33
Juncus balticus (Baltic rush)	3	0-3	33
Phleum pratense (common timothy)	10	0-20	67
Poa palustris (fowl bluegrass)	3	0-3	33
Poa pratensis (Kentucky bluegrass)	3	0-3	33
Stipa viridula (green needlegrass)	1	0-1	33
Forbs			
Achillea millefolium (common yarrow)	3	0-3	33
Actaea rubra (baneberry)	20	0-20	33
Allium spp. (onion)	1	0-1	33
Angelica arguta (sharptooth angelica)	10	0-10	33
Antennaria spp. (pussy-toes)	3	0-3	33
Aster occidentalis (western aster)	7	0-10	67
Aster spp. (aster)	3	0-3	33
Cirsium scariosum (elk thistle)	2	0-3	67
Epilobium angustifolium (fireweed)	2	0-3	67

Fragaria virginiana (Virginia strawberry)	3	3-3	100
Galium asperrimum (rough bedstraw)	3	0-3	33
Galium triflorum (sweetscented bedstraw)	1	0-1	33
Geranium spp. (geranium)	3	0-3	67
Geum macrophyllum (large-leaved avens)	3	0-3	33
Heracleum lanatum (cow-parsnip)	20	0-20	33
Osmorhiza chilensis (mountain sweet-cicely)	1	0-1	33
Pedicularis bracteosa (bracted lousewort)	1	0-1	33
Pyrola asarifolia (pink wintergreen)	1	0-1	33
Rubus pubescens (dwarf red blackberry)	3	0-3	33
Senecio pseudaureus (streambank groundsel)	3	0-3	33
Senecio serra (tall butterweed)	1	0-1	33
Senecio triangularis (arrowleaf groundsel)	3	0-3	33
Smilacina stellata (starry Solomon-plume)	1	0-1	33
Solidago canadensis (Canada goldenrod)	1	0-1	33
Taraxacum officinale (common dandelion)	3	0-3	33
Thalictrum occidentale (western meadowrue)	3	0-3	33
Trifolium repens (white clover)	3	0-3	33
Urtica dioica (stinging nettle)	1	0-1	33
Veratrum viride (green false hellebore)	1	0-1	33
Viola canadensis (Canada violet)	1	0-1	33
Viola spp. (violet)	3	0-3	33
Ferns and Allies			
Equisetum arvense (field horsetail)	15	0-20	67

SUCCESSIONAL INFORMATION

High levels of grazing and browsing by livestock and wildlife will reduce the coverages and successful reproduction of *Populus tremuloides* (quaking aspen) and the various shrubs associated with this habitat type, while increasing the coverages of disturbance-caused herbaceous species. In extreme cases, a loss of the understory may occur, and the stand will take on the appearance of the grazing disclimax *Populus tremuloides/Poa pratensis* (quaking aspen/Kentucky bluegrass) community type .

SOILS

Soils are commonly Entisols (Fluvents) or Mollisols (Borolls) derived from alluvium. Water tables approach the soil surface in spring, but are usually greater than 1 m (39 in) below the surface in mid summer. Coarse textured soils, moderate stream gradients, and high coarse fragment contents throughout the soil profile provide an environment that produces a rapid movement of highly aerated groundwater. This type of substrate is important to many floodplain communities.

ADJACENT COMMUNITIES

Adjacent wetter communities are dominated by *Alnus incana* (mountain alder), *Salix drummondiana* (Drummond willow), *Carex rostrata* (beaked sedge) or occasionally by *Populus trichocarpa* (black cottonwood). Adjacent uplands are dominated by conifers such as *Abies lasiocarpa* (subalpine fir), *Picea engelmannii* (Engelmann spruce), and *Pseudotsuga menziesii* (Douglas fir).

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Forage production is usually high. Palatability of *Calamagrostis canadensis* (bluejoint reedgrass) varies from moderate to high, depending upon season and availability of other species (USDA Forest Service 1937). Foliage is most palatable when young, but wet conditions early in the grazing season limits use by livestock, especially sheep. Continued close utilization results in decreased *Calamagrostis canadensis* (bluejoint reedgrass) production.

This type is generally moist until mid summer and is preferred as mid to late season pasture by livestock following forage depletion on adjacent uplands. Therefore, the season of use often coincides with the maturity of *Calamagrostis canadensis* (bluejoint reedgrass). Grazing by livestock can have a limited impact when done with moderation. However, grazing should be restricted when soils are moist, especially along streams where bank sloughing can occur.

In order to develop an upward trend in ecological status on moderately disturbed sites, time the season of use by livestock to both the drying of the soil surface and to the maturation of the seedheads. Livestock should be removed when 40 percent or less utilization of herbaceous forage is obtained.

In severely disturbed sites, more intensive rehabilitation strategies will be required due to the abundance of *Poa pratensis* (Kentucky bluegrass) and *Poa palustris* (fowl bluegrass).

Timber

Most timber harvest is salvage for fuelwood. Overstory removal will result in sprouting of young aspen that are susceptible to grazing pressure.

Wildlife

The *Populus tremuloides/Calamagrostis canadensis* (quaking aspen/bluejoint reedgrass) habitat type, although often covering only small areas, has high value as wildlife cover and feeding areas. Beaver, if present, may make heavy use of *Populus tremuloides* (quaking aspen) stands (Allen 1983). Wild ungulates such as deer and elk browse young suckers and occasionally feed on the bark of older trees. Use by elk during spring, fall, and winter periods is often moderate to heavy (Kufeld 1973). *Populus tremuloides* (quaking aspen) and is highly preferred by moose (Costain 1989). Use of this type as bedding grounds by wildlife is also common. Elk may make moderate summer use of *Calamagrostis canadensis* (bluejoint reedgrass) (Kufeld 1973).

Fisheries

Where adjacent to streams, stands of this type enhance fisheries by stabilizing banks and providing overhanging cover. The rhizomatous nature of *Calamagrostis canadensis* (bluejoint reedgrass) will help provide bank stability for those sites adjacent to streams. This is particularly important on the higher gradient streams where scouring by seasonal flooding is possible.

Fire

Wet conditions in the spring and summer tend to limit successful burning to the drier fall period. Fire, sometimes in combination with cutting, is becoming an increasingly important tool in regenerating decadent stands of *Populus tremuloides* (quaking aspen) (Jones and DeByle 1985). Brown (1984) provides information for using prescribed fire in stands of *Populus tremuloides* (quaking aspen). Protection of newly burned or cleared sites from beaver and grazing animals may be necessary for successful reproduction.

Fires reduce the abundance of other associated species and tend to result in increases in *Calamagrostis canadensis* (bluejoint reedgrass) and other rhizomatous species (Haeussler and Coates 1986). *Calamagrostis canadensis* (bluejoint reedgrass) is an aggressive invader of burned sites. Repeated burning tends to favor rhizomatous species such as *Poa pratensis* (Kentucky bluegrass) and *Agropyron caninum* (bearded wheatgrass).

Soil Management and Rehabilitation Opportunities

Soils compaction is likely when repeated animal use occurs on moist soils. Grazing should be deferred to periods when soils and streambanks are drier (Marlow 1984).

Populus tremuloides (quaking aspen) may be useful in revegetating disturbed sites having moist, well drained soils. Best results are obtained using rooted cuttings or nursery grown stock. Once established, growth rates are rapid. The quickly spreading roots of *Populus tremuloides* (quaking aspen) effectively stabilize soils.

Calamagrostis canadensis (bluejoint reedgrass) propagates itself by both seeds and rhizomes, making this species an aggressive invader of sites (Crane and Fischer 1986). These features also make it a valuable species for stabilizing or rehabilitating mountain streambanks.

Recreational Uses and Considerations

Fishing and birding opportunities are often good. Campsites should be located away from stands of this type because of wet soils and large mosquito populations.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = forested wetland; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

OTHER STUDIES

This type has been documented in the Classification and Management of Montana's Riparian and Wetland Sites (Hansen and others 1995).

Populus tremuloides/Cornus stolonifera Habitat Type
(Quaking Aspen/Red-Osier Dogwood Habitat Type)

POPTRE/CORSTO (POTR10/COST4)
Number Of Stands Sampled = 12

LOCATION AND ASSOCIATED LANDFORMS

The *Populus tremuloides/Cornus stolonifera* (quaking aspen/red-osier dogwood) habitat type is a major type from moderately low to high elevations throughout the mountains and valleys of eastern Idaho. Sites range in elevation from 1,455 to 2,200 m (4,800 to 7,260 ft). This type typically occurs on alluvial terraces adjacent to streams and rivers in U- and V-shaped canyon drainages, or adjacent to hillside springs and seeps.

VEGETATION

Populus tremuloides/Cornus stolonifera (quaking aspen/red-osier dogwood) habitat types in Idaho may contain *Juniperus scopulorum* (Rocky Mountain juniper), *Pseudotsuga menziesii* (Douglas fir) or *Populus angustifolia* (Narrowleaf Cottonwood) in trace amounts scattered throughout an overstory dominated by *Populus tremuloides* (quaking aspen). Although this type is generally characterized by a remarkably diverse understory both at the middle and lower levels, constancy and covers for many species tend to be low. *Cornus stolonifera* (red-osier dogwood) and *Rosa woodsii* (woods rose) share codominance in the shrub understory with a variety other less well represented species, such as *Salix spp.* (willow), *Symphoricarpos occidentalis* (western snowberry) or *Crataegus douglasii* (black hawthorn). Graminoids may include *Phalaris arundinacea* (reed canarygrass), *Agropyron repens* (quackgrass), and *Poa pratensis* (Kentucky bluegrass), while forbs consist of species such as *Glycyrrhiza lepidota* (American licorice), *Polygonum* spp. (smartweed), or *Equisetum* spp.(horsetail).

Table 8. Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax stands of the *Populus tremuloides/Cornus stolonifera* (quaking aspen/red-osier dogwood) habitat type (number = 12 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Trees			
Juniperus scopulorum (Rocky Mountain Juniper)	1	0-1	8
Populus angustifolia (Narrowleaf Cottonwood)	4	0-50	8
Populus tremuloides (Quaking Aspen)	63	30-90	100

Pseudotsuga menziesii (Douglas Fir)	<1	0-1	17
Shrubs			
Acer glabrum (Rocky Mountain Maple)	<1	0-3-8	
Alnus incana (Mountain Alder)	6	0-70	8
Amelanchier alnifolia (Western Serviceberry)	<1	0-3	17
Berberis repens (Creeping Oregongrape)	<1	0-3	8
Betula occidentalis (Water Birch)	3	0-30	8
Cornus stolonifera (Red-osier Dogwood)	23	0-80	67
Crataegus douglasii (Black Hawthorn)	5	0-40	42
Lonicera involucrata (Twin-berry)	<1	0-3	8
Prunus virginiana (Common Chokecherry)	<1	0-3	8
Rhus aromatica (Fragrant Sumac)	<1	0-3	8
Ribes hudsonianum (Stinking Currant)	<1	0-1	8
Ribes lacustre (Swamp Currant)	<1	0-3	8
Ribes odoratum (Buffalo Currant)	<1	0-3	8
Rosa woodsii (Woods Rose)	20	1-50	100
Rubus parviflorus (Thimbleberry)	4	0-50	8
Salix exigua (Sandbar Willow)	1	0-3	25
Salix lutea (Yellow Willow)	2	0-20	8
Solanum dulcamara (Climbing Nightshade)	2	0-10	33
Symphoricarpos occidentalis (Western Snowberry)	10	0-60	50
Symphoricarpos spp. (Snowberry)	3	0-40	8
Toxicodendron rydbergii (Poison Ivy)	1	0-10	8
Graminoids			
Agropyron caninum (Bearded Wheatgrass)	<1	0-3	8
Agropyron repens (Quackgrass)	17	0-70	50
Agropyron smithii (Western Wheatgrass)	<1	0-1	8
Agrostis stolonifera (Redtop)	4	0-30	17
Bromus inermis (Smooth Brome)	3	0-30	17
Carex atherodes (Awned Sedge)	<1	0-1	8
Carex athrostachya (Slender-beaked Sedge)	<1	0-3	8
Carex disperma (Soft-leaved Sedge)	<1	0-3	8
Carex spp. (Sedge)	<1	0-1	17
Carex rostrata (Beaked Sedge)	3	0-40	25
Elymus glaucus (Blue Wildrye)	<1	0-1	8
Glyceria striata (Fowl Mannagrass)	<1	0-1	8
Grass perennial (Perennial Grass)	1	0-10	8
Hordeum jubatum (Foxtail Barley)	<1	0-1	8
Muhlenbergia asperifolia (Alkali Muhly)	4	0-30	50
Phalaris arundinacea (Reed Canarygrass)	7	0-70	58
Poa pratensis (Kentucky Bluegrass)	3	0-30	25

Forbs			
Achillea millefolium (Common Yarrow)	<1	0-3	8
Allium brevistylum (Short-style Onion)	<1	0-1	8
Anthemis cotula (Dog Fennel)	<1	0-1	8
Aquilegia flavescens (Yellow Columbine)	2	0-20	8
Arctium minus (Common Burdock)	<1	0-3	8
Arctium spp. (Burdock)	<1	0-1	8
Arnica longifolia (Longleaf Arnica)	<1	0-3	8
Asparagus officinalis (Asparagus)	<1	0-1	8
Aster campestris (Meadow Aster)	<1	0-1	8
Aster eatonii (Eaton's Aster)	<1	0-1	8
Aster modestus (Few-flowered Aster)	1	0-10	8
Aster occidentalis (Western Aster)	<1	0-1	33
Aster spp. (Aster)	<1	0-1	8
Bidens cernua (Nodding Beggar-ticks)	<1	0-1	8
Bidens vulgata (Tall Beggar-ticks)	<1	0-1	25
Cardamine spp. (Bittercress)	<1	0-3	8
Cicuta maculata (Spotted Water-hemlock)	<1	0-3	8
Cirsium arvense (Canada Thistle)	3	0-20	67
Cirsium vulgare (Bull Thistle)	<1	0-1	8
Cynoglossum officinale (Common Hound's-tongue)	<1	0-3	8
Epilobium latifolium (Red Willow-herb)	<1	0-1	8
Forb (Forb)	<1	0-1	17
Fragaria virginiana (Virginia Strawberry)	<1	0-1	8
Galium triflorum (Sweetscented Bedstraw)	1	0-3	17
Geranium viscosissimum (Sticky Geranium)	1	0-10	8
Geum macrophyllum (Larged-leaved Avens)	1	0-3	17
Glycyrrhiza lepidota (American Licorice)	9	0-90	25
Helenium autumnale (Sneezeweed)	<1	0-1	8
Heracleum lanatum (Cow-parsnip)	<1	0-3	8
Hydrophyllum capitatum (Ballhead Waterleaf)	<1	0-1	8
Lactuca serriola (Prickly Lettuce)	<1	0--3	8
Lysimachia ciliata (Fringed Loosestrife)	3	0-30	25
Medicago sativa (Alfalfa)	<1	0-1	8
Melilotus officinalis (Yellow Sweet-clover)	<1	0-3	8
Mentha arvensis (Field Mint)	<1	0-1	8
Mimulus guttatus (Common Monkey-flower)	<1	0-1	8
Montia chamissoi (Water Montia)	<1	0-1	8
Osmorhiza chilensis (Mountain Sweet-cicely)	1	0-10	8
Osmorhiza depauperata (Blunt-fruit Sweet-cicely)	<1	0-3	8
Plantago major (Common Plantain)	<1	0-1	17

Polygonum amphibium (Water Smartweed)	8	0-40	25
Polemonium occidentale (Western Polemonium)	<1	0-1	8
Pyrola asarifolia (Pink Wintergreen)	<1	0-1	8
Rumex crispus (Curly Dock)	<1	0-3	25
Senecio canus (Woolly Groundsel)	<1	0-3	8
Senecio hydrophilus (Alkali-marsh Butterweed)	<1	0-1	17
Senecio serra (Tall Butterweed)	<1	0-3	8
Smilacina racemosa (False Spikenard)	1	0-10	8
Smilacina stellata (Starry Solomon-plume)	1	0-3	17
Solidago canadensis (Canada Goldenrod)	1	0-10	17
Solidago gigantea (Late Goldenrod)	<1	0-3	8
Sonchus arvensis (Field Milk-thistle)	<1	0-1	8
Stachys palustris (Swamp Hedge-nettle)	1	0-10	8
Taraxacum officinale (Common Dandelion)	<1	0-3	17
Thalictrum occidentale (Western Meadowrue)	2	0-20	8
Tragopogon dubius (Goat's Beard)	<1	0-1	8
Ferns and Allies			
Equisetum laevigatum (Smooth Scouring-rush)	<1	0-3	17
Equisetum spp. (Horsetail; Scouring-rush)	1	0-10	25

SUCCESSIONAL INFORMATION

Various shrub communities, particularly *Alnus incana* (mountain alder), *Salix lutea* (yellow willow) and *Salix exigua* (sandbar willow), or deciduous forests, dominated by *Populus trichocarpa* (Black cottonwood) or *Populus angustifolia* (Narrowleaf Cottonwood, may act as transitional phases for the *Populus tremuloides/Cornus stolonifera* (quaking aspen/red-osier dogwood) habitat type. If site conditions shift to favor conifer types, *Populus tremuloides* (quaking aspen) stands may in turn act as seral stages for *Picea* spp. (spruce), *Abies lasiocarpa* (subalpine fir) or *Pseudotsuga menziesii* (Douglas fir). Excessive utilization of this habitat type by wildlife or livestock may impact the regeneration of both *Populus tremuloides* (quaking aspen) and the shrub understory, shifting the site toward the disclimax *Populus tremuloides/Poa pratensis* (quaking aspen/Kentucky bluegrass) community type

SOILS

An organic layer, indicative of Mollisols, may be present to a depth of 25 cm (10 in) or more. Where sites occur below seeps and springs, this layer characteristically forms a saturated muck at the surface mixed with fine alluvial silts and sands. Where the organic layer is essentially absent, a sandy loam of similar dimensions may occur. Mottles may be in evidence, although infrequent, on sites that occupy active floodplains. Underlying horizons may be composed of fine and coarse sands. The deeper substrate are often dominated by gravels, cobbles and rocks with fines filling the interstitial spaces. Litter and duff layers occur where flooding or disturbance is absent or infrequent and may be 45 cm (18 in) deep, but are generally only a few centimeters in depth. Water tables may be at or near the surface where sites occur below seeps and springs, or 2 m (6.5 ft) or more deep on upper floodplains although moisture may be present closer to the surface due to capillary action.

ADJACENT COMMUNITIES

Typha spp.(cattail), *Scirpus* spp. (bulrush), *Eleocharis palustris* (common spikesedge) and *Phalaris arundinacea* (reed canarygrass) may occupy saturated sites adjacent to the *Populus tremuloides/Cornus stolonifera* (quaking aspen/red-osier dogwood) habitat type. Other associated riparian communities include *Alnus incana* (mountain alder), *Salix spp.* (willow) and *Populus* spp.(cottonwood). Drier uplands may be dominated by conifers such as *Pseudotsuga menziesii* (Douglas fir), and *Pinus contorta* (lodgepole pine), or by steppe vegetation such as *Artemisia tridentata* (big sagebrush) or mixed grasslands.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Forage production varies from low to moderate, depending on the density of the tree and shrub layer. Palatability of the various herbaceous species associated with this type are often high, and cattle use may be heavy as upland vegetation cures and animals spend much of their time in the shade provided by these communities. Livestock will use this type for forage, shade, and as bedding ground. They also browse young suckers and, combined with trampling and soil compaction, can alter both the age structure and herbaceous layer of this type (Hansen and others 1995).

Cornus stolonifera (red-osier dogwood) is considered an "ice cream" plant by livestock and wildlife. Its utilization is a direct indication of past and current use levels. In some areas, livestock browsing of *Cornus stolonifera* (red-osier dogwood) may be quite high. Overuse by livestock will result in a reduced vigor by the willows present, as illustrated by highlining, clubbing, or dead clumps. With continued overuse, willows show a sharp decline in vigor and may be eventually eliminated from the site (Hansen and others 1995).

Timber

Most timber harvest is salvage for fuelwood. Overstory removal will result in sprouting of young aspen that are susceptible to grazing pressure (Hansen and others 1995).

Wildlife

The *Populus tremuloides/Cornus stolonifera* (quaking aspen/red-osier dogwood) habitat type, although often covering only small areas, has high value as wildlife cover and feeding areas. Beaver, if present, may make heavy use of *Populus tremuloides* (quaking aspen) stands (Allen 1983). Wild ungulates such as moose, deer and elk browse young suckers and occasionally feed on the bark of older trees. Use by elk during spring, fall, and winter periods is often moderate to heavy (Kufeld 1973). *Populus tremuloides* (quaking aspen) and *Cornus stolonifera* (red-osier dogwood) are highly preferred by moose (Costain 1989). Use of this type as bedding grounds by wildlife is also common.

Numerous bird species frequent communities dominated by *Populus tremuloides* (quaking aspen). Common species nesting and feeding in this type include flickers, chickadees, sap suckers, and woodpeckers (Flack 1976).

Fisheries

Where adjacent to streams, stands of this type enhance fisheries by stabilizing banks and providing overhanging cover. *Cornus stolonifera* (red-osier dogwood) is an excellent shrub for controlling erosion along streams. This is particularly important on the higher gradient streams where scouring by seasonal flooding is possible (Hansen and others 1995).

Fire

Wet conditions in the spring and summer tend to limit successful burning to the drier fall period. Fire, sometimes in combination with cutting, is becoming an increasingly important tool in regenerating decadent stands of *Populus tremuloides* (quaking aspen) (Jones and DeByle 1985). Brown (1984) provides information for using prescribed fire in stands of *Populus tremuloides* (quaking aspen). Protection of newly burned or cleared sites from beaver and grazing animals may be necessary for successful reproduction.

Cornus stolonifera (red-osier dogwood) and the associated shrub species can survive all but the most severe fires that remove duff and cause extended heating of the upper layer of soil. After a fire, the shrubs sprouts from the surviving rhizomes or stolons (runners) (Fischer and Bradley 1987).

Soil Management and Rehabilitation Opportunities

Soils compaction is likely when repeated animal use occurs on moist soils. Grazing should be deferred to periods when soils and streambanks are drier (Marlow 1984).

Populus tremuloides (quaking aspen) may be useful in revegetating disturbed sites having moist, well drained soils. Best results are obtained using rooted cuttings or nursery grown stock. Once established, growth rates are rapid. The quickly spreading roots of *Populus tremuloides* (quaking aspen) effectively stabilize soils (Hansen and others 1995).

Where revegetation with woody shrub species is desired, *Cornus stolonifera* (red-osier dogwood), *Amelanchier alnifolia* (western serviceberry), *Prunus virginiana* (common chokecherry), and various species of *Salix* (willows) and *Ribes* (currants and gooseberries) may be well adapted to planting on disturbed sites. Rooted cuttings or nursery grown seedlings are easily established on moist, well drained soils. Growth rates are rapid and the roots of established seedlings are effective stabilizers of alluvial soil deposits (Hansen and others 1995).

Recreational Uses and Considerations

Fishing and birding opportunities are often good. Campsites should be located away from stands of this type because of wet soils and large mosquito populations (Hansen and others 1995).

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = forested wetland; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

OTHER STUDIES

This type has been described by Hansen and others (1995) for the state of Montana and Manning and Padgett (1992) for Nevada and eastern California.

Populus tremuloides/Osmorhiza occidentalis Habitat Type (Quaking Aspen/Western Sweet-Cicely Habitat Type)

POPTRE/OSMOCC (POTR10/OSCC)
Number Of Stands Sampled = 3

LOCATION AND ASSOCIATED LANDFORMS

The *Populus tremuloides/Osmorhiza occidentalis* (quaking aspen/western sweet-cicely) habitat type is a minor type occurring in broad, gentle mountain valleys and foothills of eastern Idaho. *Populus tremuloides* (quaking aspen) stands may occupy alluvial terraces adjacent to small streams in U-shaped canyons, or hillsides below springs and seeps. Sites range in elevation from 1,700 to 2,182 m (5,610 to 7,200 ft).

VEGETATION

Populus tremuloides (quaking aspen) dominates the overstory of this type, periodically accompanied by *Pinus contorta* (lodgepole pine) with limited coverage. The modest shrub component may consist of *Symphoricarpos oreophilus* (mountain snowberry), *Amelanchier alnifolia* (western serviceberry) or *Rosa woodsii* (woods rose). The herbaceous layer is often lush and exhibits a high diversity of graminoids and forbs such as *Carex* spp. (sedge), *Thalictrum occidentale* (western meadowrue), *Ranunculus* spp. (buttercup), *Osmorhiza occidentalis* (western sweet-cicely), and *Wyethia helianthoides* (white-head mule's-ears). Moss may form a dense carpet over the ground surface below the herbaceous layer where sufficient moisture is present.

Table 9. Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax stands of the *Populus tremuloides/Osmorhiza occidentalis* (quaking aspen/western sweet-cicely) habitat type (number = 3 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Trees			
Pinus contorta (Lodgepole Pine)	1	0-3	33
Populus tremuloides (Quaking Aspen)	63	40-80	100
Shrubs			

Amelanchier alnifolia (Western Serviceberry)	7	0-20	33
Berberis repens (Creeping Oregongrape)	3	0-10	33
Prunus virginiana (Common Chokecherry)	1	0-3	33
Rosa woodsii (Woods Rose)	7	0-20	33
Symphoricarpos oreophilus (Mountain Snowberry)	10	0-30	67
Graminoids			
Agrostis stolonifera (Redtop)	<1	0-1	33
Bromus inermis (Smooth Brome)	<1	0-1	33
Carex spp. (Sedge)	<1	0-1	33
Carex geyeri (Elk Sedge)	7	0-20	33
Carex hoodii (Hood's Sedge)	7	0-20	33
Carex raynoldsii (Raynolds' Sedge)	<1	0-1	67
Elymus glaucus (Blue Wildrye)	7	0-20	33
Grass perennial (Perennial Grass)	7	0-20	33
Melica spectabilis (Showy Oniongrass)	<1	0-1	67
Phleum alpinum (Alpine Timothy)	7	0-20	33
Phleum pratense (Common Timothy)	1	0-3	33
Poa pratensis (Kentucky Bluegrass)	1	0-3	33
Forbs			
Achillea millefolium (Common Yarrow)	10	1-20	100
Actaea rubra (Baneberry)	<1	0-1	33
Agoseris glauca (Pale Agoseris)	1	0-3	33
Allium geyeri (Geyer's Onion)	<1	0-1	33
Angelica arguta (Sharptooth Angelica)	1	0-3	33
Arnica cordifolia (Heart-leaf Arnica)	7	0-20	33
Barbarea orthoceras (American Wintercress)	<1	0-1	33
Erythronium grandiflorum (Glacier-lily)	4	0-10	67
Fragaria virginiana (Virginia Strawberry)	10	0-20	67
Galium aparine (Goose-grass)	7	0-20	33
Geranium viscosissimum (Sticky Geranium)	7	1-10	100
Heracleum lanatum (Cow-parsnip)	<1	0-1	33
Hydrophyllum capitatum (Ballhead Waterleaf)	<1	0-1	33
Lithophragma parviflorum (Smallflower Woodlandstar)	<1	0-1	67
Lomatium ambiguum (Swale Desert-parsley)	<1	0-1	33
Lupinus argenteus (Silvery Lupine)	1	0-3	33
Myosotis sylvatica (Wood Forget-me-not)	<1	0-1	33
Nepeta cataria (Catnip)	1	0-3	33
Osmorhiza chilensis (Mountain Sweet-cicely)	7	0-20	33
Osmorhiza occidentalis (Western Sweet-cicely)	4	0-10	67
Pedicularis bracteosa (Bracted Lousewort)	2	0-3	67
Perideridia bolanderi (Bolander's Yampah)	<1	0-1	33

Perideridia gairdneri (Gairdner's Yampah)	<1	0-1	33
Polygonum bistortoides (American Bistort)	<1	0-1	33
Potentilla diversifolia (Diverse-leaved Cinquefoil)	7	0-20	33
Potentilla gracilis (Slender Cinquefoil)	4	0-10	67
Ranunculus spp. (Buttercup)	10	0-20	67
Ranunculus uncinatus (Little Buttercup)	8	0-20	67
Rumex paucifolius (Mountain Sorrel)	4	0-10	67
Saxifraga integrifolia (Swamp Saxifrage)	7	0-20	33
Senecio foetidus (Sweet-marsh Butterweed)	7	0-10	6
Senecio serra (Tall Butterweed)	3	0-10	33
Smilacina stellata (Starry Solomon-plume)	4	0-10	67
Taraxacum officinale (Common Dandelion)	1	1-1	100
Thalictrum occidentale (Western Meadowrue)	8	1-20	100
Tragopogon dubius (Goat's Beard)	<1	0-1	33
Trifolium longipes (Long-stalked Clover)	3	0-10	33
Valeriana occidentalis (Western Valerian)	<1	0-1	33
Viola nuttallii (Yellow Prairie Violet)	<1	0-1	33
Wyethia helianthoides (White-head Mule's-ears)	17	0-30	67

SUCCESSIONAL INFORMATION

Salix spp. (willow) communities may act as seral stages for the *Populus tremuloides/Osmorhiza occidentalis* (quaking aspen/western sweet-cicely) habitat type. If site conditions shift to favor conifer types, *Populus tremuloides* (quaking aspen) stands may in turn act as seral stages for *Picea* spp. (spruce), *Abies lasiocarpa* (subalpine fir) or *Pseudotsuga menziesii* (Douglas fir). Although the *Populus tremuloides/Osmorhiza occidentalis* (quaking aspen/western sweet-cicely) habitat type exhibits varying degrees of livestock impacts, prolonged, high intensity grazing may result in an increase in the proportion of disturbance tolerant species and a shift to the grazing or browsing disclimax *Populus tremuloides/Poa pratensis* (quaking aspen/Kentucky bluegrass) community type.

SOILS

Fine textured soils, often rich in nutrients and organic materials, are present near the surface. Soils are probably classified as Mollisols or Entisols. The upper horizon, 30 cm (12 in) or more in depth, is predominantly silt or silt loam. Alluvial gravels and sands may be present in association with channel or overland flow, but are generally absent in the upper layers. Unconsolidated rocks, in the medium and large size class range, may compose underlying layers. Water tables may be at or near the surface for some sites but may be as deep as 1 m (39 in) or more in others.

ADJACENT COMMUNITIES

Other types within the *Populus tremuloides* (quaking aspen) series tend to occupy adjacent riparian zones. The *Populus tremuloides/Poa pratensis* (quaking aspen/Kentucky bluegrass) community type occurs on disturbed sites while the *Populus tremuloides/Cornus stolonifera* (quaking aspen/red-osier dogwood) habitat type may establish on

more pristine locations. *Salix* spp. (willow) communities often form dense stands bordering stream channels while *Wyethia* spp. (mule's-ears) meadows may dominant moist hillsides. Adjacent drier upland sites are generally uplands, dominated by *Pinus contorta* (lodgepole pine), *Abies lasiocarpa* (subalpine fir), or *Pseudotsuga menziesii* (Douglas fir) forests or *Artemisia tridentata* (big sagebrush) steppe.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Palatability of the various herbaceous species associated with this type are often high, and cattle use may be heavy as upland vegetation cures and animals spend much of their time in the shade provided by these communities. Livestock will use this type for forage, shade, and as bedding ground. They also browse young suckers and, combined with trampling and soil compaction, can alter both the age structure and herbaceous layer of this type (Hansen and others 1995).

The *Populus tremuloides/Osmorhiza occidentalis* (quaking aspen/western sweet-cicely) habitat type rates high for forage production. In a similar type in western Wyoming, Youngblood and Mueggler (1981) found forage production to be approximately 1,200 lbs/acre.

Wildlife

The *Populus tremuloides/Osmorhiza occidentalis* (quaking aspen/western sweet-cicely) habitat type has high value as wildlife cover and feeding areas. These sites are important winter and summer grounds for big game. Beaver, if present, may make heavy use of *Populus tremuloides* (quaking aspen) stands (Allen 1983). Wild ungulates such as deer and elk browse young suckers and occasionally feed on the bark of older trees. Use by elk during spring, fall, and winter periods is often moderate to heavy (Kufeld 1973). *Populus tremuloides* (quaking aspen) is a highly preferred species by moose (Costain 1989). Use of this type as bedding grounds by wildlife is also common.

Numerous bird species frequent communities dominated by *Populus tremuloides* (quaking aspen). Common species nesting and feeding in this type include flickers, chickadees, sap suckers, and woodpeckers (Flack 1976).

Fisheries

Where adjacent to streams, stands of this type enhance fisheries by stabilizing banks and providing overhanging cover (Hansen and others 1995).

Fire

Wet conditions in the spring and summer tend to limit successful burning until the drier fall period. Fire, sometimes in combination with cutting, is becoming an increasingly important tool in regenerating decadent stands of *Populus tremuloides* (quaking aspen) (Jones and DeByle 1985). Brown (1984) provides information for using prescribed fire in stands of *Populus tremuloides* (quaking aspen). Protection of newly burned or cleared sites from beaver and grazing animals may be necessary for successful reproduction.

Soil Management and Rehabilitation Opportunities

Soils compaction is likely when repeated animal use occurs on moist soils. Grazing should be deferred to periods when soils and streambanks are drier (Marlow 1984). *Populus tremuloides* (quaking aspen) can be useful in revegetating disturbed sites having moist, well drained soils. Best results are obtained using rooted cuttings or nursery grown stock. Once established, growth rates are rapid with spreading roots quickly stabilizing the soil Mueggler and Campbell (1982).

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = forested wetland; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

OTHER STUDIES

This type represents the *Populus tremuloides-Populus trichocarpa/Osmorhiza occidentalis* (quaking aspen-black cottonwood/western sweet-cicely) community type described by Cooper (1981) for the Blackfeet Indian Reservation. A similar type was described by Lynch (1955) for Glacier County, Montana, and by Youngblood and Mueggler (1981) for western Wyoming. Hansen and others (1995) documented this type for the state of Montana

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Populus tremuloides/Poa pratensis Community Type
(Quaking Aspen/Kentucky Bluegrass Community Type)

POPTRE/POAPRA (POTR10/POPR)

Number Of Stands Sampled in Montana= 26

CAUTION—Not all sites currently dominated by *Populus tremuloides* (quaking aspen) are considered riparian or wetland sites. In some instances, they are considered upland sites. The topographic position of the site must match the description as presented in the Location and Associated Landform section.

NOTE: The *Populus tremuloides/Poa pratensis* (quaking aspen/Kentucky bluegrass) community type has been documented in Idaho according to field surveys conducted in 1994. However, due to time constraints during the 1995 field season, homogeneous stand data could not be collected for this type. In the subsequent discussion, any references to physical site location or vegetation characteristics for this type in Idaho were interpreted from 1994 field surveys. The remainder of this description was taken from the Classification and Management of Montana's Riparian and Wetland Sites (Hansen and others 1995).

LOCATION AND ASSOCIATED LANDFORMS

The *Populus tremuloides/Poa pratensis* (quaking aspen/Kentucky bluegrass) community type occurs at mid eleva-

tions throughout mountain valleys and foothills of eastern and southern Idaho. Sites range from 1,667 to 1,909 m (5,500 to 6,300 ft). This major type occupies alluvial terraces adjacent to streams in both broad and narrow drainages, or hillsides near mountainous headwater springs and seeps.

VEGETATION

Populus tremuloides/Poa pratensis (quaking aspen/Kentucky bluegrass) community types in Idaho are dominated solely by *Populus tremuloides* (quaking aspen) in the overstory, to the exclusion of other tree species. Because this type is a grazing disclimax, the understory is dominated by disturbance tolerant species. Currants, *Ribes hudsonianum* (stinking currant) and *Ribes lacustre* (swamp currant), and *Rosa woodsii* (woods rose) occupy the shrub layer while *Poa pratensis* (Kentucky bluegrass) and *Bromus tectorum* (cheatgrass) are prevalent in the herbaceous layer. Other minor understory components include various *Carex* spp. (sedge), *Juncus balticus* (Baltic rush) and *Taraxacum officinale* (common dandelion).

The *Populus tremuloides/Poa pratensis* (quaking aspen/Kentucky bluegrass) community type in Montana represents a grazing or browsing disclimax. *Populus tremuloides* (quaking aspen) dominates the overstory. Shrubs such as *Cornus stolonifera* (red-osier dogwood), *Alnus incana* (mountain alder), *Prunus virginiana* (common chokecherry), and *Salix* species (willows) are absent or present in limited amounts only, due to high grazing and browsing pressures. *Rosa woodsii* (woods rose) may be present, often in substantial amounts. Grasses include *Poa pratensis* (Kentucky bluegrass) and *Phleum pratense* (common timothy). *Taraxacum officinale* (common dandelion) and *Fragaria virginiana* (Virginia strawberry) are common forbs (Table 10). Table 10 reflects vegetation surveyed on sites restricted to Montana, and may not accurately portray species composition and canopy cover for sites identified in Idaho.

Table 10. Average canopy cover, range of canopy cover, and constancy for indicator species of the sampled stands of the grazing or browsing disclimax *Populus tremuloides/Poa pratensis* (quaking aspen/Kentucky bluegrass) community type in Montana (number = 26 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Trees			
Populus tremuloides (quaking aspen)	50	10-80	100
Shrubs			
Rosa woodsii (woods rose)	15	0-80	50
Graminoids			
Agrostis stolonifera (redtop)	16	0-60	23
Phleum pratense (common timothy)	17	0-60	73
Poa pratensis (Kentucky bluegrass)	22	0-98	85
Forbs			
Actaea rubra (baneberry)	2	0-3	8
Aster occidentalis (western aster)	4	0-10	42

Fragaria virginiana (Virginia strawberry)	8	0-40	46
Galium boreale (northern bedstraw)	1	0-3	50
Galium triflorum (sweetscented bedstraw)	1	0-1	12
Heracleum lanatum (cow-parsnip)	10	0-20	8
Smilacina stellata (starry Solomon-plume)	1	0-10	54
Taraxacum officinale (common dandelion)	4	0-20	58
Viola canadensis (Canada violet)	1	0-1	4

SUCCESSIONAL INFORMATION

This community type reflects past periods of prolonged animal use. The *Populus tremuloides/Poa pratensis* (quaking aspen/Kentucky bluegrass) community type represents a grazing or browsing disclimax of the *Populus tremuloides* (quaking aspen) dominated habitat types. Loss of the original undergrowth dominants has occurred, and successful reproduction of *Populus tremuloides* (quaking aspen) has been severely limited. Conifers may have been present as potential late successional species but have been removed by prolonged grazing disturbance. Carefully observation of site and vegetative characteristics may aid in determining the site's potential.

SOILS

Soils are commonly Entisols (Fluvents) or Mollisols (Borolls) derived from alluvium. Water tables approach the soil surface in spring, but are usually greater than one meter below the soil surface in mid summer.

ADJACENT COMMUNITIES

Adjacent wetter communities vary. Nearby uplands are often dominated by *Pseudotsuga menziesii* (Douglas fir), *Artemisia tridentata* (big sagebrush), *Festuca scabrella* (rough fescue), and *Festuca idahoensis* (Idaho fescue).

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

This type is a valuable source of browse and forage for livestock and wildlife. Livestock use this type for shade and as bedding ground. However, persistent grazing and trampling have resulted in compositional and structural changes, including the loss of native herbaceous species. Conversion back to the original vegetation is unlikely to occur simply by altering the grazing regime.

Poa pratensis (Kentucky bluegrass) is a palatable and moderately productive grass, especially when soil moisture levels are high, and tolerates a high degree of defoliation. Herbage production is moderate. *Poa pratensis* (Kentucky bluegrass) is well adapted to grazing and is considered an increaser or an invader, especially if grazing intensities and durations are severe (Wasser 1982). This species can produce new shoots from both existing tillers or rhizomes. Grazing practices influence the type of growth form present (Volland 1978). A high density of weak, low vigor tillers results under season long grazing. Stem densities are emphasized over aboveground biomass. Grazing practices incorporating early season rest increase the vigor of individual plants. Fewer shoots may be

produced, but total aboveground biomass tends to be greater. Streambanks associated with low vigor *Poa pratensis* (Kentucky bluegrass) are susceptible to sloughing.

Timber

Most timber harvest is salvage for fuelwood. Overwood removal will result in sprouting of young aspen from suckers. Stand development necessitates protection of young aspen from grazing.

Wildlife

Deer may use this type for early season forage. Cover value for big game is limited because of the typically open, two layered structure. Beaver, if present, may make heavy use of *Populus tremuloides* (quaking aspen) stands (Allen 1983). Wild ungulates such as deer and elk browse young suckers and occasionally feed on the bark of older trees. Use by elk during spring, fall, and winter periods is often moderate to heavy (Kufeld 1973). *Populus tremuloides* (quaking aspen) is highly preferred by moose (Costain 1989). Use of this type as bedding grounds by wildlife is also common. Birds such as redshafted flickers are common, and often nest in cavities of larger aspen. Understory species such as *Agropyron repens* (quackgrass), *Rosa* species (rose), and *Symphoricarpos* species (snowberry) provide food and cover for small mammals and birds, upland game and waterfowl (Dittberner and Olson 1983).

Fire

Populus tremuloides (quaking aspen) responds to fire by producing large numbers of vigorous root suckers. However, livestock and large ungulates should be kept out of newly burned stands if successful regeneration is desired. *Poa pratensis* (Kentucky bluegrass) is little harmed by fires, especially when moisture levels are adequate to dampen soil temperatures during the burn. However, it is intolerant of burning during the active growth stages and can be successfully controlled by late spring burning. Cool burns will have little effect on *Poa pratensis* (Kentucky bluegrass) (Volland and Dell 1981), but spring burns may lower tiller densities (Dix and Smeins 1967). Intense burns during active growing periods can severely damage stands of *Poa pratensis* (Kentucky bluegrass) (Wasser 1982).

Soil Management and Rehabilitation Opportunities

Moist, fine textured soils are easily compacted and disturbed by livestock in spring and after rain events. Soil compaction is minimal on dry coarse textured soils.

Populus tremuloides (quaking aspen) may be useful in revegetating disturbed sites having moist, well drained soils. Best results are obtained using rooted cuttings or nursery grown stock. Once established, growth rates are rapid. The quickly spreading roots of *Populus tremuloides* (quaking aspen) effectively stabilize soils.

On the other hand, *Poa pratensis* (Kentucky bluegrass) is not very effective in stabilizing streambanks (Youngblood and others 1985b). Bank undercutting and sloughing may occur, especially when soils are wet or stands weakened by excessive grazing.

Recreational Uses and Considerations

If stands are extensive, this community type may provide good campground locations. Overstory aspen provide shade in an often otherwise treeless environment. However, successful aspen reproduction is likely to be reduced or eliminated by trampling. Fencing of selected areas to allow suckers to grow is recommended.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = forested wetland; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

OTHER STUDIES

This type has been documented for the state of Montana (Hansen and others 1995). Similar grazing influenced *Populus tremuloides/Poa pratensis* (quaking aspen/Kentucky bluegrass) community types have been described for southeastern Idaho and western Wyoming by Youngblood and Mueggler (1981), Mueggler and Campbell (1982), Chadde and others (1988), Mueggler (1988), and Padgett and others (1989).

Populus trichocarpa/Cornus stolonifera Community Type
(Black Cottonwood/Red-Osier Dogwood Community Type)

POPTRI/CORSTO (POTR6/COST4)
Number Of Stands Sampled = 7

LOCATION AND ASSOCIATED LANDFORMS

The *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type is a major type from low to higher elevations throughout the foothills and valleys of eastern Idaho. *Populus trichocarpa* (black cottonwood) stands occupy floodplains and islands of major streams and rivers, developing as extensive forests, as narrow, stringer communities paralleling minor stream courses, or as matrices of smaller clustered stands . This type may be located on stream banks and alluvial bars immediately adjacent to flowing channels or stranded on upper, secondary floodplains as natural river dynamics cause channels to migrate across valley bottoms. Sites range from 1,394 to 2,121 m (4,600 to 7,000 ft). Hansen and others indicate that *Populus trichocarpa* (Black cottonwood) generally occurs at higher elevations than *Populus angustifolia* (narrowleaf cottonwood) in Montana. Additional samples need to be collected to determine if this trend holds true in Idaho.

VEGETATION

In Idaho, *Populus trichocarpa* (black cottonwood) is the principal overstory species for this type. *Salix amygdaloides* (Peach-leaf Willow), *Populus angustifolia* (narrowleaf cottonwood) and *Populus acuminata* (Lanceleaf Cottonwood)

may also be present in the upper strata as subordinates with minimal coverages. *Cornus stolonifera* (red-osier dogwood), the signature shrub for this type, may form a dense understory with other shrub species such as *Betula occidentalis* (water birch), *Salix exigua* (sandbar willow), *Salix lutea* (yellow willow), and *Rosa woodsii* (woods rose). Grasses and forbs vary widely depending on the type and level of disturbance, and may be lush or sparse depending on the nature of the overlying shrub layer. The herbaceous element typically contains *Agrostis stolonifera* (redtop), *Poa pratensis* (Kentucky bluegrass), *Phalaris arundinacea* (reed canarygrass), *Polygonum* spp. (smartweed) and *Equisetum* spp.(horsetail). Deadwood may be prominent on the ground surface as mature stands become decadent with age.

Table 11. Average canopy cover, range of canopy cover, and constancy for species recorded in stands of the *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type that are relatively undisturbed by livestock or wildlife (number = 7 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Trees			
Populus acuminata (Lanceleaf Cottonwood)	1	0-10	14
Populus trichocarpa (Black Cottonwood)	61	30-90	100
Salix amygdaloides (Peach-leaf Willow)	11	0-80	14
Shrubs			
Cornus stolonifera (Red-osier Dogwood)	41	3-90	100
Crataegus douglasii (Black Hawthorn)	7	0-30	43
Crataegus succulenta (Succulent Hawthorn)	3	0-20	14
Ribes lacustre (Swamp Currant)	1	0-3	71
Rosa woodsii (Woods Rose)	30	0-70	86
Salix lutea (Yellow Willow)	3	0-10	29
Solanum dulcamara (Climbing Nightshade)	4	0-10	43
Symphoricarpos occidentalis (Western Snowberry)	4	0-20	29
Graminoids			
Agropyron repens (Quackgrass)	<1	0-3	14
Agrostis stolonifera (Redtop)	5	0-30	71
Calamagrostis canadensis (Bluejoint Reedgrass)	<1	0-1	14
Carex stipata (Sawbeak Sedge)	<1	0-1	14
Elymus virginicus (Virginia Wildrye)	3	0-20	14
Glyceria striata (Fowl Mannagrass)	<1	0-1	14
Muhlenbergia asperifolia (Alkali Muhly)	<1	0-1	14
Phalaris arundinacea (Reed Canarygrass)	3	0-20	57
Poa bolanderi (Bolander's Bluegrass)	1	0-10	14
Poa pratensis (Kentucky Bluegrass)	9	0-60	29
Forbs			

Arctium minus (Common Burdock)	<1	0-1	14
Bidens cernua (Nodding Beggar-ticks)	1	0-10	14
Bidens vulgata (Tall Beggar-ticks)	<1	0-1	14
Cirsium arvense (Canada Thistle)	6	0-20	71
Epilobium glaberrimum (Smooth Willow-herb)	<1	0-1	14
Forb (Forb)	<1	0-1	29
Lycopus uniflorus (Northern Bugleweed)	<1	0-1	14
Lysimachia thyrsiflora (Tufted Loosestrife)	<1	0-1	14
Mentha arvensis (Field Mint)	3	0-20	29
Polygonum amphibium (Water Smartweed)	3	0-10	29
Polygonum punctatum (Water Smartweed)	1	0-10	14
Rumex crispus (Curly Dock)	<1	0-3	14
Scutellaria galericulata (Marsh Skullcap)	<1	0-1	14
Sium suave (Hemlock Water-parsnip)	<1	0-1	14
Solidago gigantea (Late Goldenrod)	<1	0-3	14
Trifolium spp. (Clover)	<1	0-1	14
Ferns and Allies			
Equisetum arvense (Field Horsetail)	1	0-10	14
Equisetum spp. (Horsetail; Scouring-rush)	4	0-30	29

SUCCESSIONAL INFORMATION

The *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type represents a mid-seral stage of primary succession (Hansen and others 1995).

Primary Successional Stages

Cottonwoods are a pioneering species that requires moist, barren, newly deposited alluvium that is exposed to full sunlight. In general, these sites represent point bars, side bars, mid channel bars, delta bars, and islands. Since cottonwoods do not regenerate in their own shade and require moist, barren, fully exposed, newly deposited alluvial material as a suitable seedbed, they are considered a seral species and do not represent the climax community (PNC) for the site. Many stands may appear to have limited regeneration, especially in the open areas. However, it is important to understand that these young seedlings and saplings represent sprouts (asexual reproduction) and not establishment by seeds (sexual reproduction). These sprouts may help prolong the life span of the stand, but will not perpetuate or maintain the stand. In time the cottonwood stand will be replaced by a later successional stage (Hansen and others 1995).

The erosional and depositional pattern of a river helps maintain the diversity of plant communities on the floodplain. The distribution of various communities depends on the way the river meanders. In turn, the rate of meandering determines the proportion of floodplain communities considered to be in the pioneer or early seral, mid-seral, late seral, or climax (PNC) stage of succession. Where the river meanders frequently, few stands progress to later successional stages. Near the outer edges of the floodplain, the effect of the river is less pronounced, allow-

ing later successional stages to develop. Typically, rivers meander like a whip or snake across their floodplain. Lateral movement of the river initiates a dynamic series of vegetation events. As water moves downstream, it erodes established banks, typically covered with riparian or wetland vegetation in different stages of development, on outside curves and deposits fresh alluvial materials on the point bars of inside curves. Each new deposit of alluvium forms a distinct band or terrace with each band being even aged and with gaps in ages between the bands. The ages of the bands are progressively older on older terraces. As the river moves away from sites of previous deposition and continues to downcut, the amount of soil water recharge from channel seepages decreases, making these sites (terraces) drier. If certain portions of the floodplain remain undisturbed for a long enough period of time, their relief with respect to the river may increase to a point where they are only rarely flooded, if at all. These terraces are considered old or mature alluvial terraces and can continue development toward climax (PNC) without the modifying influences of floods (Hansen 1989).

Early Seral Stage—The *Populus trichocarpa*/Recent Alluvial Bar (black cottonwood/Recent Alluvial Bar) community type is an early seral stage.

Mid-Seral Stage—If disturbance (either human-caused or natural) does not eliminate the stand, the *Populus trichocarpa*/Recent Alluvial Bar (black cottonwood/Recent Alluvial Bar) community type will progress to the relatively undisturbed mid-seral stage called the *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type. Normally, the understory of a pole to mature *Populus trichocarpa* (black cottonwood) stand is dominated by conifers such as *Pseudotsuga menziesii* (Douglas fir), *Picea* (spruce), *Abies lasiocarpa* (subalpine fir), and *Juniperus scopulorum* (Rocky Mountain juniper). As the *Populus trichocarpa* (black cottonwood) overstory matures, becomes open, and finally, becomes decadent, the conifers are ready to replace them (Hansen and others 1995).

Late Seral to Climax (PNC) Stage—As the cottonwood stand dies, primary succession toward other communities will occur unless flooding deposits new sediments suitable for cottonwood seedlings. In the absence of sediment deposition, at low to mid elevations succession continues from the *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type to wetland habitat types dominated by conifers such as *Pseudotsuga menziesii* (Douglas fir), *Picea* (spruce), *Abies lasiocarpa* (subalpine fir), and *Juniperus scopulorum* (Rocky Mountain juniper). In other instances, this community type may be successional to the *Salix geyeriana/Calamagrostis canadensis* (Geyer willow/bluejoint reedgrass) habitat type or the *Salix lutea/Calamagrostis canadensis* (yellow willow/bluejoint reedgrass) habitat type, depending upon elevation (Hansen and others 1995).

Secondary Successional Stages

The presence or absence of a particular understory community may aid in determining the degree of disturbance (both present and historical disturbance) on a particular site. On sites that are relatively undisturbed, the understory of the *Populus trichocarpa* (black cottonwood) community will contain a diverse, dense shrub layer dominated by *Cornus stolonifera* (red-osier dogwood), *Amelanchier alnifolia* (western serviceberry), *Prunus virginiana* (common choke-cherry), and various species of *Salix* (willows) and *Ribes* (currants and gooseberries). This stage is called the *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type. With moderate levels of grazing or browsing, there will be an increase in *Symphoricarpos occidentalis* (western snowber-

ry) and *Rosa* species (rose), with a corresponding decrease in both the abundance and canopy cover of *Cornus stolonifera* (red-osier dogwood), *Amelanchier alnifolia* (western serviceberry), *Prunus virginiana* (common chokecherry), and various species of *Ribes* (currants and gooseberries). If grazing or browsing pressures continue, the more desirable shrubs will be eliminated leaving *Symphoricarpos occidentalis* (western snowberry) and *Rosa* species (rose) which can form a nearly impenetrable understory. This stage of disturbance-caused succession is called the *Populus trichocarpa/Symphoricarpos occidentalis* (black cottonwood/western snowberry) community type. If the disturbance is severe enough, ***ALL*** shrubs can be eliminated and the understory will be converted to a herbaceous one dominated by species such as *Poa pratensis* (Kentucky bluegrass), *Phleum pratensis* (common timothy), *Bromus inermis* (smooth brome), and a variety of "weedy" forbs (e.g., the *Populus trichocarpa*/Herbaceous [black cottonwood/Herbaceous] community type). During the process of converting from a diverse, dense shrub understory to a herbaceous understory, the stand will open up resulting in a drier site. Finally the stand becomes decadent with the stand's appearance becoming one of widely spaced, dying cottonwoods. The site now has become so open and dry that the site's potential may have changed to one capable of supporting a variety of upland types. The presence of conifers and upland shrub species will usually indicate the site's potential. However, conversion may be slow due to heavy grazing pressures and the sod forming characteristic of herbaceous species. Remnant shrubs and grasses, if present will help indicate the potential undergrowth composition (Hansen and others 1995).

Once the stand has converted from a shrub-dominated understory to one that is dominated by a variety of introduced herbaceous species, the ability to return the site to its former state (shrub-dominated) is very difficult. (It may be possible, but it will require a drastic change in management and may be very costly in terms of both labor and money.) Therefore, if a manager wants to maintain the stand in a shrub-dominated understory state, the most cost effective method is to change the management on the site ***BEFORE*** the site is too degraded (Hansen and others 1995).

SOILS

Fine textured mineral soils, composed of varying degrees of silts, clays and fine grain sands, form the surface layers of sites occupied by this community type. These alluvial layers may extend to depths exceeding well beyond 90 cm (36 in). Mottled and gleyed soil characteristics occur where the flux of near surface water tables facilitate oxidation and reduction reactions. Gravels and cobbles may be present in pockets and ill-defined layers throughout this zone. Underlying layers tend to be composed of coarse grain materials and large cobbles or rocks. Substrates tend to be well-drained, and are prone to flooding where sites occur on the active floodplain and on islands. Water tables are near the surface in the immediate vicinity of the channel, but drop proportionally for sites further removed from the active floodplain. *Populus trichocarpa* (Black cottonwood) stands located on secondary (upper) floodplains may be 2 m (6.5 ft) or more above the water table, although capillary action may promote greater moisture availability upward in the soil solum. These sites may be characterized by moderate soil development due to the accumulation of leaf litter and absence of regular disturbance, and may be classified as Inceptisols, Entisols or Mollisols.

ADJACENT COMMUNITIES

Saturated sites may be dominated by *Typha* spp.(cattail), *Scirpus* spp. (bulrush), and *Phalaris arundinacea* (reed ca-

narygrass). Other types in the *Populus trichocarpa* (Black cottonwood) series may border the *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type where disturbance has altered the composition of the understory component and/or the physical site features. Additional adjacent riparian communities may be dominated by *Crataegus douglasii* (Black Hawthorn) or a diversity of *Salix spp.* (willow). Nearby uplands are dominated by *Juniperus scopulorum* (Rocky Mountain juniper), *Artemisia tridentata* (big sagebrush) and *Poa pratensis* (Kentucky bluegrass).

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Forage production ranges from low to moderate due to the dense nature of the stands. Stands in good to excellent health (condition) often support dense thickets of shrubs, limiting the amount of available forage. *Cornus stolonifera* (red-osier dogwood) is considered an "ice cream" plant by livestock and wildlife. Its utilization is a direct indication of past and current use levels. In some areas, livestock browsing of *Cornus stolonifera* (red-osier dogwood) may be quite high (Hansen and others 1995).

Most sites are presently subjected to heavy grazing pressures because of their topographic location and ease of access. With moderate to heavy prolonged grazing pressures, most shrubs will be eliminated leaving the shrubs *Symphoricarpos occidentalis* (western snowberry) and *Rosa woodsii* (woods rose) as the dominate understory. At this point, the stand has been converted to the *Populus trichocarpa/Symphoricarpos occidentalis* (black cottonwood/western snowberry) disturbance-caused community type. If disturbance is severe, the shrubs will also be eliminated and the stand has converted to the *Populus trichocarpa*/Herbaceous (black cottonwood/ Herbaceous) disturbance-caused community type (Hansen and others 1995).

Timber

Due to the favorable moisture relationship of this type, timber productivity for the associated cottonwoods and conifers ranges from low to moderate. Complete stand removal may result in a shrub-dominated community with extremely limited cottonwood regeneration except for occasional sprouting from stumps (Hansen and others 1995). Unless sites are prone to at least occasional alluvial deposition through flooding, new seedbeds will not develop and the timber potential will be lost.

Wildlife

The *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type provides valuable cover, shade, and food for a variety of species. Big game use may be high, depending upon the time of year. The spreading crown of *Populus trichocarpa* (black cottonwood) provides sites for huge platform like stick nests of bald eagles and ospreys (Arno and Hammerly 1984) and for great blue herons (Parker 1980). Canada geese occasionally use the nests previously built by bald eagles and osprey. A variety of birds and mammals, such as woodpeckers, great horned owls, wood ducks, and raccoons, nest in trunk cavities. *Populus trichocarpa* (black cottonwood) and *Cornus stolonifera* (red-osier dogwood) are often eaten by moose (Costain 1989) and used by beaver for food and building materials (Allen 1983). Understory species provide food and cover for waterfowl, small birds,

and mammals (Dittberner and Olson 1983).

Fisheries

The stream side location of the *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type is very important in providing thermal cover, debris recruitment, and streambank stability. Its importance can not be emphasized enough (see discussion in the Soil Management and Rehabilitation Opportunities section). *Cornus stolonifera* (red-osier dogwood) and associated shrub species are excellent in controlling erosion along streams. This is particularly important on the higher gradient streams where scouring by seasonal flooding is possible (Hansen and others 1995).

Fire

The *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type is susceptible to fire during the late summer and fall. *Populus trichocarpa* (black cottonwood) and associated shrubs are adapted to light and in some instances to moderate intensity fires and may produce new sprouts following burns. The ability of cottonwoods to produce new sprouts following fire seems to be dependent upon three criteria: 1) The particular species of cottonwood present in the stand. In general, *Populus angustifolia* (narrowleaf cottonwood) has a greater sprouting capability than *Populus trichocarpa* (black cottonwood). 2) The age of the trees in the stand. As the trees mature, the sprouting potential tends to decrease proportionally. As the trees reach the decadent stage of development, the sprouting potential is severely limited. 3) The location of the water table. In general, the higher the water table throughout the growing season, the greater the ability for sprouts to survive. Therefore, if a manager wants to extend the life span of a stand of cottonwoods, fire ***MAY BE*** used as a tool in the pole to early mature stage of development. If fire is used to rehabilitate a stand, it is imperative that the stand be excluded from all livestock grazing for at least five years and that browsing by wildlife be closely monitored (Hansen and others 1995).

Cornus stolonifera (red-osier dogwood) and the associated shrub species can survive all but the most severe fires that remove duff and cause extended heating of the upper layer of soil. After a fire, the shrubs sprouts from the surviving rhizomes or stolons (runners) (Fischer and Bradley 1987).

Soil Management and Rehabilitation Opportunities

Coarse textured soils are not as susceptible to compaction problems. This community type is subject to recurring scouring by floods and alluvium deposition. However, stands are relatively stable because of the strong rooting action of the associated species. Management should emphasize the importance of the understory shrub layer in streambank stabilization. This is particularly important on higher gradient stream channels where scouring by seasonal flooding occurs (Hansen and others 1995).

Managers should maintain a buffer strip of the *Populus trichocarpa* (black cottonwood) dominated community types adjacent to rivers and streams. These buffer strips reduce sedimentation, stabilize streambanks, and slow flood waters (Hansen and others 1995).

If the stand still has a fairly high water table, a dramatic change in management (i.e. elimination of livestock graz-

ing and close monitoring of wildlife impacts) *MAY* allow the remnant shrub population to sprout and re-invade the stand. However, if the water table has dropped dramatically and the shrubs have been completely eliminated, the opportunity to reestablish a shrub understory dominated by desirable shrubs may be lost (Hansen and others 1995).

Where revegetation with woody species is wanted, desirable shrubs such as *Cornus stolonifera* (red-osier dogwood), *Amelanchier alnifolia* (western serviceberry), *Prunus virginiana* (common chokecherry), and various species of *Salix* (willows) and *Ribes* (currants and gooseberries) may be well adapted to planting on disturbed sites. Rooted cuttings or nursery grown seedlings are easily established on moist, well drained soils. Growth rates are rapid and the roots of established seedlings effectively stabilize recent bare alluvium. Remember: If the canopy cover of the trees in the stand has opened up too much and/or the water table has been lowered dramatically, the success of revegetation with desirable woody species will be low (Hansen and others 1995).

For rehabilitation of stands by the use of fire, see the discussion in the Fire Management section about the limitations of fire as a tool for rehabilitation. If fire is to be used to rehabilitate a stand, it is imperative that the stand be excluded from all livestock grazing for at least five years and that browsing by wildlife be closely monitored (Hansen and others 1995).

The following guidelines should be followed when attempting to revegetate sites with cuttings from cottonwoods (Swenson 1988): 1) Do not plant cottonwoods in saline or alkaline sites. 2) Select sites with substrates of sand, gravel, or small cobbles. Avoid sites that are classified as clays or have a thick clay layer. 3) Make cuttings from stands of open, young, rapidly growing trees, using only cuttings that are four years old or less. Remove the side branches, leaving only the tip and next two lower side branches. 4) Make the cuttings when the plants are completely dormant. 5) Soak the cuttings in water for 10 to 14 days. 6) Auger holes to a depth of the lowest anticipated growing season water table. 7) Place the cuttings in the augered holes the same day they are removed from the soak. Set the butt at the lowest anticipated growing season groundwater depth. Select cuttings of a length which provides 1 to 2 m (3 to 6 ft) of cutting to remain above the soil surface. 8) Back fill the holes carefully to avoid air pockets. 9) Place tree guards around the cuttings if rodent or rabbit damage is anticipated. 10) As buds begin to swell along the cuttings, wipe them off the lower two-thirds of the cutting. 11) Plantings must be excluded from livestock grazing and big game browsing for two to three growing seasons. Some beaver control may be needed

Recreational Uses and Considerations

Because of its proximity to streams and rivers and its flat topography, recreational developments and transportation corridors are common within this type. Recreational opportunities are excellent for fishing, big game and waterfowl hunting, and observing a variety of bird species (Hansen and others 1995).

When locating structures for camping or other purposes in this community type, avoid active floodplains or other sites that may be prone to disturbance.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is list-

ed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = forested wetland; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

OTHER STUDIES

Similar communities have been reported for western Montana (Foote 1965), central Oregon (Kovalchik 1987), and central Idaho (Tuhy and Jensen 1982).

Populus trichocarpa/Herbaceous Community Type
(Black Cottonwood/Herbaceous Community Type)

POPTRI (POTR6)
Number Of Stands Sampled = 2

LOCATION AND ASSOCIATED LANDFORMS

The *Populus trichocarpa*/Herbaceous (black cottonwood/Herbaceous) community type is a major type from low to moderately high elevations throughout the foothills and valleys of eastern Idaho. *Populus trichocarpa* (black cottonwood) stands occupy floodplains and islands of major streams and rivers, establishing extensive forests, narrow, stringer communities paralleling minor stream courses, or matrices of smaller clustered stands . This type may be located on stream banks and alluvial bars immediately adjacent to flowing channels or stranded on upper, secondary floodplains as natural river dynamics cause channels to migrate across valley bottoms. Sites range in elevation from 1,394 to 2,121 m (4,600 to 7,000 ft). Hansen and others indicate that *Populus trichocarpa* (Black cottonwood) generally occurs at higher elevations than *Populus angustifolia* (narrowleaf cottonwood) in Montana. Additional samples need to be collected to determine if this trend holds true in Idaho.

VEGETATION

The *Populus trichocarpa*/Herbaceous (black cottonwood/Herbaceous) community type in Idaho forms essentially a two-tiered structure, dominated by *Populus trichocarpa* (Black cottonwood) in the overstory, and *Poa pratensis* (Kentucky bluegrass) and other disturbance induced species in the understory. This type is a grazing or browsing disclimax, the result of prolonged, intense utilization by livestock and, to a lesser degree, wildlife. *Populus trichocarpa* (Black cottonwood) may form a dense, closed canopy, or a more open overstory of widely scattered individuals, often with limited coverages of *Populus angustifolia* (Narrowleaf Cottonwood). The shrub component is essentially absent, or when present, only as a remnant, represented by disturbance tolerant species such as *Rosa woodsii* (woods rose) and *Crataegus douglasii* (Black Hawthorn). *Agrostis stolonifera* (redtop), *Agropyron caninum* (bearded wheatgrass), *Aster laevis* (smooth aster), and *Anthemis cotula* (Dog Fennel) are common graminoids and forbs.

Table 12. Average canopy cover, range of canopy cover, and constancy for indicator species of the sampled stands of the grazing or browsing disclimax *Populus trichocarpa*/Herbaceous (black cottonwood/Herbaceous) community type (number = 2 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Trees			
Populus trichocarpa (Black Cottonwood)	80	80-80	100
Shrubs			
Rosa woodsii (Woods Rose)	2	1-3	100
Solanum dulcamara (Climbing Nightshade)	<1	0-1	50
Graminoids			
Agropyron caninum (Bearded Wheatgrass)	10	0-20	50
Agropyron smithii (Western Wheatgrass)	<1	0-1	50
Agrostis stolonifera (Redtop)	10	0-20	50
Bromus tectorum (Cheatgrass)	<1	0-1	50
Carex microptera (Small-winged Sedge)	2	0-3	50
Eleocharis palustris (Common Spikesedge)	<1	0-1	50
Hordeum brachyantherum (Meadow Barley)	2	0-3	50
Hordeum jubatum (Foxtail Barley)	2	1-3	100
Phalaris arundinacea (Reed Canarygrass)	<1	0-1	50
Poa palustris (Fowl Bluegrass)	2	0-3	50
Poa pratensis (Kentucky Bluegrass)	70	60-80	100
Forbs			
Anthemis cotula (Dog Fennel)	7	3-10	100
Aster campestris (Meadow Aster)	<1	0-1	50
Aster laevis (Smooth Aster)	10	0-20	50
Aster occidentalis (Western Aster)	<1	0-1	50
Castilleja linariifolia (Narrow-leaved Paintbrush)	2	0-3	50
Cirsium arvense (Canada Thistle)	<1	0-1	50
Forb (Forb)	<1	0-1	50
Glycyrrhiza lepidota (American Licorice)	2	1-3	100
Grindelia squarrosa (Curlycup Gumweed)	<1	0-1	50
Iva axillaris (Poverty-weed)	2	0-3	50
Lactuca ludoviciana (Western Lettuce)	<1	1	50
Medicago sativa (Alfalfa)	<1	0-1	50
Melilotus officinalis (Yellow Sweet-clover)	2	0-3	50
Polygonum amphibium (Water Smartweed)	<1	0-1	50
Polygonum sawatchense (Sawatch Knotweed)	<1	0-1	50
Rumex crispus (Curly Dock)	<1	0-1	50

Taraxacum officinale (Common Dandelion)	5	0-10	50
Trifolium spp. (Clover)	<1	0-1	50
Ferns and Allies			
Equisetum laevigatum (Smooth Scouring-rush)	2	0-3	50

SUCCESSIONAL INFORMATION

The *Populus trichocarpa*/Herbaceous (black cottonwood/Herbaceous) community type represents a severely disturbed secondary successional stage of the mid-seral *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type (Hansen and others 1995).

Primary Successional Stages

Cottonwoods are a pioneering species that requires moist, barren, newly deposited alluvium that is exposed to full sunlight. In general, these sites represent point bars, side bars, mid channel bars, delta bars, and islands. Since cottonwoods do not regenerate in their own shade and require moist, barren, fully exposed, newly deposited alluvial material as a suitable seedbed, they are considered a seral species and do not represent the climax community (PNC) for the site. Many stands may appear to have limited regeneration, especially in the open areas. However, it is important to understand that these young seedlings and saplings represent sprouts (asexual reproduction) and not establishment by seeds (sexual reproduction). These sprouts may help prolong the life span of the stand, but will not perpetuate or maintain the stand. In time the cottonwood stand will be replaced by a later successional stage.

The erosional and depositional pattern of a river helps maintain the diversity of plant communities on the floodplain. The distribution of various communities depends on the way the river meanders. In turn, the rate of meandering determines the proportion of floodplain communities considered to be in the pioneer or early seral, mid-seral, late seral, or climax (PNC) stage of succession. Where the river meanders frequently, few stands progress to later successional stages. Near the outer edges of the floodplain, the effect of the river is less pronounced, allowing later successional stages to develop. Typically, rivers meander like a whip or snake across their floodplain. Lateral movement of the river initiates a dynamic series of vegetation events. As water moves downstream, it erodes established banks, typically covered with riparian or wetland vegetation in different stages of development, on outside curves and deposits fresh alluvial materials on the point bars of inside curves. Each new deposit of alluvium forms a distinct band or terrace with each band being even aged and with gaps in ages between the bands. The ages of the bands are progressively older on older terraces. As the river moves away from sites of previous deposition and continues to downcut, the amount of soil water recharge from channel seepages decreases, making these sites (terraces) drier. If certain portions of the floodplain remain undisturbed for a long enough period of time, their relief with respect to the river may increase to a point where they are only rarely flooded, if at all. These terraces are considered old or mature alluvial terraces and can continue development toward climax (PNC) without the modifying influences of floods (Hansen 1989).

Early Seral Stage—The *Populus trichocarpa*/Recent Alluvial Bar (black cottonwood/Recent Alluvial Bar) community type represents an early seral stage (Hansen and others 1995).

Mid-Seral Stage—If disturbance (either human-caused or natural) does not eliminate the stand, the *Populus trichocarpa*/Recent Alluvial Bar (black cottonwood/Recent Alluvial Bar) community type will progress to the relatively undisturbed mid-seral stage called the *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type. Normally, the understory of a pole to mature *Populus trichocarpa* (black cottonwood) stand is dominated by conifers such as *Pseudotsuga menziesii* (Douglas fir), *Picea* (spruce), *Abies lasiocarpa* (subalpine fir), and *Juniperus scopulorum* (Rocky Mountain juniper). As the *Populus trichocarpa* (black cottonwood) overstory matures, becomes open, and finally, becomes decadent, the conifers are ready to replace them (Hansen and others 1995).

Late Seral to Climax (PNC) Stage—As the cottonwood stand dies, primary succession toward other communities will occur unless flooding deposits new sediments suitable for cottonwood seedlings. In the absence of sediment deposition, at low to mid elevations succession continues from the *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type to wetland habitat types dominated by conifers such as *Pseudotsuga menziesii* (Douglas fir), *Picea* (spruce), *Abies lasiocarpa* (subalpine fir), and *Juniperus scopulorum* (Rocky Mountain juniper). In other instances, this community type may be successional to the *Salix geyeriana/Calamagrostis canadensis* (Geyer willow/bluejoint reedgrass) habitat type or the *Salix lutea/Calamagrostis canadensis* (yellow willow/bluejoint reedgrass) habitat type, depending upon elevation (Hansen and others 1995).

Secondary Successional Stages

The presence or absence of a particular understory community may aid in determining the degree of disturbance (both present and historical disturbance) on a particular site. On sites that are relatively undisturbed, the understory of the *Populus trichocarpa* (black cottonwood) community will contain a diverse, dense shrub layer dominated by *Cornus stolonifera* (red-osier dogwood), *Amelanchier alnifolia* (western serviceberry), *Prunus virginiana* (common choke-cherry), and various species of *Salix* (willows) and *Ribes* (currants and gooseberries). This stage is called the *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type. With moderate levels of grazing or browsing, there will be an increase in *Symphoricarpos occidentalis* (western snowberry) and *Rosa* species (rose), with a corresponding decrease in both the abundance and canopy cover of *Cornus stolonifera* (red-osier dogwood), *Amelanchier alnifolia* (western serviceberry), *Prunus virginiana* (common chokecherry), and various species of *Ribes* (currants and gooseberries). If grazing or browsing pressures continue, the more desirable shrubs will be eliminated leaving *Symphoricarpos occidentalis* (western snowberry) and *Rosa* species (rose) which can form a nearly impenetrable understory. This stage of disturbance-caused succession is called the *Populus trichocarpa/Symphoricarpos occidentalis* (black cottonwood/western snowberry) community type. If the disturbance is severe enough, ***ALL*** shrubs can be eliminated and the understory will be converted to a herbaceous one dominated by species such as *Poa pratensis* (Kentucky bluegrass), *Phleum pratensis* (common timothy), *Bromus inermis* (smooth brome), and a variety of "weedy" forbs (e.g., the *Populus trichocarpa*/Herbaceous [black cottonwood/Herbaceous] community type). During the process of converting from a diverse, dense shrub understory to a herbaceous understory, the stand will open up resulting in a drier site. Finally the stand becomes decadent with the stand's appearance becoming one of widely spaced, dying cottonwoods. The site now has become so open and dry that the site's potential may have changed to one capable of supporting a variety of upland types. The presence of conifers and upland shrub species will usually indicate the site's potential. However, con-

version may be slow due to heavy grazing pressures and the sod forming characteristic of herbaceous species. Remnant shrubs and grasses, if present will help indicate the potential undergrowth composition (Hansen and others 1995).

Once the stand has converted from a shrub-dominated understory to one that is dominated by a variety of introduced herbaceous species, the ability to return the site to its former state (shrub-dominated) is very difficult. (It may be possible, but it will require a drastic change in management and may be very costly in terms of both labor and money.) Therefore, if a manager wants to maintain the stand in a shrub-dominated understory state, the most cost effective method is to change the management on the site ***BEFORE*** the site is too degraded (Hansen and others 1995).

SOILS

Fine textured mineral soils, composed of varying degrees of silts, clays and fine grain sands, form the surface layers of sites occupied by this community type. These alluvial layers may extend to depths exceeding well beyond 90 cm (36 in). Mottled and gleyed soil characteristics occur where the flux of near surface water tables facilitate oxidation and reduction reactions. Gravels and cobbles may be present in pockets and ill-defined layers throughout this zone. Underlying layers tend to be composed of coarse grain materials and large cobbles or rocks. Substrates tend to be well-drained, and are prone to flooding where sites occur on the active floodplain and on islands. Water tables are near the surface in the immediate vicinity of the channel, but drop proportionally for sites further removed from the active floodplain. *Populus trichocarpa* (Black cottonwood) stands located on secondary (upper) floodplains may be 2 m (6.5 ft) or more above the water table, although capillary action may promote greater moisture availability upward in the soil solum. These sites may be characterized by moderate soil development due to the accumulation of leaf litter and absence of regular disturbance, and may be classified as Inceptisols, Entisols or Mollisols.

ADJACENT COMMUNITIES

Saturated sites may be dominated by *Typha* spp.(cattail), *Scirpus* spp. (bulrush), and *Phalaris arundinacea* (reed canarygrass). Other types in the *Populus trichocarpa* (Black cottonwood) series may border the *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type depending on the level of disturbance, or lack there of, on a site. Additional adjacent riparian communities may be dominated by *Crataegus douglasii* (Black Hawthorn) or a diversity of *Salix spp.* (willow). Nearby uplands are dominated by *Juniperus scopulorum* (Rocky Mountain juniper), *Artemisia tridentata* (big sagebrush) and *Poa pratensis* (Kentucky bluegrass).

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

The *Populus trichocarpa*/Herbaceous (black cottonwood/Herbaceous) community type provides moderate levels of spring and summer forage. Heavy grazing and trampling tend to maintain the open (park-like) structure of this community type and continued dominance of the undergrowth by *Poa pratensis* (Kentucky bluegrass) *Phleum pratense* (common timothy), *Bromus inermis* (smooth brome), and a variety of "weedy" forbs. This community type

has been and in many instances, still is used by the ranching community as a winter feeding ground. *Poa pratensis* (Kentucky bluegrass), *Phleum pratense* (common timothy), and *Bromus inermis* (smooth brome) are palatable and moderately productive, especially when soil moisture levels are high, and tolerate a high degree of defoliation. Herbage production is moderate. *Poa pratensis* (Kentucky bluegrass) is well adapted to grazing and is considered an increaser or an invader, especially if grazing intensities and durations are severe (Wasser 1982). This species can produce new shoots from both existing tillers or rhizomes. Grazing practices influence the type of growth form present (Volland 1978). A high density of weak, low vigor tillers results under season long grazing. Stem densities are emphasized over aboveground biomass. Grazing practices incorporating early season rest increase the vigor of individual plants. Fewer shoots may be produced, but total aboveground biomass tends to be greater (Hansen and others 1995).

Timber

Due to the favorable moisture relationship of this type, timber productivity for the associated cottonwoods and conifers ranges from low to moderate. Complete stand removal may result in a graminoid dominated community with extremely limited cottonwood regeneration except for occasional sprouting from stumps (Hansen and others 1995). Unless sites are prone to at least occasional alluvial deposition through flooding, new seedbeds will not develop and the timber potential will be lost.

Wildlife

This type is a source of early spring forage for moose, deer and elk. Cover value is limited because of the typically open, two layered structure. All kinds of birds are common since food and cover is available both on the ground and in the trees. Great blue herons nest in large cottonwood stands if isolation during the nesting period is possible. Colonial nest sites are used for many years if left undisturbed (Parker 1980). Osprey will also use this type for nesting (Zarn 1974).

Fisheries

The stream-side location of this type is important in providing thermal cover, debris recruitment, and streambank stability. Its importance can not be emphasized enough (Hansen and others 1995).

Fire

This type will burn when conditions are dry, such as fall or in late winter if snow accumulations are minimal. The ability of cottonwoods to produce new sprouts following fire seems to be dependent upon three criteria: 1) The particular species of cottonwood present in the stand. In general, *Populus angustifolia* (narrowleaf cottonwood) has a greater sprouting capability than *Populus trichocarpa* (black cottonwood) 2) The age of the trees in the stand. As the trees mature, the sprouting potential tends to decrease proportionally. As the trees reach the decadent stage of development, the sprouting potential is severely limited. 3) The location of the water table. In general, the higher the water table throughout the growing season, the greater the ability for sprouts to survive. Therefore, if a manager wants to extend the life span of a stand of cottonwoods, fire *MAY BE* used as a tool in the pole to early mature stage of development. If fire is used to rehabilitate a stand, it is imperative that the stand be excluded from all livestock grazing for at least five years and that browsing by wildlife be closely monitored (Hansen and others 1995).

Poa pratensis (Kentucky bluegrass) is damaged only by a hot, intense fire. Cool burns will have little effect on *Poa pratensis* (Kentucky bluegrass) (Volland and Dell 1981), but spring burns may lower tiller densities (Dix and Smeins 1967). Intense burns during active growing periods can used to control stands of *Poa pratensis* (Kentucky bluegrass) (Wasser 1982).

Soil Management and Rehabilitation Opportunities

Coarse textured soils are not as susceptible to compaction problems. This community type is subject to recurring scouring by floods and alluvium deposition. However, stands are relatively stable because of the strong rooting action of the associated species. Management should emphasize the importance of the understory shrub layer in streambank stabilization. This is particularly important on higher gradient stream channels where scouring by seasonal flooding occurs (Hansen and others 1995).

Managers should maintain a buffer strip of the *Populus trichocarpa* (black cottonwood) dominated community types adjacent to rivers and streams. These buffer strips reduce sedimentation, stabilize streambanks, and slow flood waters (Hansen and others 1995).

If the stand still has a fairly high water table, a dramatic change in management (i.e. elimination of livestock grazing and close monitoring of wildlife impacts) *MAY* allow the remnant shrub population to sprout and re-invade the stand. However, if the water table has dropped dramatically and the shrubs have been completely eliminated, the opportunity to reestablish a shrub understory dominated by desirable shrubs may be lost (Hansen and others 1995).

Where revegetation with woody species is wanted, desirable shrubs such as *Cornus stolonifera* (red-osier dogwood), *Amelanchier alnifolia* (western serviceberry), *Prunus virginiana* (common chokecherry), and various species of *Salix* (willows) and *Ribes* (currants and gooseberries) may be well adapted to planting on disturbed sites. Rooted cuttings or nursery grown seedlings are easily established on moist, well drained soils. Growth rates are rapid and the roots of established seedlings effectively stabilize recent bare alluvium. Remember: If the canopy cover of the trees in the stand has opened up too much and/or the water table has been lowered dramatically, the success of revegetation with desirable woody species will be low (Hansen and others 1995).

For rehabilitation of stands by the use of fire, see the discussion in the Fire Management section about the limitations of fire as a tool for rehabilitation. If fire is to be used to rehabilitate a stand, it is imperative that the stand be excluded from all livestock grazing for at least five years and that browsing by wildlife be closely monitored (Hansen and others 1995).

The following guidelines should be followed when attempting to revegetate sites with cuttings from cottonwoods (Swenson 1988): 1) Do not plant cottonwoods in saline or alkaline sites. 2) Select sites with substrates of sand, gravel, or small cobbles. Avoid sites that are classified as clays or have a thick clay layer. 3) Make cuttings from stands of open, young, rapidly growing trees, using only cuttings that are four years old or less. Remove the side branches, leaving only the tip and next two lower side branches. 4) Make the cuttings when the plants are com-

pletely dormant. 5) Soak the cuttings in water for 10 to 14 days. 6) Auger holes to a depth of the lowest anticipated growing season water table. 7) Place the cuttings in the augered holes the same day they are removed from the soak. Set the butt at the lowest anticipated growing season groundwater depth. Select cuttings of a length which provides 1 to 2 m (3 to 6 ft) of cutting to remain above the soil surface. 8) Back fill the holes carefully to avoid air pockets. 9) Place tree guards around the cuttings if rodent or rabbit damage is anticipated. 10) As buds begin to swell along the cuttings, wipe them off the lower two thirds of the cutting. 11) Plantings must be excluded from livestock grazing and big game browsing for two to three growing seasons. Some beaver control may be needed.

Recreational Uses and Considerations

Because of its proximity to streams and rivers and its flat topography, recreational developments and transportation corridors are common within this type. Recreational opportunities are excellent for fishing, big game and waterfowl hunting, and observing a variety of bird species (Hansen and others 1995).

When locating structures for camping or other purposes in this community type, avoid active floodplains or other sites that may be prone to disturbance.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = forested wetland; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

OTHER STUDIES

Similar communities have been reported for western Montana (Foote 1965), the state of Montana (Hansen and others 1995), central Oregon (Kovalchik 1987), and central Idaho (Tuhy and Jensen 1982).

Populus trichocarpa/Recent Alluvial Bar Community Type
(Black Cottonwood/Recent Alluvial Bar Community Type)

POPTRI (POTR6)

Number Of Stands Sampled in Montana = 10

NOTE: The *Populus trichocarpa*/Recent Alluvial Bar (black cottonwood/Recent Alluvial Bar) community type has been documented in Idaho according to field surveys conducted in 1994. However, due to time constraints during the 1995 field season, homogeneous stand data could not be collected for this type. In the subsequent discussion, any references to physical site location or vegetation characteristics for this type in Idaho were interpreted from 1994 field surveys. The remainder of this description was taken from the Classification and Management of Mon-

tana's Riparian and Wetland Sites (Hansen and others 1995).

LOCATION AND ASSOCIATED LANDFORMS

The *Populus trichocarpa*/Recent Alluvial Bar (black cottonwood/Recent Alluvial Bar) community type is a major type from low to moderately high elevations throughout the foothills and valleys of eastern Idaho. Sites range from 1,394 to 2,121 m (4,600 to 7,000 ft). *Populus trichocarpa* (black cottonwood) stands occupy floodplains and islands of major streams and rivers, developing as extensive forests, as narrow, stringer communities paralleling stream courses, or as matrices of smaller, clustered stands. Seedlings germinate on point bars, side bars, mid channel bars, delta bars and outwash plains, requiring unvegetated, barren sites composed of sands, cobbles, and /or gravels, and water levels at or near the surface. Hansen and others indicate that *Populus trichocarpa* (Black cottonwood) generally occurs at higher elevations than *Populus angustifolia* (narrowleaf cottonwood) in Montana. Additional samples need to be collected to determine if this trend holds true in Idaho.

VEGETATION

In Montana, this type is characterized by a stand dominated by seedlings or saplings of *Populus trichocarpa* (black cottonwood), or a stand codominated by cottonwoods and *Salix exigua* (sandbar willow). *Populus angustifolia* (narrowleaf cottonwood) and *Populus deltoides* (Great Plains cottonwood) may be present but are subordinate to *Populus trichocarpa* (black cottonwood). A wide variety of herbaceous species occupy the understory (Table 13). Table 13 reflects vegetation surveyed on sites exclusive to Montana, and may not accurately portray species composition and canopy cover for sites identified in Idaho.

In Idaho, while the dominant *Populus* spp. (cottonwood) element remains similar, the shrub layer is inconsistent. *Salix geyeriana* (Geyer willow) and *Salix boothii*(Booth willow) are common, along with moderate amounts of *Rosa woodsii* (woods rose). Various *Carex* spp. (sedge) are present, as are miscellaneous forbs. *Agrostis stolonifera* (redtop) may also be prominent.

Table 13. Average canopy cover, range of canopy cover, and constancy for species recorded in stands of the *Populus trichocarpa*/Recent Alluvial Bar (black cottonwood/Recent Alluvial Bar) community type that are relatively undisturbed by livestock or wildlife (number = 10 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Trees			
Abies lasiocarpa (subalpine fir)	1	0-1	10
Betula papyrifera (paper birch)	1	0-1	10
Juniperus scopulorum (Rocky Mountain juniper)	1	0-1	20
Picea spp. (spruce)	3	0-3	10
Pinus ponderosa (ponderosa pine)	2	0-3	20
Populus trichocarpa (black cottonwood)	48	10-98	100
Shrubs			

Alnus incana (mountain alder)	20	0-20	10
Alnus sinuata (Sitka alder)	1	0-1	10
Amelanchier alnifolia (western serviceberry)	1	0-1	30
Betula occidentalis (water birch)	3	0-3	10
Clematis ligusticifolia (western virgins-bower)	1	0-1	10
Cornus canadensis (bunchberry)	40	0-40	10
Cornus stolonifera (red-osier dogwood)	2	0-3	20
Potentilla fruticosa (shrubby cinquefoil)	1	0-1	10
Prunus virginiana (common chokecherry)	1	0-1	10
Rosa woodsii (woods rose)	2	0-3	20
Salix drummondiana (Drummond willow)	15	0-30	20
Salix exigua (sandbar willow)	11	0-20	40
Salix lutea (yellow willow)	1	0-1	10
Salix planifolia (planeleaf willow)	1	0-1	10
Salix scouleriana (Scouler willow)	3	0-3	10
Symphoricarpos occidentalis (western snowberry)	1	0-1	20
Toxicodendron rydbergii (poison ivy)	1	0-1	20
Graminoids			
Agropyron repens (quackgrass)	1	0-1	30
Agropyron smithii (western wheatgrass)	1	0-1	10
Agropyron spicatum (bluebunch wheatgrass)	1	0-1	10
Agrostis stolonifera (redtop)	10	0-20	40
Calamagrostis canadensis (bluejoint reedgrass)	20	0-40	20
Carex prionophylla (saw-leaved sedge)	3	0-3	10
Dichanthelium acuminatum (western witchgrass)	2	0-3	20
Elymus glaucus (blue wildrye)	1	0-1	10
Phleum pratense (common timothy)	2	0-3	20
Poa compressa (Canada bluegrass)	6	0-10	40
Poa palustris (fowl bluegrass)	20	0-20	10
Poa pratensis (Kentucky bluegrass)	1	0-1	10
Forbs			
Achillea millefolium (common yarrow)	1	0-1	10
Allium cernuum (nodding onion)	1	0-1	10
Allium schoenoprasum (chives)	1	0-1	10
Anaphalis margaritacea (common pearly-everlasting)	1	0-1	10
Arnica lonchophylla (point-leaf arnica)	1	0-1	10
Artemisia lindleyana (riverbank wormwood)	1	0-1	20
Artemisia ludoviciana (prairie sagewort)	1	0-1	10
Asclepias speciosa (showy milkweed)	1	0-1	10
Aster foliaceus (leafy aster)	3	0-3	20
Aster laevis (smooth aster)	1	0-1	10

Aster modestus (few-flowered aster)	3	0-3	10
Astragalus spp. (milk-vetch)	1	0-1	10
Castilleja spp. (paintbrush)	1	0-1	10
Centaurea maculosa (spotted knapweed)	1	0-1	10
Chenopodium spp. (goosefoot)	1	0-1	10
Chrysanthemum leucanthemum (oxeye-daisy)	3	0-3	10
Epilobium angustifolium (fireweed)	3	0-3	10
Epilobium palustre (swamp willow-herb)	3	0-3	10
Euphorbia esula (leafy spurge)	1	0-1	20
Fragaria vesca (woods strawberry)	3	0-3	10
Gaillardia aristata (blanket-flower)	1	0-1	10
Galium triflorum (sweetscented bedstraw)	1	0-1	10
Heracleum lanatum (cow-parsnip)	20	0-20	10
Hypericum perforatum (common St. John's-wort)	1	0-1	20
Lathyrus ochroleucus (cream-flowered peavine)	1	0-1	10
Lysimachia ciliata (fringed loosestrife)	10	0-10	10
Medicago lupulina (black medic)	1	0-1	10
Medicago sativa (alfalfa)	10	0-10	10
Melilotus alba (white sweet-clover)	1	0-1	20
Melilotus officinalis (yellow sweet-clover)	1	0-1	10
Monarda fistulosa (horsemint)	1	0-1	10
Oxytropis spp. (crazyweed)	1	0-1	10
Physostegia parviflora (purple dragonhead)	1	0-1	10
Smilacina stellata (starry Solomon-plume)	3	0-3	30
Solidago canadensis (Canada goldenrod)	5	0-10	30
Streptopus amplexifolius (clasping-leaved twisted stalk)	3	0-3	10
Tanacetum vulgare (common tansy)	1	0-1	20
Taraxacum officinale (common dandelion)	1	0-1	30
Thalictrum occidentale (western meadowrue)	40	0-40	10
Verbascum thapsus (common mullein)	1	0-1	10
Vicia americana (American vetch)	1	0-1	20
Viola spp. (violet)	1	0-1	10
Ferns and Allies			
Equisetum arvense (field horsetail)	1	0-1	10
Equisetum hyemale (common scouring-rush)	1	0-1	10
Equisetum laevigatum (smooth scouring-rush)	1	0-1	10

SUCCESSIONAL INFORMATION

The *Populus trichocarpa*/Recent Alluvial Bar (black cottonwood/Recent Alluvial Bar) community type represents an early seral (pioneer) stage of primary succession.

Primary Successional Stages

Cottonwoods are a pioneering species that requires moist, barren, newly deposited alluvium that is exposed to full sunlight. In general, these sites represent point bars, side bars, mid channel bars, delta bars, and islands. Since cottonwoods do not regenerate in their own shade and require moist, barren, fully exposed, newly deposited alluvial material as a suitable seedbed, they are considered a seral species and do not represent the climax community (PNC) for the site. Many stands may appear to have limited regeneration, especially in the open areas. However, it is important to understand that these young seedlings and saplings represent sprouts (asexual reproduction) and not establishment by seeds (sexual reproduction). These sprouts may help prolong the life span of the stand, but will not perpetuate or maintain the stand. In time the cottonwood stand will be replaced by a later successional stage.

The erosional and depositional pattern of a river helps maintain the diversity of plant communities on the floodplain. The distribution of various communities depends on the way the river meanders. In turn, the rate of meandering determines the proportion of floodplain communities considered to be in the pioneer or early seral, mid-seral, late seral, or climax (PNC) stage of succession. Where the river meanders frequently, few stands progress to later successional stages. Near the outer edges of the floodplain, the effect of the river is less pronounced, allowing later successional stages to develop. Typically, rivers meander like a whip or snake across their floodplain. Lateral movement of the river initiates a dynamic series of vegetation events. As water moves downstream, it erodes established banks, typically covered with riparian or wetland vegetation in different stages of development, on outside curves and deposits fresh alluvial materials on the point bars of inside curves. Each new deposit of alluvium forms a distinct band or terrace with each band being even aged and with gaps in ages between the bands. The ages of the bands are progressively older on older terraces. As the river moves away from sites of previous deposition and continues to downcut, the amount of soil water recharge from channel seepages decreases, making these sites (terraces) drier. If certain portions of the floodplain remain undisturbed for a long enough period of time, their relief with respect to the river may increase to a point where they are only rarely flooded, if at all. These terraces are considered old or mature alluvial terraces and can continue development toward climax (PNC) without the modifying influences of floods (Hansen 1989).

Early Seral Stage—The *Populus trichocarpa*/Recent Alluvial Bar (black cottonwood/Recent Alluvial Bar) community type is an early seral stage.

Mid-Seral Stage—If disturbance (either human-caused or natural) does not eliminate the stand, the *Populus trichocarpa*/Recent Alluvial Bar (black cottonwood/Recent Alluvial Bar) community type will progress to the relatively undisturbed mid-seral stage called the *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type. Normally, the understory of a pole to mature *Populus trichocarpa* (black cottonwood) stand is dominated by conifers such as *Pseudotsuga menziesii* (Douglas fir), *Abies grandis* (grand fir), *Picea* (spruce), *Thuja plicata* (western red cedar), *Tsuga heterophylla* (western hemlock), *Abies lasiocarpa* (subalpine fir), and *Juniperus scopulorum* (Rocky Mountain juniper). As the *Populus trichocarpa* (black cottonwood) overstory matures, becomes open, and finally, becomes decadent, the conifers are ready to replace them.

Late Seral to Climax (PNC) Stage—As the cottonwood stand dies, primary succession toward other communities will occur unless flooding deposits new sediments suitable for cottonwood seedlings. In the absence of sediment deposition, at low to mid elevations succession continues from the *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type to wetland habitat types dominated by conifers such as *Pseudotsuga menziesii* (Douglas fir), *Abies grandis* (grand fir), *Picea* (spruce), *Thuja plicata* (western red cedar), *Tsuga heterophylla* (western hemlock), *Abies lasiocarpa* (subalpine fir), and *Juniperus scopulorum* (Rocky Mountain juniper). In other instances, this community type may be successional to the *Salix geyeriana/Calamagrostis canadensis* (Geyer willow/bluejoint reedgrass) habitat type or the *Salix lutea/Calamagrostis canadensis* (yellow willow/bluejoint reedgrass) habitat type, depending upon elevation.

Secondary Successional Stages

The normal primary successional sequence (described above) may be altered due to varying degrees of grazing and browsing pressures. Moderate, prolonged grazing and browsing pressures will cause a stand to progress to the disturbance-caused *Populus trichocarpa/Symphoricarpos occidentalis* (black cottonwood/western snowberry) community type. Severe, prolonged grazing and browsing pressures may eliminate all conifer and/or deciduous seedlings and may eliminate the undergrowth of shrub species as well. This severely disturbed stage of secondary succession is called the *Populus trichocarpa*/Herbaceous (black cottonwood/Herbaceous) community type. In this situation, the overstory of *Populus trichocarpa* (black cottonwood) still matures and becomes open with an understory dominated by herbaceous species. Finally the stand becomes decadent with the stand's appearance becoming one of widely spaced, dying cottonwoods. The site now has become so open and dry that the site's potential may have changed to one capable of supporting a variety of upland types.

Stands of the *Populus trichocarpa/Symphoricarpos occidentalis* (black cottonwood/western snowberry) community type are very susceptible to the natural dynamics of a river system and may be flooded and eliminated after just a year or two of growth. Ice can also have a dramatic impact on these recently deposited alluvial bars. Ice can influence the floodplain landscape by either one of two ways: 1) mechanical damage, or 2) flooding (inundation). Mechanical damage generally involves the following: a) the laying down or bending over of the younger cottonwoods, b) the physical shearing off of the stems, c) the actual pulling out of the ground by the ice that surrounds the main stems, and d) the tilting or pushing over of mature trees. Young cottonwood seedlings and saplings are very susceptible to defoliation by livestock. If livestock pressures are too great, the stand can be either partially or totally eliminated. In many situations, excessive livestock pressure has completely eliminated the establishment of new cottonwood stands. Beaver and big game species can also have a dramatic impact on newly established cottonwood stands.

SOILS

Soils are typically Entisols (Fluvents) overlying river gravel or cobbles. Soil texture varies from loam to coarse sand. Water tables are generally at or near the soil surface. In late summer water tables may drop below 50 cm (20 in) of the soil surface but surface horizons remain moist due to capillary action. Soils are well drained with low available water. Coarse textured soils, moderate stream gradients, and high coarse fragment contents throughout the soil profile provide an environment that produces a rapid movement of highly aerated groundwater. This type of substrate is important to many floodplain communities.

ADJACENT COMMUNITIES

Adjacent wetter communities may be dominated by a variety of types including the *Salix exigua* (sandbar willow) and the *Salix lasiandra* (Pacific willow) community types, or the *Typha latifolia* (common cattail) and *Eleocharis* (spikesedge) dominated habitat types. Adjacent drier communities may be dominated by a variety of *Populus trichocarpa* (black cottonwood) types, or by a variety of upland species.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Forage production is low to moderate. Stands in good to excellent health (condition) often support dense thickets of cottonwoods and associated shrub species thereby limiting the amount of available forage. These stands are very susceptible to defoliation by livestock. If establishment of new cottonwood stands is a management objective, livestock impacts should be closely monitored. In some situations it may be advisable to eliminate livestock use until the cottonwoods are of sufficient height to preclude defoliation by livestock.

Wildlife

The *Populus trichocarpa*/Recent Alluvial Bar (black cottonwood/Recent Alluvial Bar) community type provides valuable cover, shade, and food for a variety of species. Big game use may be high, depending upon the time of year. *Populus trichocarpa* (black cottonwood) is used by beaver for food and building materials (Allen 1983). Understory species provide food and cover for waterfowl, small birds, and mammals (Dittberner and Olson 1983).

Fisheries

The stream side location of the *Populus trichocarpa*/Recent Alluvial Bar (black cottonwood/Recent Alluvial Bar) community type is valuable for fisheries by providing for streambank stability.

Fire

The *Populus trichocarpa*/Recent Alluvial Bar (black cottonwood/Recent Alluvial Bar) community type is susceptible to fire. In general, cottonwood seedlings, and to a lesser degree, cottonwood saplings do not have an extensive root system or thick bark and may be severely damaged (or eliminated) by fire.

Soil Management and Rehabilitation Opportunities

The coarse textured substrates are not susceptible to compaction problems. This community type is subject to recurring scouring by floods and alluvium deposition. Managers should maintain a buffer strip of the *Populus trichocarpa* (black cottonwood) dominated community types adjacent to rivers and streams. These buffer strips reduce sedimentation, stabilize stream banks, and slow flood waters.

The following guidelines should be followed when attempting to revegetate sites with cuttings from cottonwoods (Swenson 1988): 1) Do not plant cottonwoods in saline or alkaline sites. 2) Select sites with substrates of sand, gravel, or small cobbles. Avoid sites that are classified as clays or have a thick clay layer. 3) Make cuttings from

stands of open, young, rapidly growing trees, using only cuttings that are four years old or less. Remove the side branches, leaving only the tip and next two lower side branches. 4) Make the cuttings when the plants are completely dormant. 5) Soak the cuttings in water for 10 to 14 days. 6) Auger holes to a depth of the lowest anticipated growing season water table. 7) Place the cuttings in the augered holes the same day they are removed from the soak. Set the butt at the lowest anticipated growing season groundwater depth. Select cuttings of a length which provides 1 to 2 m (3 to 6 ft) of cutting to remain above the soil surface. 8) Back fill the holes carefully to avoid air pockets. 9) Place tree guards around the cuttings if rodent or rabbit damage is anticipated. 10) As buds begin to swell along the cuttings, wipe them off the lower two-thirds of the cutting. 11) Plantings must be excluded from livestock grazing and big game browsing for two to three growing seasons. Some beaver control may be needed.

Recreational Uses and Considerations

Recreational opportunities are excellent for fishing, big game and waterfowl hunting, and observing a variety of bird species. However, the dense nature of many of these stands may preclude various types of recreational activities such as fly fishing.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = forested wetland; Subclass = broad-leaved deciduous; Water Regime (nontidal) = seasonally flooded.

OTHER STUDIES

The *Populus trichocarpa*/Recent Alluvial Bar (black cottonwood/Recent Alluvial Bar) community type has been described by Hansen and others (1995) for the state of Montana.

Populus trichocarpa/Symphoricarpos occidentalis Community Type (Black Cottonwood/Western Snowberry Community Type)

POPTRI/SYMOCC (POTR6/SYOC)

Number Of Stands Sampled in Montana= 21

NOTE: The *Populus trichocarpa/Symphoricarpos occidentalis* (black cottonwood/western snowberry) community type has been documented in Idaho according to field surveys conducted in 1994. However, due to time constraints during the 1995 field season, homogeneous stand data could not be collected for this type. In the subsequent discussion, any references to physical site location or vegetation characteristics for this type in Idaho were interpreted from 1994 field surveys. The remainder of this description was taken from the Classification and Management of Montana's Riparian and Wetland Sites (Hansen and others 1995).

LOCATION AND ASSOCIATED LANDFORMS

The *Populus trichocarpa/Symphoricarpos occidentalis* (black cottonwood/western snowberry) community type is a major type from low to moderately high elevations throughout the foothills and valleys of eastern Idaho. *Populus trichocarpa* (black cottonwood) stands occupy floodplains and islands of major streams and rivers, establishing extensive forests, narrow, stringer communities paralleling minor stream courses, or matrices of smaller clustered stands. This type may be located on stream banks and alluvial bars immediately adjacent to flowing channels or stranded on upper, secondary floodplains as natural river dynamics cause channels to migrate across valley bottoms. Sites range from 1,394 to 2,121 m (4,600 to 7,000 ft).

VEGETATION

Stands of the *Populus trichocarpa/Symphoricarpos occidentalis* (black cottonwood/western snowberry) community type in Idaho are dominated by *Populus trichocarpa* (Black cottonwood) in the overstory, although other tree species, namely *Populus angustifolia* (Narrowleaf Cottonwood) and *Juniperus scopulorum* (Rocky Mountain juniper), may be present as minor components. This type is defined as a grazing or browsing disclimax. *Rosa woodsii* (woods rose) may codominant understory layers with *Salix exigua* (sandbar willow), and *Amelanchier alnifolia* (western serviceberry) to a lesser degree. Assorted grasses and forbs, present in the lowest canopy layers, are characteristic of moist sites, such as *Smilacina stellata* (starry Solomon-plume), *Juncus balticus* (Baltic rush), *Equisetum* spp. (horsetail) and *Carex* spp. (sedges). *Symphoricarpos* spp. (snowberry), the understory signature species, is absent from sites in Idaho. Additional stands need to be surveyed to determine whether this type, described by Hansen and others (1995), needs to be modified accordingly.

The *Populus trichocarpa/Symphoricarpos occidentalis* (black cottonwood/western snowberry) community type in Montana represents a grazing disclimax. This type is characterized by an overstory of cottonwoods over a potentially dense and diverse group of undergrowth shrubs and herbaceous plants, generally dominated by *Symphoricarpos occidentalis* (western snowberry) or *Rosa woodsii* (woods rose). *Populus deltoides* (Great Plains cottonwood) and *Populus angustifolia* (narrowleaf cottonwood) may be present but are subordinate to *Populus trichocarpa* (black cottonwood). Table 14 reflects vegetation surveyed on sites limited to Montana, and may not accurately portray species composition and canopy cover for sites identified in Idaho.

Table 14. Average canopy cover, range of canopy cover, and constancy for indicator species and those species recorded in 40 percent or more of the sampled stands of the grazing disclimax *Populus trichocarpa/Symphoricarpos occidentalis* (black cottonwood/western snowberry) community type (number = 21 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Trees			
Populus trichocarpa (black cottonwood)	60	20-90	100
Shrubs			
Amelanchier alnifolia (western serviceberry)	10	0-60	43

Cornus stolonifera (red-osier dogwood)	1	0-1	24
Rosa acicularis (prickly rose)	20	0-20	5
Rosa woodsii (woods rose)	22	0-60	71
Symphoricarpos albus (common snowberry)	8	0-20	19
Symphoricarpos occidentalis (western snowberry)	18	0-80	52
Graminoids			
Phleum pratense (common timothy)	17	0-80	48
Poa pratensis (Kentucky bluegrass)	12	0-50	67
Forbs			
Smilacina stellata (starry Solomon-plume)	4	0-20	67
Taraxacum officinale (common dandelion)	1	0-3	43

SUCCESSIONAL INFORMATION

The *Populus trichocarpa/Symphoricarpos occidentalis* (black cottonwood/western snowberry) community type represents a moderately disturbed secondary successional stage of the mid-seral *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type.

Primary Successional Stages

Cottonwoods are a pioneering species that requires moist, barren, newly deposited alluvium that is exposed to full sunlight. In general, these sites represent point bars, side bars, mid channel bars, delta bars, and islands. Since cottonwoods do not regenerate in their own shade and require moist, barren, fully exposed, newly deposited alluvial material as a suitable seedbed, they are considered a seral species and do not represent the climax community (PNC) for the site. Many stands may appear to have limited regeneration, especially in the open areas. However, it is important to understand that these young seedlings and saplings represent sprouts (asexual reproduction) and not establishment by seeds (sexual reproduction). These sprouts may help prolong the life span of the stand, but will not perpetuate or maintain the stand. In time the cottonwood stand will be replaced by a later successional stage.

The erosional and depositional pattern of a river helps maintain the diversity of plant communities on the floodplain. The distribution of various communities depends on the way the river meanders. In turn, the rate of meandering determines the proportion of floodplain communities considered to be in the pioneer or early seral, mid-seral, late seral, or climax (PNC) stage of succession. Where the river meanders frequently, few stands progress to later successional stages. Near the outer edges of the floodplain, the effect of the river is less pronounced, allowing later successional stages to develop. Typically, rivers meander like a whip or snake across their floodplain. Lateral movement of the river initiates a dynamic series of vegetation events. As water moves downstream, it erodes established banks, typically covered with riparian or wetland vegetation in different stages of development, on outside curves and deposits fresh alluvial materials on the point bars of inside curves. Each new deposit of alluvium forms a distinct band or terrace with each band being even aged and with gaps in ages between the bands. The ages of the bands are progressively older on older terraces. As the river moves away from sites of previous deposition and continues to downcut, the amount of soil water recharge from channel seepages decreas-

es, making these sites (terraces) drier. If certain portions of the floodplain remain undisturbed for a long enough period of time, their relief with respect to the river may increase to a point where they are only rarely flooded, if at all. These terraces are considered old or mature alluvial terraces and can continue development toward climax (PNC) without the modifying influences of floods (Hansen 1989).

Early Seral Stage—The *Populus trichocarpa*/Recent Alluvial Bar (black cottonwood/Recent Alluvial Bar) community type is an early seral stage.

Mid-Seral Stage—If disturbance (either human-caused or natural) does not eliminate the stand, the *Populus trichocarpa*/Recent Alluvial Bar (black cottonwood/Recent Alluvial Bar) community type will progress to the relatively undisturbed mid-seral stage called the *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type. Normally, the understory of a pole to mature *Populus trichocarpa* (black cottonwood) stand is dominated by conifers such as *Pseudotsuga menziesii* (Douglas fir), *Abies grandis* (grand fir), *Picea* (spruce), *Thuja plicata* (western red cedar), *Tsuga heterophylla* (western hemlock), *Abies lasiocarpa* (subalpine fir), and *Juniperus scopulorum* (Rocky Mountain juniper). As the *Populus trichocarpa* (black cottonwood) overstory matures, becomes open, and finally, becomes decadent, the conifers are ready to replace them.

Late Seral to Climax (PNC) Stage—As the cottonwood stand dies, primary succession toward other communities will occur unless flooding deposits new sediments suitable for cottonwood seedlings. In the absence of sediment deposition, at low to mid elevations succession continues from the *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type to wetland habitat types dominated by conifers such as *Pseudotsuga menziesii* (Douglas fir), *Abies grandis* (grand fir), *Picea* (spruce), *Thuja plicata* (western red cedar), *Tsuga heterophylla* (western hemlock), *Abies lasiocarpa* (subalpine fir), and *Juniperus scopulorum* (Rocky Mountain juniper). In other instances, this community type may be successional to the *Salix geyeriana/Calamagrostis canadensis* (Geyer willow/bluejoint reedgrass) habitat type or the *Salix lutea/Calamagrostis canadensis* (yellow willow/bluejoint reedgrass) habitat type, depending upon elevation.

Secondary Successional Stages

The presence or absence of a particular understory community may aid in determining the degree of disturbance (both present and historical disturbance) on a particular site. On sites that are relatively undisturbed, the understory of the *Populus trichocarpa* (black cottonwood) community will contain a diverse, dense shrub layer dominated by *Cornus stolonifera* (red-osier dogwood), *Amelanchier alnifolia* (western serviceberry), *Prunus virginiana* (common choke-cherry), and various species of *Salix* (willows) and *Ribes* (currants and gooseberries). This stage is called the *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type. With moderate levels of grazing or browsing, there will be an increase in *Symphoricarpos occidentalis* (western snowberry) and *Rosa* species (rose), with a corresponding decrease in both the abundance and canopy cover of *Cornus stolonifera* (red-osier dogwood), *Amelanchier alnifolia* (western serviceberry), *Prunus virginiana* (common chokecherry), and various species of *Ribes* (currants and gooseberries). If grazing or browsing pressures continue, the more desirable shrubs will be eliminated leaving *Symphoricarpos occidentalis* (western snowberry) and *Rosa* species (rose) which can form a nearly impenetrable understory. This stage of disturbance-caused succession is called the *Populus trichocarpa/Symphoricarpos occidentalis* (black cottonwood/western snowberry) community type. If the dis-

turbance is severe enough, ***ALL*** shrubs can be eliminated and the understory will be converted to a herbaceous one dominated by species such as *Poa pratensis* (Kentucky bluegrass), *Phleum pratensis* (common timothy), *Bromus inermis* (smooth brome), and a variety of "weedy" forbs (e.g., the *Populus trichocarpa*/Herbaceous [black cottonwood/Herbaceous] community type). During the process of converting from a diverse, dense shrub understory to a herbaceous understory, the stand will open up resulting in a drier site. Finally the stand becomes decadent with the stand's appearance becoming one of widely spaced, dying cottonwoods. The site now has become so open and dry that the site's potential may have changed to one capable of supporting a variety of upland types. The presence of conifers and upland shrub species will usually indicate the site's potential. However, conversion may be slow due to heavy grazing pressures and the sod forming characteristic of herbaceous species. Remnant shrubs and grasses, if present will help indicate the potential undergrowth composition.

Once the stand has converted from a shrub-dominated understory to one that is dominated by a variety of introduced herbaceous species, the ability to return the site to its former state (shrub-dominated) is very difficult. (It may be possible, but it will require a drastic change in management and may be very costly in terms of both labor and money.) Therefore, if a manager wants to maintain the stand in a shrub-dominated understory state, the most cost effective method is to change the management on the site ***BEFORE*** the site is too degraded.

SOILS

Soils are typically Entisols (Fluvents), usually up to 1 m (39 in) of mineral soil overlying river gravel and/or cobbles. Inceptisols and Mollisols can also be found on older sites of relatively longer stability where time has allowed more development to occur. Soil texture varies from loam to coarse sand. Water tables usually drop below 1 m (39 in) of the soil surface in summer, but soils can remain moist due to capillary action. Redox concentrations (mottles) are common in these soils as evidence of a fluctuating water table. Soils are generally well drained with low available water. Coarse textured soils, moderate stream gradients, and high coarse fragment contents throughout the soil profile provide an environment that produces a rapid movement of highly aerated groundwater. This type of substrate is important to many floodplain communities.

ADJACENT COMMUNITIES

Adjacent wetter communities may be dominated by a variety of types including the *Salix exigua* (sandbar willow) and the *Salix lasiandra* (Pacific willow) community types, or the *Typha latifolia* (common cattail) and *Eleocharis* (spikesedge) dominated habitat types. Adjacent drier communities may be dominated by the *Populus trichocarpa*/Herbaceous (black cottonwood/Herbaceous) community type, or by a variety of upland species.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Forage production ranges from low to moderate due to the dense shrub understory within the stands. Forage production from dense thickets of *Symphoricarpos occidentalis* (western snowberry) and *Rosa woodsii* (woods rose) is low. Stands may be so dense that they exclude most livestock use. As the shrub understory is eliminated by continual prolonged heavy grazing or browsing, stands open and forage production increases accordingly due to the

presence and amount of *Poa pratensis* (Kentucky bluegrass), *Phleum pratense* (common timothy), or *Bromus inermis* (smooth brome). The palatability of *Symphoricarpos occidentalis* (western snowberry) ranges from low to fair for cattle and sheep (Wasser 1982, Johnson and Nichols 1982), and the leaves of *Rosa woodsii* (woods rose) are considered fair to fairly good livestock forage, particularly for sheep (Johnson and Nichols 1982).

Timber

Due to the favorable moisture relationship of this type, timber productivity for the associated cottonwoods and conifers ranges from low to moderate. Complete stand removal may result in a shrub-dominated community with extremely limited cottonwood regeneration except for occasional sprouting from stumps.

Wildlife

The *Populus trichocarpa/Symphoricarpos occidentalis* (black cottonwood/western snowberry) community type provides valuable cover, shade, and food for a variety of species. Big game use may be high, depending upon the time of year. The spreading crown of *Populus trichocarpa* (black cottonwood) provides sites for huge platform-like stick nests of bald eagles and ospreys (Arno and Hammerly 1984) and for great blue herons (Parker 1980). Canada geese occasionally use the nests previously built by bald eagles and osprey. A variety of birds and mammals, such as woodpeckers, great horned owls, wood ducks, and raccoons, nest in trunk cavities. *Populus trichocarpa* (black cottonwood) and *Rosa woodsii* (woods rose) are used by beaver for food and building materials (Allen 1983). Understory species provide food and cover for waterfowl, small birds, and mammals (Dittberner and Olson 1983).

The moderate structural understory diversity of *Symphoricarpos occidentalis* (western snowberry) and *Rosa woodsii* (woods rose) provides thermal and hiding cover for big game and upland bird species. The palatability of *Symphoricarpos occidentalis* (western snowberry) is rated as good for deer and elk (Wasser 1982, Johnson and Nichols 1982). Deer and elk may browse heavily on *Rosa woodsii* (woods rose), while the persistent fruit (rose hips) provides fall and winter food for birds, small mammals, and bears, which disperse the seeds. *Rosa woodsii* (woods rose) is strongly grazing tolerant but can be dwarfed and thinned by intense browsing or defoliation by season long use.

Fisheries

The stream side location of the *Populus trichocarpa/Symphoricarpos occidentalis* (black cottonwood/western snowberry) community type is very important in providing thermal cover, debris recruitment, and streambank stability. Its importance can not be emphasized enough (see discussion in the Soil Management and Rehabilitation Opportunities section). *Symphoricarpos occidentalis* (western snowberry) and *Rosa woodsii* (woods rose) are excellent in controlling erosion along streams due to their rhizomatous nature. This is particularly important on the higher gradient streams where scouring by seasonal flooding is possible.

Fire

The *Populus trichocarpa/Symphoricarpos occidentalis* (black cottonwood/western snowberry) community type is susceptible to fire during the late summer and fall. *Populus trichocarpa* (black cottonwood) and associated shrubs are adapted to light and in some instances to moderate intensity fires and may produce new sprouts following burns.

The ability of cottonwoods to produce new sprouts following fire seems to be dependent upon three criteria: 1) The particular species of cottonwood present in the stand. In general, *Populus angustifolia* (narrowleaf cottonwood) has a greater sprouting capability than *Populus trichocarpa* (black cottonwood) which in turn has a greater sprouting capability than *Populus deltoides* (Great Plains cottonwood). 2) The age of the trees in the stand. As the trees mature, the sprouting potential tends to decrease proportionally. As the trees reach the decadent stage of development, the sprouting potential is severely limited. 3) The location of the water table. In general, the higher the water table throughout the growing season, the greater the ability for sprouts to survive. Therefore, if a manager wants to extend the life span of a stand of cottonwoods, fire ***MAY BE*** used as a tool in the pole to early mature stage of development. If fire is used to rehabilitate a stand, it is imperative that the stand be excluded from all livestock grazing for at least five years and that browsing by wildlife be closely monitored.

Symphoricarpos occidentalis (western snowberry) is tolerant of fire. It can be injured by fire but usually sprouts, with stands becoming denser afterward. It is such a strong competitor, particularly in dense colonies, that it is not very compatible with most herbaceous vegetation. *Rosa woodsii* (woods rose) is strongly fire tolerant, except for smoldering fires with heavy volumes of surface fuel. The species has a shallow and much branched rhizomatous root system that will readily sprout and sucker. This sprouting capability of *Rosa woodsii* (woods rose) make it a good soil stabilizer.

Soil Management and Rehabilitation Opportunities

Coarse textured soils are not as susceptible to compaction problems. This community type is subject to recurring scouring by floods and alluvium deposition. However, stands are relatively stable because of the strong rooting action of the associated species. Management should emphasize the importance of the understory shrub layer in streambank stabilization. This is particularly important on higher gradient stream channels where scouring by seasonal flooding occurs.

Managers should maintain a buffer strip of the *Populus trichocarpa* (black cottonwood) dominated community types adjacent to rivers and streams. These buffer strips reduce sedimentation, stabilize streambanks, and slow flood waters.

If the stand still has a fairly high water table, a dramatic change in management (i.e. elimination of livestock grazing and close monitoring of wildlife impacts) ***MAY*** allow the remnant shrub population to sprout and re-invade the stand. However, if the water table has dropped dramatically and the shrubs have been completely eliminated, the opportunity to reestablish a shrub understory dominated by desirable shrubs may be lost.

Where revegetation with woody species is wanted, desirable shrubs such as *Cornus stolonifera* (red-osier dogwood), *Amelanchier alnifolia* (western serviceberry), *Prunus virginiana* (common chokecherry), and various species of *Salix* (willows) and *Ribes* (currants and gooseberries) may be well adapted to planting on disturbed sites. Rooted cuttings or nursery grown seedlings are easily established on moist, well drained soils. Growth rates are rapid and the roots of established seedlings effectively stabilize recent bare alluvium. Remember: If the canopy cover of the trees in the stand has opened up too much and/or the water table has been lowered dramatically, the success of revegetation with desirable woody species will be low.

For rehabilitation of stands by the use of fire, see the discussion in the Fire Management section about the limitations of fire as a tool for rehabilitation. If fire is to be used to rehabilitate a stand, it is imperative that the stand be excluded from all livestock grazing for at least five years and that browsing by wildlife be closely monitored.

The following guidelines should be followed when attempting to revegetate sites with cuttings from cottonwoods (Swenson 1988): 1) Do not plant cottonwoods in saline or alkaline sites. 2) Select sites with substrates of sand, gravel, or small cobbles. Avoid sites that are classified as clays or have a thick clay layer. 3) Make cuttings from stands of open, young, rapidly growing trees, using only cuttings that are four years old or less. Remove the side branches, leaving only the tip and next two lower side branches. 4) Make the cuttings when the plants are completely dormant. 5) Soak the cuttings in water for 10 to 14 days. 6) Auger holes to a depth of the lowest anticipated growing season water table. 7) Place the cuttings in the augered holes the same day they are removed from the soak. Set the butt at the lowest anticipated growing season groundwater depth. Select cuttings of a length which provides 1 to 2 m (3 to 6 ft) of cutting to remain above the soil surface. 8) Back fill the holes carefully to avoid air pockets. 9) Place tree guards around the cuttings if rodent or rabbit damage is anticipated. 10) As buds begin to swell along the cuttings, wipe them off the lower two-thirds of the cutting. 11) Plantings must be excluded from livestock grazing and big game browsing for two to three growing seasons. Some beaver control may be needed.

Symphoricarpos occidentalis (western snowberry) is well adapted for revegetating sites. Commonly growing in dense colony stands makes it suitable for disturbed land stabilization. It does best on moist, well drained soils which have not been excessively disturbed. Once established, it grows at a moderate rate and spreads rapidly by root sprouts. Nursery grown seedlings, rooted cuttings, or wildlings are the preferred planting materials. Critical, erosive sites may need complete exclusion from grazing during establishment, and animal populations and stacking rates should be balanced with forage supply on noncritical sites after establishment (Wasser 1982).

Rosa woodsii (woods rose) is valuable for revegetating disturbed sites along streambanks and seeps. It is easily established from nursery grown stock, root cuttings, or transplanted materials.

Recreational Uses and Considerations

Because of its proximity to streams and rivers and its flat topography, recreational developments and transportation corridors are common within this type. Recreational opportunities are excellent for fishing, big game and waterfowl hunting, and observing a variety of bird species.

Care must be taken when locating structures within this type. Some campgrounds in Montana have been seriously damaged by floods or lost altogether.

Symphoricarpos occidentalis (western snowberry) is an important food source for upland birds due to fruits that persist into the winter. Native Americans made extensive use of *Rosa woodsii* (woods rose) roots, stems, leaves, flowers, and rose hips for food and therapeutic materials (US Forest Service 1975). The persistent rose hips are edible, and are one of the best natural sources of vitamin C. They can be dried for use in flavoring teas, jellies, fruitcakes, and puddings.

Nature trails should be routed around dense stands of *Rosa woodsii* (woods rose) community type. However, *Rosa woodsii* (woods rose) is useful for planting in recreation areas as a biological barrier to protect physical structures, young and delicate plants, and to direct traffic.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = forested wetland; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

OTHER STUDIES

Similar communities have been reported for western Montana (Foote 1965), central Oregon (Kovalchik 1987), and central Idaho (Tuhy and Jensen 1982).

Salix amygdaloides Community Type
(Peach-Leaf Willow Community Type)

SALAMY (SAAM2)
Number Of Stands Sampled = 2

LOCATION AND ASSOCIATED LANDFORMS

The *Salix amygdaloides* (peach-leaf willow) community type is an incidental type at lower elevations throughout valleys of southern and eastern Idaho. It occurs in narrow bands along oxbows, islands and on floodplains adjacent to major streams and rivers. Sites occur at elevations in the neighborhood of 1,455 m (4,800 ft).

VEGETATION

Salix amygdaloides (peach-leaf willow), an arborescent shrub or small tree rarely exceeding 12 m (36 ft) in height (Hitchcock and others 1973), dominates the overstory in this community type, although *Populus trichocarpa* (Black cottonwood) may actually be present in the tallest layer. Associated shrubs include *Salix lutea* (yellow willow) and *Cornus stolonifera* (red-osier dogwood). In mature stands of this type, the often dense overhead canopy created by *Salix amygdaloides* (peach-leaf willow) and the upper shrub layer results in a sparse herbaceous understory characterized by low vigor. Graminoids and forbs may include *Phalaris arundinacea* (reed canarygrass) and *Equisetum* spp.(horsetail). In some cases, *Salix amygdaloides* (peach-leaf willow) may sprout from horizontal or fallen trunks.

Table 15. Average canopy cover, range of canopy cover, and constancy for species recorded in stands of the *Salix amygdaloides* (peach-leaf willow) community type that are relatively undisturbed by livestock or wildlife (number = 2 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Trees			
Populus trichocarpa (Black Cottonwood)	5	0-10	50
Salix amygdaloides (Peach-leaf Willow)	98	98-98	100
Shrubs			
Cornus stolonifera (Red-osier Dogwood)	35	0-70	50
Salix lutea (Yellow Willow)	5	0-10	50
Graminoids			
Phalaris arundinacea (Reed Canarygrass)	10	1-20	100
Forbs			
Aster spp. (Aster)	<1	0-1	50
Aster occidentalis (Western Aster)	<1	0-1	50
Forb (Forb)	<1	0-1	50
Mentha arvensis (Field Mint)	<1	0-1	50
Ferns and Allies			
Equisetum spp. (Horsetail; Scouring-rush)	2	1-3	100

SUCCESSIONAL INFORMATION

Hansen and others indicate that the *Salix amygdaloides* (peach-leaf willow) community type represents a successional stage of the *Fraxinus pennsylvanica/Prunus virginiana* (green ash/common chokecherry) habitat type or the *Acer negundo/Prunus virginiana* (box-elder/common chokecherry) habitat type in Montana. Decadent *Populus trichocarpa* (Black cottonwood) and *Populus angustifolia* (Narrowleaf Cottonwood) forests may act as potential seral stages for the *Salix amygdaloides* (peach-leaf willow) community type, as well as other, shorter *Salix* spp. (willow) dominated stands. Additional sites should be surveyed to determine the specific successional pathways in which this community type is involved.

Disturbance Stages

Increased levels of disturbance tend to increase those disturbance-caused species already present. If the disturbance includes trampling and/or rubbing by livestock, the weak, multi-stemmed nature of *Salix amygdaloides* (peach-leaf willow) will result in a great deal of downed woody material. When this happens, the stands tend to limit livestock use. In other situations, the sites may be too wet so as to preclude most types of disturbances (Hansen and others 1995).

SOILS

Hansen and others (1995) note that soils for this type are commonly Entisols (Aquents and Fluvents) or Mollisols (Aquolls and Borolls). This community type occurs on a wide range of soil textures except heavy clay. Underlying layers may consist of coarse sands and gravels. Water tables are usually within 1 m (39 in) of the soil surface throughout the growing season, facilitating the development of mottles in the upper soil horizons. *Salix amygda-*

loides (peach-leaf willow) can tolerate weak saline and alkali soils, poorly drained soils, and prolonged flooding.

ADJACENT COMMUNITIES

Carex spp. (sedge) and *Phalaris arundinacea* (reed canarygrass) communities may border the *Salix amygdaloides* (peach-leaf willow) community type on wetter riparian sites while *Populus trichocarpa* (Black cottonwood) and *Populus angustifolia* (Narrowleaf Cottonwood) often dominant drier floodplain locations. Hansen and others (1995) observed in Montana that drier sites may be occupied by the *Fraxinus pennsylvanica/Prunus virginiana* (green ash/common chokecherry) habitat type and *Acer negundo/Prunus virginiana* (box-elder/common chokecherry) habitat type, or the *Artemisia cana/Agropyron smithii* (silver sagebrush/western wheatgrass) habitat type.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Wet conditions and the limited size and extent of stands of this type generally limit livestock use. However, livestock use during wet periods can either lead to the churning of soil or soil compaction (Hansen and others 1995).

Wildlife

The high structural diversity of stands of the *Salix amygdaloides* (peach-leaf willow) community type provide excellent thermal and hiding cover for all categories of wildlife (Hansen and others 1995).

Fisheries

The *Salix amygdaloides* (peach-leaf willow) community type provides limited thermal cover for fish. However, it is an effective stabilizer of streambanks and managers should attempt to protect them whenever possible (Hansen and others 1995).

Fire

Limited information is available on the effects of fire on *Salix amygdaloides* (peach-leaf willow). However, based on our understanding of other willow species, we would assume *Salix amygdaloides* (peach-leaf willow) to be a prolific sprouter after all but the hottest fires (Hansen and others 1995).

Soil Management and Rehabilitation Opportunities

High water tables and seasonal flooding should limit activities and development in most of these stands. Care must be taken in the placement of roads and other developments in sites that permit these activities (Hansen and others 1995).

Recreational Uses and Considerations

Stands of this community type provide excellent opportunities for viewing wildlife species. However, the dense nature of most stands and the high water tables associated with them tend to limit access. The large mosquito populations may also reduce he use of this type (Hansen and others 1995).

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = forested wetland; Subclass = broad-leaved deciduous; Water Regime (nontidal) = seasonally flooded.

OTHER STUDIES

The *Salix amygdaloides* (peach-leaf willow) community type has been described by Hansen and others (1995) for the state of Montana.

Salix bebbiana Community Type
(Bebb Willow Community Type)

SALBEB (SABE2)

Number Of Stands Sampled = 2

LOCATION AND ASSOCIATED LANDFORMS

The *Salix bebbiana* (Bebb willow) community type is a minor type at moderately high elevations throughout foothills and mountain valleys of eastern Idaho, ranging from 1,950 to 2,121 m (6,435 to 7,000 ft). This type often persists as stringer communities paralleling abandoned oxbows on upper (secondary) floodplains; however, it may occur on streambanks immediately adjacent to active channels along major rivers, in proximity to seeps or springs, or on alluvial terraces in U-shaped canyons.

VEGETATION

The *Salix bebbiana* (Bebb willow) community type, a browsing or grazing disclimax, generally perseveres under an intense disturbance regime unsuitable for other *Salix spp.* (willow). Long-lived *Salix bebbiana* (Bebb willow) often appear as short, thick-trunked trees in widely scattered or clumped stands depending on local topography. Due to the impact of livestock, mature individuals take on an umbrelled or umbrella-like appearance. Where grazing is intense, associated shrubs may be virtually nonexistent, although as pressure by livestock diminishes, a diverse shrub component may reestablish. Disturbance-induced herbaceous species may include *Poa pratensis* (Kentucky bluegrass), *Phleum pratensis* (common timothy), *Agrostis stolonifera* (redtop), and *Solidago canadensis* (Canada goldenrod). On less disturbed sites, *Osmorhiza chilensis* (mountain sweet-cicely), *Galium triflorum* (sweetscented bedstraw), *Smilacina racemosa* (false spikenard) may be present.

Table 1. Average canopy cover, range of canopy cover, and constancy for indicator species of the sampled stands of the grazing disclimax *Salix bebbiana* (Bebb willow) community type (number = 2 stands)

Species	% Canopy Cover Average	Range	Constancy
Trees			
Juniperus scopulorum (Rocky Mountain Juniper)	<1	0-1	50
Shrubs			
Alnus incana (Mountain Alder)	2	0-3	50
Amelanchier alnifolia (Western Serviceberry)	2	0-3	50
Cornus stolonifera (Red-osier Dogwood)	20	1-40	100
Lonicera involucrata (Twin-berry)	5	0-10	50
Ribes lacustre (Swamp Currant)	2	1-3	100
Rosa woodsii (Woods Rose)	25	20-30	100
Salix bebbiana (Bebb Willow)	75	60-90	100
Salix exigua (Sandbar Willow)	2	0-3	50
Salix lasiandra (Pacific Willow)	2	0-3	50
Salix lutea (Yellow Willow)	2	1-3	100
Symphoricarpos occidentalis (Western Snowberry)	<1	0-1	50
Agropyron caninum (Bearded Wheatgrass)	2	0-3	50
Agrostis stolonifera (Redtop)	5	0-10	50
Carex lanuginosa (Woolly Sedge)	<1	0-1	50
Carex microptera (Small-winged Sedge)	<1	0-1	50
Elymus glaucus (Blue Wildrye)	5	0-10	50
Festuca subulata (Bearded Fescue)	2	0-3	50
Phleum pratense (Common Timothy)	2	0-3	50
Poa pratensis (Kentucky Bluegrass)	12	3-20	100
Achillea millefolium (Common Yarrow)	1	1-1	100
Actaea rubra (Baneberry)	2	0-3	50
Aster eatonii (Eaton's Aster)	<1	0-1	50
Aster modestus (Few-flowered Aster)	<1	0-1	50
Cirsium arvense (Canada Thistle)	<1	0-1	50
Epilobium ciliatum (Common Willow-herb)	<1	0-1	50
Galium triflorum (Sweetscented Bedstraw)	3	3-3	100
Geranium viscosissimum (Sticky Geranium)	3	3-3	100
Geum macrophyllum (Larged-leaved Avens)	1	1-1	100
Heracleum lanatum (Cow-parsnip)	2	0-3	50
Lactuca serriola (Prickly Lettuce)	<1	0-1	50
Mertensia ciliata (Mountain Bluebell)	1	1-1	100
Osmorhiza chilensis (Mountain Sweet-cicely)	7	3-10	100
Pyrola asarifolia (Pink Wintergreen)	<1	0-1	50
Senecio serra (Tall Butterweed)	2	1-3	100

Smilacina racemosa (False Spikenard)	5	0-10	50
Smilacina stellata (Starry Solomon-plume)	<1	0-1	50
Solidago canadensis (Canada Goldenrod)	2	0-3	50
Taraxacum officinale (Common Dandelion)	3	3-3	100
Thalictrum occidentale (Western Meadowrue)	1	1-1	100
Thermopsis montana (Mountain Thermopsis)	<1	0-1	50
Urtica dioica (Stinging Nettle)	2	0-3	50
Equisetum arvense (Field Horsetail)	2	0-3	50

SUCCESSIONAL INFORMATION

Hansen and others (1995) indicate that the *Salix bebbiana* (Bebb willow) community type represents a browsing/grazing disclimax of the *Salix geyeriana* (Geyer willow), *Salix lutea* (yellow willow), or *Salix drummondiana* (Drummond willow) dominated habitat types

Salix bebbiana (Bebb willow) seems to be a highly palatable willow. However, this high level of palatability does not tend to negatively affect the status of *Salix bebbiana* (Bebb willow) on a site. In fact, *Salix bebbiana* (Bebb willow) seems to have evolved a physiological tolerance to browsing and remains on a site under all but the most severe conditions, such as sustained long-term browsing. This tolerance to repeated browsing allows *Salix bebbiana* (Bebb willow) to increase at the expense of less browsing-tolerant willow species such as *Salix geyeriana* (Geyer willow), *Salix boothii* (Booth willow), *Salix lutea* (yellow willow), and *Salix drummondiana* (Drummond willow). On severely degraded sites with prolonged levels of browsing, *Salix bebbiana* (Bebb willow) is typically the last willow to remain on the site. The dominance of the undergrowth by introduced species can aid in determining the extent of the disturbance (Hansen and others 1995).

SOILS

A litter/duff layer generally less than 10 cm (4 in) deep covers a nutrient-rich, organic layer, indicative of Mollisols, up to 45 cm (18 in) or more in depth. Surface soil textures range from silt loams to clay loams. Alluvial coarse sands, gravels and small, medium and large cobbles comprise the lower horizons. Occasionally, large rocks are present as well. Water tables probably occur within 60 cm (24 in) of the surface, but can vary according to local site features.

ADJACENT COMMUNITIES

The *Salix bebbiana* (Bebb willow) community type may be associated with a mosaic of other *Salix spp.* (willow) communities along riparian corridors and across large floodplains where disturbance is minimal. *Populus tremuloides* (quaking aspen), *Betula occidentalis* (water birch) or *Alnus incana* (mountain alder) stands may also be present as well as *Wyethia* spp. (mule's-ears) meadows. Excessive disturbance tends to limit the diversity of other shrub species, resulting in a savannah-like environment with sporadic stands of *Salix bebbiana* (Bebb willow) over a grass, or where sufficient moisture persists, a *Carex* (sedge) understory. Uplands are dominated by *Pseudotsuga menziesii* (Douglas fir), *Abies lasiocarpa* (subalpine fir) or *Artemisia tridentata* (big sagebrush)/grassland steppe.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Stands are usually characterized by widely spaced shrubs, allowing for easy livestock access. Forage production is moderate to high, composed primarily of introduced species. As a result, heavy use by livestock is common. In some stands the willows may have a reduced vigor, as illustrated by highlining, clubbing, or dead clumps. With continued overuse, willows show a sharp decline in vigor and may be eventually eliminated from the site (Hansen and others 1995).

Frisina (1991) states that for a grazing program to be successful, it must meet the basic biological requirements of the plants such as photosynthesis, food storage, reproduction, and seedling establishment. In order to meet these requirements, long periods of rest are needed. It is during long growing season rest periods that the essential biological processes of food production and storage, reproduction, and seedling establishment take place. In some instances, additional periods of rest may be required to either improve or maintain a plant community.

Wildlife

Where this community type occurs on winter game ranges, browsing of *Salix bebbiana* (Bebb willow) is often high enough to reduce both plant vigor and regeneration. Gaffney (1941) reported that *Salix bebbiana* (Bebb willow) is a highly valuable browse for elk, with heavy utilization common. Continued use may lead to a conversion to herbaceous communities such as the *Poa palustris* (fowl bluegrass) and *Poa pratensis* (Kentucky bluegrass) community types. Moose and beaver heavily utilize most species of willow.

Fisheries

Salix spp. (willow) communities function in a variety of capacities to promote stream health and enhance fisheries. Willows form dense root networks that stabilize streambanks against lateral cutting and erosion, provide cover in the form of overhanging branches and banks, and shade channels, effectively moderating extreme temperature fluctuations. Although not a source of large woody debris, willows may trap large trees borne downstream, creating deeper pools and additional cover for fish species. *Carex* spp. (sedge) and other associated mat-forming understory species trap sediments, essentially building streambanks and filtering steam flows.

Fire

Salix bebbiana (Bebb willow) sprouts rapidly following fire (Haeussler and Coates 1986). Quick, hot fires maximize sprouting, while slower burns cause more damage to plants. Prescribed burning is a commonly used wildlife management tool to rejuvenate decadent communities dominated by *Salix bebbiana* (Bebb willow).

Soil Management and Rehabilitation Opportunities

The *Salix bebbiana* (Bebb willow) community type is a browsing/grazing disclimax and has historically received high use by wildlife and cattle. Soils and streambanks are highly susceptible to trampling damage, especially when soils are fine textured or wet. Deferring grazing until sites are drier can reduce trampling and compaction problems (Marlow 1984).

Unless water tables are restored, these sites will for all practical purposes remain with a ground cover dominated by introduced grass species. On those sites adjacent to a first or second order stream, the use of rock checkdams to aid in the rehabilitation of degraded (de-watered) sites is an excellent cost effective approach. The rock dam will help raise the water table thereby allowing the willows and sedges to reclaim a degraded site (Hansen and others 1995).

Salix bebbiana (Bebb willow) is valuable for revegetating streambanks. Cuttings are best taken in the spring from dormant two to four year old wood. Cuttings 30-50 cm (12-20 in) long and >1 cm (0.5 in) in diameter produce the best results with the cuttings rooting freely along the entire length of the stem. Roots and shoots from cuttings can be expected to appear 10-20 days after planting. However, the use of rooted cuttings and nursery grown stock will produce the best results (Hansen and others 1995).

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded.

OTHER STUDIES

Hansen and others 1995 describe this type for the state of Montana. A similar *Salix bebbiana* (Bebb willow) community type was identified by Padgett and others (1989) in Utah, with an undergrowth dominated by *Poa pratensis* (Kentucky bluegrass) and other mesic grasses. Chadde and others (1988) defined a *Salix bebbiana/Agrostis stolonifera* (Bebb willow/redtop) community type for northern Yellowstone National Park. A somewhat similar community type was described by Szaro (1989) for Arizona and New Mexico.

Salix drummondiana/Calamagrostis canadensis Habitat Type
(Drummond Willow/Bluejoint Reedgrass Habitat Type)

SALDRU/CALCAN (SADR/CACA4)

Number Of Stands Sampled = 1

LOCATION AND ASSOCIATED LANDFORMS

The *Salix drummondiana/Calamagrostis canadensis* (Drummond willow/bluejoint reedgrass) habitat type is an incidental type at mid to moderately high elevations in the mountainous regions throughout eastern Idaho, ranging from 2,060 to 2,273 m (6,800 to 7,500 ft). This type may occur on level outwash plains of mountain streams, below hillside seeps and springs, or adjacent to beaver-dammed impoundments. Communities dominated by *Salix drummondiana* (Drummond willow) occupy sites at higher elevations while communities dominated by *Salix*

geyeriana - *Salix boothii* (Geyer willow - Booth willow) occur at moderate elevations. Lower elevational foothill sites are dominated by the *Salix lutea* (yellow willow) types.

VEGETATION

Salix drummondiana (Drummond willow) may form dense, impenetrable stands in the absence of grazing or browsing pressure. Other *Salix spp.* (willow), particularly *Salix geyeriana* (Geyer willow), *Salix boothii* (Booth willow) and *Salix lutea* (yellow willow), may be present with reduced coverages. Lower shrub layers may be composed of *Rubus parviflorus* (thimbleberry) and *Ribes* spp. (currant). The herbaceous undergrowth is characterized primarily by *Calamagrostis canadensis* (bluejoint reedgrass), although a diversity of other graminoids and forbs, such as *Actaea rubra* (baneberry), *Senecio triangularis* (arrowleaf groundsel), and *Heracleum lanatum* (cow-parsnip), may be present to a minor degree.

Table 2. Canopy cover for species recorded in late seral to climax stands of the *Salix drummondiana/Calamagrostis canadensis* (Drummond willow/bluejoint reedgrass) habitat type (number = 1 stands)

Species	% Canopy Cover
Shrubs	
Cornus stolonifera (Red-osier Dogwood)	10
Ribes lacustre (Swamp Currant)	10
Rubus parviflorus (Thimbleberry)	3
Salix drummondiana (Drummond Willow)	80
Graminoids	
Agrostis stolonifera (Redtop)	3
Agrostis exarata (Spike Bentgrass)	3
Calamagrostis canadensis (Bluejoint Reedgrass)	10
Elymus canadensis (Canada Wildrye)	3
Forbs	
Actaea rubra (Baneberry)	3
Epilobium angustifolium (Fireweed)	1
Galium aparine (Goose-grass)	3
Geranium richardsonii (White Geranium)	3
Heracleum lanatum (Cow-parsnip)	3
Osmorhiza chilensis (Mountain Sweet-cicely)	1
Senecio triangularis (Arrowleaf Groundsel)	3
Taraxacum officinale (Common Dandelion)	1
Thalictrum occidentale (western meadowrue)	3

SUCCESSIONAL INFORMATION

The *Salix drummondiana/Calamagrostis canadensis* (Drummond willow/bluejoint reedgrass) habitat type tends to

occupy moist to slightly saturated sites. However, if physical site alterations cause the riparian zone to become moderately drier, coniferous or deciduous tree dominated communities, notably *Picea* spp. (spruce), *Pseudotsuga menziesii* (Douglas fir), *Abies lasiocarpa* (subalpine fir), and *Populus tremuloides* (quaking aspen) types, may represent the new climax vegetation. Similarly, where sites become inundated for longer periods of time due to beaver dams or other impoundments, *Carex* spp. (sedge) dominated communities may prevail. Utilization may influence the direction of succession as well as physiological changes. Prolonged grazing pressure by livestock may ultimately eliminate the presence of native species, causing a shift toward the drier *Salix drummondiana* (Drummond willow) community type.

SOILS

The *Salix drummondiana/Calamagrostis canadensis* (Drummond willow/bluejoint reedgrass) habitat type may occur over a range of soil types. Some sites are primarily sandy soils underlain by gravels, cobbles and various larger sized rocks. Slightly elevated zones above the active floodplain may have 2.5 to 5 cm (1 to 2 in) of litter/duff above a silt loam extending to a depth of 25 cm (10 in) or more over the dominant sand/gravel substrate. In regions characterized by fines and silts, organic horizons, often with a high component of root/fibrous plant material, may reach 45 cm (18 in) or more below the surface. When saturated, these soils may take on a muck-like consistency. Fine and coarse sands often compose the underlying layers with a moderate gravel element. A shallow litter and duff layer may develop where flood disturbance is infrequent. This habitat type tends to occupy moist sites with water tables generally near (60 cm /24 in), if not at, the soil surface. Although mottled and gleyed soils, the result of oxidation/reduction reactions, were not observed, they are expected to be present due to shallow water tables.

ADJACENT COMMUNITIES

The *Salix drummondiana/Carex rostrata* (Drummond willow/beaked sedge) habitat type may occupy slightly wetter sites while the *Salix drummondiana* (Drummond willow) community type may be present on drier, disturbed sites. Willows often establish along riparian corridors with an assortment of other shrub and tree communities, forming a mosaic of mixed vegetation types. Generally, a variety of willow and shrub types, such as *Salix exigua* (sandbar willow), *Salix geyeriana* (Geyer willow), *Salix lutea* (yellow willow), *Cornus stolonifera* (red-osier dogwood) and *Prunus virginiana* (common chokecherry) are present with scattered stands of tree-dominated communities represented by *Picea* spp. (spruce), *Pseudotsuga menziesii* (Douglas fir), and *Populus tremuloides* (quaking aspen) types. Uplands may be dominated by *Pseudotsuga menziesii* (Douglas fir), *Pinus contorta* (lodgepole pine) or mixed grasslands.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Forage production is high, and where extensive, this type may be an important source of summer forage. Palatability of *Calamagrostis canadensis* (bluejoint reedgrass) and *Deschampsia cespitosa* (tufted hairgrass) varies from moderate to high, depending upon season and availability of other species (USDA Forest Service 1937). Foliage is most palatable when young, but wet conditions early in the grazing season limits use by livestock, especially

sheep. Due to the high forage production and highly palatable grasses, many of these sites have heavy summer and fall use, especially after uplands have been grazed. Sustained grazing decreases the vigor, reproductive success, and competitive ability of *Calamagrostis canadensis* (bluejoint reedgrass) and *Deschampsia cespitosa* (tufted hairgrass) (Volland 1985). Under season long grazing, they may be replaced by *Poa pratensis* (Kentucky bluegrass). To maintain vigor and prevent damage to soils and vegetation, grazing should be deferred until soils dry. Proper levels of grazing should range from light to moderate.

Overuse by livestock will result in a reduced vigor by the willows present, as illustrated by highlining, clubbing, or dead clumps. With continued overuse, willows show a sharp decline in vigor and may be eventually eliminated from the site (Hansen and others 1995).

Frisina (1991) states that for a grazing program to be successful, it must meet the basic biological requirements of the plants such as photosynthesis, food storage, reproduction, and seedling establishment. In order to meet these requirements, long periods of rest are needed. It is during long growing season rest periods that the essential biological processes of food production and storage, reproduction, and seedling establishment take place. In some instances, additional periods of rest may be required to either improve or maintain a plant community.

Wildlife

Abundant food, cover, and proximity to water provide habitat for numerous wildlife species such as mammals and songbirds. Summer and winter use by elk may be moderate (Gaffney 1941). Big game use of *Salix drummondiana* (Drummond willow) shoots, especially during the winter, may be heavy. The linear nature of many of these communities along waterways serve as important corridors for wildlife movement. Moose and beaver tend to heavily utilize most species of willows. Elk may make moderate summer use of *Calamagrostis canadensis* (bluejoint reedgrass) (Kufeld 1973).

Beaver perform a vital role in the health and maintenance of riparian ecosystems. Beaver dams assist in controlling the downcutting of channels, bank erosion, and the movement of sediment downstream (Gordon and others 1992). When beaver construct a dam, they raise the water table in the area, which provides water for hydrophytic plants such as willows and sedges. The beaver dam also slows down the water in the channel, which allows suspended sediment to be deposited behind the dam. The combination of sediment deposition and plant reproduction raises the channel bed, creating a wetland environment which is excellent waterfowl and fish habitat. It has often been the policy of land managers to trap and kill beaver because they can be a nuisance. However, because beaver produce such desirable habitat and provide many beneficial stream functions, their removal from a riparian system needs to be closely evaluated (Hansen and others 1995).

Fisheries

Salix spp. (willow) communities function in a variety of capacities to promote stream health and enhance fisheries. Willows form dense root networks that armor streambanks against lateral cutting and erosion, provide cover in the form of overhanging branches and banks, and shade channels, effectively moderating extreme temperature fluctuations. Although not a source of large woody debris, willows may trap large trees borne downstream, creating deeper pools and additional cover for fish species. *Carex* spp. (sedge) and other associated mat-forming un-

derstory species trap sediments, essentially building streambanks and filtering steam flows.

Fire

Prescribed burning in this type is an effective method of rejuvenating decadent clumps. The various willow species present in this type sprout vigorously following fire, especially in wetter stands. Quick, hot fires result in more sprouts than slower fires, which are potentially more damaging to the willows and tends to result in fewer sprouts. After burning, sites should be removed from livestock grazing for at least 2 to 3 years to avoid attracting livestock to young, palatable regrowth (Hansen and others 1995).

Calamagrostis canadensis (bluejoint reedgrass) propagates itself by both seeds and rhizomes, making this species an aggressive invader of moist, burned sites (Crane and Fischer 1986). These features also make it a valuable species for stabilizing or rehabilitating mountain streams.

Soil Management and Rehabilitation Opportunities

Wet, fine textured soils are highly susceptible to trampling damage by cattle. Grazing should be deferred until soils are drier to protect streambanks and minimize damage (Marlow 1984). Woody species provide the greatest amount of streambank protection. Herbaceous species rarely afford sufficient stream bank protection. Management should emphasize the importance of willows in protecting the streambank (Hansen and others 1995).

Salix drummondiana (Drummond willow) is valuable in revegetating disturbed streambanks. Cuttings should be first rooted then grown in a nursery to insure survival. Cut stems of *Salix drummondiana* (Drummond willow) produce an abundance of roots, located along the entire length of the stem. Best results are obtained from cuttings taken in the spring from dormant two to four year old wood. Cuttings 30-50 cm (12-20 in) long and >1 cm (0.5 in) in diameter produce the best results. Roots and shoots from cuttings can be expected to appear 10-15 days after planting (Hansen and others 1995).

Recreational Uses and Considerations

Fishing opportunities are good in streams associated with this type. Moist soils and streambanks are subject to trampling damage. Some stands may be so dense as to hinder most forms of recreational fishing. If fishing access is important, dense stands may be opened by the use of livestock as a management tool (Hansen and others 1995).

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = seasonally flooded to saturated to temporarily flooded.

OTHER STUDIES

The *Salix drummondiana/Calamagrostis canadensis* (Drummond willow/bluejoint reedgrass) habitat type has been

documented in the Classification and Management of Montana's Riparian and Wetland Sites (Hansen and others 1995). In addition, communities containing high constancies and coverages of *Salix drummondiana* (Drummond willow) have been described. These include the *Salix boothii* (Booth willow) dominated communities described by Padgett and others (1989) for Utah and southeastern Idaho, the *Salix geyeriana* (Geyer willow) dominated communities types described by Hansen and others (1989) for Montana, and the *Salix boothii* (Booth willow) dominated communities described by Youngblood and others (1985b) for eastern Idaho and western Wyoming.

Salix drummondiana/Carex rostrata Habitat Type (Drummond Willow/Beaked Sedge Habitat Type)

SALDRU/CARROS (SADR/CARO6)
Number Of Stands Sampled in Montana = 43

NOTE: The *Salix drummondiana/Carex rostrata* (Drummond willow/beaked sedge) habitat type has been documented in Idaho according to field surveys conducted in 1994. However, due to time constraints during the 1995 field season, homogeneous stand data could not be collected for this type. In the subsequent discussion, any references to physical site location or vegetation characteristics for this type in Idaho were interpreted from 1994 field surveys. The remainder of this description was taken from the Classification and Management of Montana's Riparian and Wetland Sites (Hansen and others 1995).

LOCATION AND ASSOCIATED LANDFORMS

The *Salix drummondiana/Carex rostrata* (Drummond willow/beaked sedge) habitat type is an incidental type at mid to moderately high elevations in the mountainous regions throughout eastern Idaho, ranging from 2,060 to 2,273 m (6,800 to 7,500 ft). This type may occur on level outwash and alluvial floodplains of mountain streams, below hillside seeps and springs, or adjacent to beaver-dammed or other impoundments. Communities dominated by *Salix drummondiana* (Drummond willow) occupy sites at higher elevations while communities dominated by *Salix geyeriana - Salix boothii* (Geyer willow - Booth willow) occur at moderate elevations. Lower elevational foothill sites are dominated by the *Salix lutea* (yellow willow) types.

VEGETATION

In Idaho, *Salix drummondiana* (Drummond willow) may form dense, impenetrable stands in the absence of grazing or browsing pressure. Other *Salix spp.* (willow), particularly *Salix geyeriana* (Geyer willow), *Salix boothii* (Booth willow) and *Salix lutea* (yellow willow), may be present with reduced coverages. Lower shrub layers may be composed of *Rosa* spp. (rose) or *Ribes* spp. (currant). The herbaceous undergrowth is dominated by *Carex* spp. (sedge), primarily *Carex rostrata* (beaked sedge), *Carex aquatilis* (water sedge), and *Carex phaeocephala* (Dunhead sedge). Where sites are subject to grazing pressures, *Carex nebrascensis* (Nebraska sedge), *Poa pratensis* (Kentucky bluegrass) and other distubance-induced types may become prevalent. A diversity of other graminoids and forbs are present; however, they occur with limited constancy and coverage.

Salix drummondiana (Drummond willow) is the dominant shrub in Montana. Limited amounts of *Salix geyeriana* (Geyer willow) and *Salix boothii* (Booth willow) may be present. The undergrowth is dominated by *Carex rostrata* (beaked sedge) with lesser amounts of *Calamagrostis canadensis* (bluejoint reedgrass), *Carex aquatilis* (water sedge), and *Carex vesicaria* (inflated sedge) also present. *Geum macrophyllum* (large leaved avens) and *Epilobium ciliatum* (common willow-herb) are the most common forb associated with this type (Table 3). Although Table 3 reflects vegetation surveyed on sites exclusive to Montana, it appears to provide a fairly accurate interpretation of species composition and canopy cover for sites identified in Idaho.

Table 3. Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax stands of the *Salix drummondiana/Carex rostrata* (Drummond willow/beaked sedge) habitat type (number = 17 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Trees			
Abies lasiocarpa (subalpine fir)	1	0-1	6
Picea spp. (spruce)	1	0-1	6
Shrubs			
Alnus incana (mountain alder)	7	0-20	29
Amelanchier alnifolia (western serviceberry)	1	0-1	6
Betula glandulosa (bog birch)	14	0-20	18
Cornus stolonifera (red-osier dogwood)	1	0-1	12
Lonicera involucrata (twin-berry)	3	0-3	12
Menziesia ferruginea (fool's huckleberry)	1	0-1	6
Potentilla fruticosa (shrubby cinquefoil)	1	0-1	6
Rhamnus alnifolia (alder buckthorn)	1	0-1	6
Ribes hudsonianum (stinking currant)	1	0-1	6
Ribes odoratum (buffalo currant)	1	0-1	6
Ribes spp. (currant)	3	0-10	35
Rubus idaeus (red raspberry)	1	0-1	12
Salix boothii (Booth willow)	14	0-20	47
Salix drummondiana (Drummond willow)	55	30-90	100
Salix geyeriana (Geyer willow)	1	0-1	18
Salix planifolia (planeleaf willow)	10	0-10	6
Salix pseudomonticola (mountain willow)	15	0-30	12
Spiraea douglasii (Douglas's spiraea)	1	0-1	6
Vaccinium scoparium (whortleberry)	1	0-1	6
Graminoids			
Agrostis diegoensis (thin bentgrass)	40	0-40	6
Agrostis exarata (spike bentgrass)	1	0-1	6

Agrostis scabra (tickle-grass)	1	0-1	6
Agrostis tenuis (colonial bentgrass)	20	0-20	6
Agrostis thurberiana (Thurber bentgrass)	20	0-20	6
Alopecurus pratensis (meadow foxtail)	3	0-3	6
Calamagrostis canadensis (bluejoint reedgrass)	16	0-40	29
Calamagrostis stricta (narrow-spiked reedgrass)	1	0-1	6
Carex aquatilis (water sedge)	34	0-60	18
Carex disperma (soft-leaved sedge)	3	0-3	6
Carex flava (yellow sedge)	1	0-1	6
Carex lanuginosa (woolly sedge)	5	0-10	12
Carex lenticularis (lentil-fruited sedge)	10	0-10	6
Carex rostrata (beaked sedge)	36	0-80	82
Carex vesicaria (inflated sedge)	33	0-80	18
Deschampsia cespitosa (tufted hairgrass)	1	0-1	12
Glyceria grandis (American mannagrass)	3	0-3	6
Glyceria striata (fowl mannagrass)	1	0-1	12
Juncus balticus (Baltic rush)	1	0-1	6
Juncus ensifolius (dagger-leaf rush)	5	0-10	12
Phalaris arundinacea (reed canarygrass)	30	0-30	6
Poa palustris (fowl bluegrass)	5	0-10	12
Scirpus microcarpus (small-flowered bulrush)	1	0-1	6
Forbs			
Angelica arguta (sharptooth angelica)	1	0-1	12
Aster eatonii (Eaton's aster)	1	0-1	6
Aster foliaceus (leafy aster)	3	0-3	6
Aster modestus (few-flowered aster)	3	0-20	41
Aster occidentalis (western aster)	5	0-10	18
Epilobium alpinum (alpine willow-herb)	3	0-3	6
Epilobium angustifolium (fireweed)	1	0-1	12
Epilobium ciliatum (common willow-herb)	3	0-10	53
Fragaria virginiana (Virginia strawberry)	1	0-1	12
Galium aparine (goose-grass)	2	0-3	12
Galium trifidum (small bedstraw)	2	0-10	29
Geum macrophyllum (large-leaved avens)	2	0-10	59
Habernaria dilatata (white orchis)	1	0-1	6
Heracleum lanatum (cow-parsnip)	3	0-3	6
Iris pseudacorus (yellow iris)	1	0-1	6
Ligusticum canbyi (Canby's licorice-root)	1	0-1	6
Lycopus uniflorus (northern bugleweed)	1	0-1	6
Mentha arvensis (field mint)	5	0-10	35
Pedicularis groenlandica (elephant's head)	5	0-10	12

Petasites sagittatus (arrowleaf coltsfoot)	4	0-10	18
Polemonium occidentale (western polemonium)	7	0-10	12
Polygonum amphibium (water smartweed)	1	0-1	6
Polygonum austinae (Austin's knotweed)	10	0-10	6
Potentilla palustris (purple cinquefoil)	1	0-1	18
Pyrola asarifolia (pink wintergreen)	1	0-1	12
Rumex crispus (curly dock)	1	0-1	6
Saussurea americana (American sawwort)	1	0-1	6
Saxifraga arguta (brook saxifrage)	20	0-20	6
Scutellaria galericulata (marsh skullcap)	1	0-1	6
Senecio pseudaureus (streambank groundsel)	1	0-1	12
Senecio triangularis (arrowleaf groundsel)	4	0-10	18
Smilacina stellata (starry Solomon-plume)	1	0-1	12
Stellaria longipes (longstalk starwort)	7	0-20	18
Veronica americana (American speedwell)	5	0-10	12
Viola spp. (violet)	1	0-1	6
Ferns and Allies			
Botrychium lanceolatum (lance-leaved grape-fern)	1	0-1	6
Equisetum arvense (field horsetail)	7	0-10	29
Equisetum fluviatile (water horsetail)	10	0-10	6
Equisetum hyemale (common scouring-rush)	1	0-1	6
Equisetum pratense (meadow horsetail)	1	0-1	6

SUCCESSIONAL INFORMATION

With prolonged disturbance, introduced grasses, such as *Poa palustris* (fowl bluegrass), *Poa pratensis* (Kentucky bluegrass), and *Equisetum arvense* (field horsetail) tend to increase (Table 4). If browsing is heavy, willow coverages will decrease, resulting in more open communities. The site may then become occupied by the *Salix drummondiana* (Drummond willow) community type which represents a grazing disclimax.

Table 4. Average canopy cover, range of canopy cover, and constancy for species recorded in disturbed and/or early to mid-seral stands of the *Salix drummondiana/Carex rostrata* (Drummond willow/beaked sedge) habitat type (number = 26 stands)

	% Canopy Cover		
Species	Average	Range	Constancy
Trees			
Juniperus scopulorum (Rocky Mountain juniper)	1	0-1	4
Picea spp. (spruce)	1	0-3	15
Pinus contorta (lodgepole pine)	1	0-3	15

Populus tremuloides (quaking aspen)	1	0-1	4
Pseudotsuga menziesii (Douglas fir)	1	0-1	4
Shrubs			
Acer glabrum (Rocky Mountain maple)	3	0-3	4
Alnus incana (mountain alder)	18	0-40	31
Alnus sinuata (Sitka alder)	30	0-30	4
Amelanchier alnifolia (western serviceberry)	1	0-1	4
Betula glandulosa (bog birch)	13	0-30	19
Cornus canadensis (bunchberry)	1	0-1	4
Cornus stolonifera (red-osier dogwood)	8	0-30	31
Crataegus douglasii (black hawthorn)	1	0-1	4
Juniperus communis (common juniper)	1	0-1	4
Lonicera involucrata (twin-berry)	4	0-10	12
Potentilla fruticosa (shrubby cinquefoil)	1	0-3	15
Prunus virginiana (common chokecherry)	1	0-1	4
Rhamnus alnifolia (alder buckthorn)	7	0-20	23
Ribes spp. (currant)	10	0-20	15
Ribes hudsonianum (stinking currant)	4	0-10	19
Ribes inerme (whitestem gooseberry)	20	0-20	4
Rosa acicularis (prickly rose)	2	0-3	8
Rosa spp. (rose)	1	0-1	4
Rosa woodsii (woods rose)	7	0-10	8
Rubus idaeus (red raspberry)	10	0-10	4
Salix bebbiana (Bebb willow)	14	0-40	19
Salix boothii (Booth willow)	14	0-30	42
Salix candida (hoary willow)	1	0-1	4
Salix drummondiana (Drummond willow)	31	3-80	100
Salix exigua (sandbar willow)	10	0-10	4
Salix geyeriana (Geyer willow)	5	0-10	27
Salix spp. (willow)	40	0-40	4
Salix lasiandra (Pacific willow)	3	0-3	4
Salix lutea (yellow willow)	10	0-10	4
Salix planifolia (planeleaf willow)	3	0-10	15
Salix wolfii (Wolf's willow)	7	0-10	8
Toxicodendron rydbergii (poison ivy)	1	0-1	4
Vaccinium cespitosum (dwarf huckleberry)	10	0-10	4
Graminoids			
Agrostis exarata (spike bentgrass)	1	0-1	4
Agrostis spp. (bentgrass)	5	0-10	8
Agropyron repens (quackgrass)	3	0-3	4
Agrostis scabra (tickle-grass)	10	0-20	19

Agrostis stolonifera (redtop)	6	0-10	19
Alopecurus aequalis (short-awn foxtail)	1	0-1	4
Alopecurus alpinus (alpine foxtail)	10	0-10	4
Alopecurus pratensis (meadow foxtail)	10	0-10	4
Bromus ciliatus (fringed brome)	6	0-20	27
Bromus spp. (brome)	2	0-3	8
Calamagrostis canadensis (bluejoint reedgrass)	16	0-40	42
Calamagrostis stricta (narrow-spiked reedgrass)	1	0-1	4
Carex aperta (Columbia sedge)	1	0-1	4
Carex aquatilis (water sedge)	18	0-30	19
Carex aurea (golden sedge)	1	0-1	4
Carex bebbii (Bebb's sedge)	3	0-3	4
Carex canescens (gray sedge)	26	0-80	19
Carex cusickii (Cusick's sedge)	20	0-20	4
Carex spp. (sedge)	1	0-1	4
Carex illota (sheep sedge)	5	0-10	8
Carex lanuginosa (woolly sedge)	10	0-10	4
Carex lenticularis (lentil-fruit sedge)	10	0-10	8
Carex leptalea (bristle-stalked sedge)	10	0-10	4
Carex microptera (small-winged sedge)	5	0-10	8
Carex nebrascensis (Nebraska sedge)	20	0-30	8
Carex pachystachya (thick-headed sedge)	5	0-10	8
Carex retrorsa (retrorse sedge)	20	0-20	4
Carex rostrata (beaked sedge)	31	0-80	88
Carex spectabilis (showy sedge)	1	0-1	4
Carex vesicaria (inflated sedge)	5	0-10	8
Cinna latifolia (drooping woodreed)	1	0-1	4
Danthonia spp. (danthonia)	1	0-1	4
Deschampsia cespitosa (tufted hairgrass)	5	0-10	15
Elymus cinereus (basin wildrye)	1	0-1	4
Glyceria elata (tall mannagrass)	1	0-1	4
Glyceria grandis (American mannagrass)	6	0-10	19
Glyceria striata (fowl mannagrass)	1	0-1	12
Hordeum brachyantherum (meadow barley)	5	0-10	15
Juncus alpinus (northern rush)	1	0-1	4
Juncus balticus (Baltic rush)	11	0-30	19
Juncus ensifolius (dagger-leaf rush)	2	0-3	15
Juncus regelii (Regel's rush)	20	0-20	4
Juncus vaseyi (Vasey's rush)	1	0-1	4
Luzula campestris (field woodrush)	1	0-1	8
Muhlenbergia asperifolia (alkali muhly)	1	0-1	4

Phalaris arundinacea (reed canarygrass)	40	0-80	8
Phleum pratense (common timothy)	5	0-10	27
Poa compressa (Canada bluegrass)	10	0-10	4
Poa palustris (fowl bluegrass)	15	0-60	54
Poa pratensis (Kentucky bluegrass)	6	0-20	38
Scirpus microcarpus (small-flowered bulrush)	1	0-1	8
Trisetum wolfii (Wolf's trisetum)	3	0-10	23
Forbs			
Achillea millefolium (common yarrow)	3	0-10	19
Actaea rubra (baneberry)	1	0-1	4
Angelica arguta (sharptooth angelica)	8	0-10	12
Antennaria microphylla (rosy pussy-toes)	1	0-1	4
Antennaria neglecta (field pussy-toes)	3	0-3	4
Antennaria umbrinella (umber pussy-toes)	1	0-1	4
Apocynum cannabinum (hemp dogbane)	20	0-20	4
Arenaria macrophylla (bigleaf sandwort)	3	0-3	4
Arnica chamissonis (meadow arnica)	1	0-3	12
Aster laevis (smooth aster)	1	0-1	8
Aster modestus (few-flowered aster)	4	0-10	27
Aster occidentalis (western aster)	7	0-20	35
Bidens cernua (nodding beggar-ticks)	1	0-1	4
Castilleja miniata (scarlet paintbrush)	2	0-3	8
Cicuta maculata (spotted water-hemlock)	3	0-3	4
Cirsium arvense (Canada thistle)	1	0-3	19
Cirsium scariosum (elk thistle)	11	0-30	12
Descurainia richardsonii (Richardson's tansymustard)	1	0-1	4
Epilobium angustifolium (fireweed)	1	0-1	23
Epilobium ciliatum (common willow-herb)	3	0-10	42
Forb (forb)	20	0-20	4
Fragaria virginiana (Virginia strawberry)	4	0-10	27
Galium aparine (goose-grass)	1	0-1	4
Galium boreale (northern bedstraw)	1	0-1	4
Galium triflorum (sweetscented bedstraw)	3	0-10	35
Galium trifidum (small bedstraw)	1	0-3	15
Geranium richardsonii (white geranium)	2	0-3	12
Geranium viscosissimum (sticky geranium)	1	0-1	4
Geum macrophyllum (large-leaved avens)	6	0-20	62
Geum rivale (water avens)	1	0-1	4
Habernaria dilatata (white orchis)	1	0-1	12
Habernaria hyperborea (northern green bog-orchid)	1	0-1	4
Habernaria saccata (slender bog-orchid)	1	0-1	4

Heracleum lanatum (cow-parsnip)	4	0-10	15
Lemna minor (water lentil)	1	0-1	8
Ligusticum tenuifolium (slender-leafed licorice-root)	10	0-10	4
Lupinus argenteus (silvery lupine)	1	0-1	4
Lysimachia ciliata (fringed loosestrife)	20	0-20	4
Mentha arvensis (field mint)	6	0-20	31
Mertensia ciliata (mountain bluebell)	5	0-10	8
Mimulus guttatus (common monkey-flower)	5	0-10	15
Mimulus moschatus (musk-flower)	7	0-10	8
Myosotis laxa (small-flowered forget-me-not)	1	0-1	4
Parnassia palustris (northern grass-of-parnassus)	10	0-10	4
Pedicularis groenlandica (elephant's head)	2	0-3	12
Penstemon procerus (small-flowered penstemon)	1	0-1	4
Perideridia gairdneri (Gairdner's yampah)	1	0-1	8
Petasites sagittatus (arrowleaf coltsfoot)	25	0-40	8
Phacelia procera (tall phacelia)	1	0-1	4
Polygonum amphibium (water smartweed)	45	0-80	8
Polemonium occidentale (western polemonium)	1	0-1	4
Polygonum punctatum (water smartweed)	1	0-1	4
Potentilla gracilis (slender cinquefoil)	3	0-3	8
Potentilla palustris (purple cinquefoil)	11	0-20	31
Pyrola asarifolia (pink wintergreen)	2	0-3	8
Rorippa palustris (marsh yellowcress)	1	0-1	4
Rubus pubescens (dwarf red blackberry)	3	0-3	4
Rudbeckia occidentalis (black head)	30	0-30	4
Saxifraga arguta (brook saxifrage)	1	0-1	4
Scutellaria galericulata (marsh skullcap)	10	0-10	4
Senecio eremophilus (dryland ragwort)	10	0-10	4
Senecio integerrimus (western groundsel)	1	0-1	8
Senecio pseudaureus (streambank groundsel)	4	0-10	15
Senecio sphaerocephalus (mountain-marsh butterweed)	1	0-1	4
Senecio triangularis (arrowleaf groundsel)	1	0-1	19
Sium suave (hemlock water-parsnip)	1	0-1	4
Smilacina stellata (starry Solomon-plume)	4	0-10	12
Solidago canadensis (Canada goldenrod)	10	0-20	8
Stellaria longifolia (longleaved starwort)	1	0-1	4
Stellaria longipes (longstalk starwort)	1	0-1	4
Stellaria umbellata (umbellate starwort)	10	0-10	4
Taraxacum officinale (common dandelion)	10	0-20	15
Thalictrum occidentale (western meadowrue)	5	0-1	12
Trifolium repens (white clover)	9	0-30	15

Typha latifolia (common cattail)	1	0-1	4
Urtica dioica (stinging nettle)	4	0-10	12
Valeriana occidentalis (western valerian)	1	0-1	4
Veronica americana (American speedwell)	5	0-10	12
Vicia americana (American vetch)	1	0-1	4
Viola canadensis (Canada violet)	3	0-3	4
Viola spp. (violet)	3	0-10	19
Viola palustris (marsh violet)	1	0-1	4
Ferns and Allies			
Botrychium virginianum (Virginia grapefern)	1	0-1	4
Dryopteris spinulosa (spinulose wood-fern)	10	0-10	4
Equisetum arvense (field horsetail)	5	0-20	42
Equisetum fluviatile (water horsetail)	10	0-1	4
Equisetum hyemale (common scouring-rush)	5	0-10	8
Equisetum laevigatum (smooth scouring-rush)	1	0-1	4
Equisetum palustre (marsh horsetail)	1	0-1	4

Heavy cutting of the willows by beaver may lead to dominance by the graminoids. If beaver leave the area because of the lack of food, or are removed by trapping, major storm events or seasonal runoff can cause the dams to be washed out. With the elimination of beaver, the dams will not be repaired, resulting in downcutting and eventually, a lowering of the water table. The lowering of the water table can result in the changing of the site's potential. If the water table equilibrates at a new but lower (drier) state, the site's potential changes to the *Salix drummondiana/Calamagrostis canadensis* (Drummond willow/bluejoint reedgrass) habitat type. The *Salix drummondiana/Calamagrostis canadensis* (Drummond willow/bluejoint reedgrass) habitat type occupies a slightly drier position on the landscape than that of the *Salix drummondiana/Carex rostrata* (Drummond willow/beaked sedge) habitat type.

SOILS

The *Salix drummondiana/Carex rostrata* (Drummond willow/beaked sedge) habitat type may occur over a range of soil types. Some sites consist of primarily sandy soils underlain by gravels, cobbles and various sized rocks. Slightly elevated zones above the active floodplain may have 2.5 to 5 cm (1 to 2 in) of litter/duff above a silt loam extending to a depth of 25 cm (10 in) or more. In regions characterized by fines and silts, organic horizons, often with a high component of root/fibrous plant material, may reach 45 cm (18 in) or more below the surface. This zone, when saturated, may take on a muck-like consistency. Fine and coarse sands compose the underlying layers with a moderate gravel element. A shallow litter and duff layer may develop where flood disturbance is infrequent. This habitat type tends to occupy saturated sites with water tables generally at or just below the soil surface. Although mottled and gleyed soils, the result of oxidation/reduction reactions, were not observed, they are expected to be present due to shallow water tables.

ADJACENT COMMUNITIES

This habitat type occurs either next to water or in intermediate topographic positions between wetter herbaceous communities and drier communities dominated by shrubs or trees. Adjacent wetter communities may include the *Carex rostrata* (beaked sedge) or *Carex aquatilis* (water sedge) habitat types. The *Salix drummondiana/Calamagrostis canadensis* (Drummond willow/bluejoint reedgrass) habitat type or the *Salix drummondiana* (Drummond willow) community type may occupy adjacent drier sites. Additional adjacent drier communities may include the *Potentilla fruticosa/Deschampsia cespitosa* (shrubby cinquefoil/tufted hairgrass) or *Deschampsia cespitosa* (tufted hairgrass) habitat types. Uplands support habitat types from the *Abies lasiocarpa* (subalpine fir), *Pseudotsuga menziesii* (Douglas fir), and *Pinus ponderosa* (ponderosa pine) series, depending on elevation and aspect.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Forage value of *Carex rostrata* (beaked sedge) and *Carex aquatilis* (water sedge) is variable, depending upon season, previous grazing use, and the extent of the site. Understory production depends on the density of overstory shrubs and the water level. Livestock forage value of *Carex rostrata* (beaked sedge) is variable, depending upon season, previous grazing use, and the extent of the site. *Carex vesicaria* (inflated sedge) appears to be more palatable and may be grazed in mid to late summer, especially as upland vegetation dries. On narrow riparian or wetland sites within extensive rangelands, sedge species are heavily utilized, particularly when upland plants are cured, or where livestock distribution and stocking rate problems occur.

Overuse by livestock will result in a reduced vigor by the willows present, as illustrated by highlining, clubbing, or dead clumps. With continued overuse, willows show a sharp decline in vigor and may be eventually eliminated from the site.

Myers (1989) found that deferred and rest rotation grazing systems generally favor sedge species over willow species since woody species are vulnerable to longer duration treatments and to late summer/fall treatments. Woody species are vulnerable to pruning damage, while sedges are protected by a root reserve. Late summer and fall grazing should be carefully controlled.

Marlow (Hansen and others 1995) also feels that fall (October) grazing will have a negative impact on willows due to limited regrowth at the end of the growing season. However, he feels that rest and deferred rotation can have a positive effect on willows when cattle are properly managed. High use by wildlife in the fall can limit the amount of regrowth.

To minimize undesired changes in community composition and structure, pasture or allotment management should be based on the forage available from stands of this and other riparian or wetland communities. This concept of the riparian or wetland pasture has had some success in maintaining or improving the health of riparian or wetland vegetation (Kinch 1987).

Frisina (1991) states that for a grazing program to be successful, it must meet the basic biological requirements of

the plants such as photosynthesis, food storage, reproduction, and seedling establishment. In order to meet these requirements, long periods of rest are needed. It is during long growing season rest periods that the essential biological processes of food production and storage, reproduction, and seedling establishment take place. In some instances, additional periods of rest may be required to either improve or maintain a plant community.

Wildlife

Big game use of *Salix drummondiana* (Drummond willow) shoots, especially during the winter, may be heavy. The *Salix drummondiana/Carex rostrata* (Drummond willow/beaked sedge) habitat type potentially forms structurally diverse thickets of 3-4 m (10-13 ft) tall willow, providing cover and food for many wildlife species. Moose and beaver tend to heavily utilize most species of willows.

Beaver perform a vital role in the health and maintenance of riparian ecosystems. Beaver dams assist in controlling the downcutting of channels, bank erosion, and the movement of sediment downstream (Gordon and others 1992). When beaver construct a dam, they raise the water table in the area, which provides water for hydrophytic plants such as willows and sedges. The beaver dam also slows down the water in the channel, which allows suspended sediment to be deposited behind the dam. The combination of sediment deposition and plant reproduction raises the channel bed, creating a wetland environment which is excellent waterfowl and fish habitat. It has often been the policy of land managers to trap and kill beaver because they can be a nuisance. However, because beaver produce such desirable habitat and provide many beneficial stream functions, their removal from a riparian system needs to be closely evaluated.

Fisheries

The dense network of roots from the various willows and the rhizomatous *Carex rostrata* (beaked sedge) and *Carex aquatilis* (water sedge) are effective in stabilizing streambanks. Immediately adjacent to the stream, the sedge sod may be undercut and sag into the water providing excellent cover for fish. The various species of willows provide valuable overhanging stream cover and shade. The importance of willows in streambank protection, cover, and thermal protection for fisheries can not be emphasized enough. The herbaceous understory aids in filtering out sediments during high flows thereby contributing to the overall building of the streambanks. Some stands may be so dense as to hinder most forms of recreational fishing. If fishing access is important, dense stands may be opened by the use of livestock as a management tool.

Fire

Prescribed burning in the *Salix drummondiana/Carex rostrata* (Drummond willow/beaked sedge) habitat type is an effective method of rejuvenating decadent clumps. The various willow species present in this type sprout vigorously following fire, especially in wetter stands. Quick, hot fires result in more sprouts than slower fires, which are potentially more damaging to the willows and tends to result in fewer sprouts.

Burning of this type can temporarily increase productivity of *Carex rostrata* (beaked sedge), *Carex aquatilis* (water sedge), and *Carex vesicaria* (inflated sedge). However, nonuse by livestock during the year prior to burning is essential. Residual cover burns well in the spring, prior to the growing season. After burning, the site should be eliminated from livestock grazing for at least 2 to 3 years to avoid attracting livestock to young, palatable re-

growth. Care should be taken when burning stands along streambanks because of the excellent erosion protection provided by the *Salix drummondiana/Carex rostrata* (Drummond willow/beaked sedge) habitat type.

Soil Management and Rehabilitation Opportunities

Soils are easily damaged from trampling by livestock if grazed when moist. This disturbance often leads to soil compaction, streambank sloughing, damage to vegetation, and premature drying of the soil surface. Woody species provide the greatest amount of streambank protection. Herbaceous species rarely afford sufficient stream bank protection. Management should emphasize the importance of willows in protecting the streambank.

Salix drummondiana (Drummond willow) is valuable in revegetating disturbed streambanks. Cuttings should be first rooted then grown in a nursery to insure survival. Cut stems of *Salix drummondiana* (Drummond willow) produce an abundance of roots, located along the entire length of the stem. Best results are obtained from cuttings taken in the spring from dormant two to four year old wood. Cuttings 30-50 cm (12-20 in) long and >1 cm (0.5 in) in diameter produce the best results. Roots and shoots from cuttings can be expected to appear 10-15 days after planting.

Carex rostrata (beaked sedge), *Carex aquatilis* (water sedge), and *Carex vesicaria* (inflated sedge) all form a dense, thick sod that is highly resistant to erosion. Along the stream, the sod may be undercut and sag into the water, providing additional protection to streambanks. However, if grazing or trailing impacts are severe, the heavy weight of the sod makes it susceptible to damage, and streambank sloughing can occur.

Recreational Uses and Considerations

Recreational values of this type are primarily connected with the associated high quality fishery. Dense stands limit canoe or raft access, and camping sites are often unsuitable due to moist or wet conditions. Some stands may be so dense as to hinder most forms of recreational fishing. If fishing access is important, dense stands may be opened by the use of livestock as a management tool.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = seasonally flooded to saturated to temporarily flooded.

OTHER STUDIES

The *Salix drummondiana/Carex rostrata* (Drummond willow/beaked sedge) habitat type has been documented in the Classification and Management of Montana's Riparian and Wetland Sites (Hansen and others 1995). In addition, communities containing high constancies and coverages of *Salix drummondiana* (Drummond willow) have been described elsewhere. These include the *Salix boothii* (Booth willow) dominated communities described by Padgett and others (1989) for Utah and southeastern Idaho, the *Salix geyeriana* (Geyer willow) dominated commu-

nities types described by Hansen and others (1989) for Montana, and the *Salix boothii* (Booth willow) dominated communities described by Youngblood and others (1985b) for eastern Idaho and western Wyoming.

Salix drummondiana Community Type
(Drummond Willow Community Type)

SALDRU (SADR)
Number Of Stands Sampled in Montana = 2

NOTE: The *Salix drummondiana* (Drummond willow) community type is suspected to occur in Idaho, although no stands were observed during the 1994 and 1995 field seasons. This description was taken from the Classification and Management of Montana's Riparian and Wetland Sites (Hansen and others 1995) except where otherwise specified.

LOCATION AND ASSOCIATED LANDFORMS

The *Salix drummondiana* (Drummond willow) community type may be an incidental type at mid to moderately high elevations in the mountainous regions throughout eastern Idaho, ranging from 2,060 to 2,273 m (6,800 to 7,500 ft). This type may occur on level outwash and alluvial floodplains of mountain streams, manifest below hillside seeps and springs, or be affiliated with beaver-dammed or other impoundments. Communities dominated by *Salix drummondiana* (Drummond willow) occupy sites at higher elevations while communities dominated by *Salix geyeriana - Salix boothii* (Geyer willow - Booth willow) occur at moderate elevations. Lower elevational foothill sites are dominated by the *Salix lutea* (yellow willow) types.

VEGETATION

The overstory of this grazing disclimax is dominated by *Salix drummondiana* (Drummond willow). Major herbaceous species include *Poa pratensis* (Kentucky bluegrass), *Artemisia lindleyana* (riverbank wormwood), and *Equisetum arvense* (field horsetail).

SUCCESSIONAL INFORMATION

The *Salix drummondiana* (Drummond willow) represents an early/mid-seral grazing disclimax of the *Salix drummondiana/Calamagrostis canadensis* (Drummond willow/bluejoint reedgrass) habitat type or the *Salix drummondiana/Carex rostrata* (Drummond willow/beaked sedge) habitat type.

SOILS

In Idaho, the *Salix drummondiana* (Drummond willow) community type may occur over a range of soil types . Some sites are predominantly sandy soils underlain by gravels, cobbles and various sized rocks. Slightly elevated zones above the active floodplain may have 2.5 to 5 cm (1 to 2 in) of litter/duff above a silt loam extending to a depth of 25 cm (10 in) or more. In regions characterized by fines and silts, organic horizons may reach 45 cm (18 in) or more below the surface. Root/ fibrous plant material is common in these zones, which, when saturated,

take on a muck-like consistency. Fine and coarse sands compose the underlying layers with a moderate gravel element. A shallow litter and duff layer may develop where flood disturbance is infrequent. This habitat type tends to occupy moist sites with water tables generally near (60 cm /24 in) if not at the soil surface.

ADJACENT COMMUNITIES

Adjacent sites that are slightly wetter may support either the *Salix drummondiana/Carex rostrata* (Drummond willow/beaked sedge) habitat type or the *Salix drummondiana/Calamagrostis canadensis* (Drummond willow/bluejoint reedgrass) habitat type. In other situations, wetter sites may include the *Carex rostrata* (beaked sedge) or *Carex aquatilis* (water sedge) habitat types or open water. Drier sites may support a variety of types including the *Poa pratensis* (Kentucky bluegrass) and *Juncus balticus* (Baltic rush) community types, the *Potentilla fruticosa/Deschampsia cespitosa* (shrubby cinquefoil/tufted hairgrass) habitat type or upland types.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Stands of this type are often open, allowing for easy livestock access. Forage productivity is also high, resulting in potentially heavy utilization, especially as upland vegetation dries. *Poa pratensis* (Kentucky bluegrass) is a palatable and moderately productive grass, especially when soil moisture levels are high, and tolerates a high degree of defoliation. Herbage production is moderate. *Poa pratensis* (Kentucky bluegrass) is well adapted to grazing and is considered an increaser or an invader, especially if grazing intensities and durations are severe (Wasser 1982). This species can produce new shoots from both existing tillers or rhizomes. Grazing practices influence the type of growth form present (Volland 1978). A high density of weak, low vigor tillers results under season long grazing. Stem densities are emphasized over aboveground biomass. Grazing practices incorporating early season rest increase the vigor of individual plants. Fewer shoots may be produced, but total aboveground biomass tends to be greater.

Overuse by livestock will result in a reduced vigor by the willows present, as illustrated by highlining, clubbing, or dead clumps. With continued overuse, willows show a sharp decline in vigor and may be eventually eliminated from the site.

Frisina (1991) states that for a grazing program to be successful, it must meet the basic biological requirements of the plants such as photosynthesis, food storage, reproduction, and seedling establishment. In order to meet these requirements, long periods of rest are needed. It is during long growing season rest periods that the essential biological processes of food production and storage, reproduction, and seedling establishment take place. In some instances, additional periods of rest may be required to either improve or maintain a plant community.

Wildlife

Abundant food, cover, and proximity to water provide habitat for numerous wildlife species such as mammals and songbirds. Summer and winter use by elk may be moderate (Gaffney 1941). Big game use of *Salix drummondiana* (Drummond willow) shoots, especially during the winter, may be heavy. The linear nature of many of these

communities along waterways serve as important corridors for wildlife movement. Moose and beaver tend to heavily utilize most species of willows.

Beaver perform a vital role in the health and maintenance of riparian ecosystems. Beaver dams assist in controlling the downcutting of channels, bank erosion, and the movement of sediment downstream (Gordon and others 1992). When beaver construct a dam, they raise the water table in the area, which provides water for hydrophytic plants such as willows and sedges. The beaver dam also slows down the water in the channel, which allows suspended sediment to be deposited behind the dam. The combination of sediment deposition and plant reproduction raises the channel bed, creating a wetland environment which is excellent waterfowl and fish habitat. It has often been the policy of land managers to trap and kill beaver because they can be a nuisance. However, because beaver produce such desirable habitat and provide many beneficial stream functions, their removal from a riparian system needs to be closely evaluated.

Fisheries

The importance of willows in streambank protection, cover, and thermal protection for fisheries can not be emphasized enough. The herbaceous understory aids in filtering out sediments during high flows thereby contributing to the overall building of the streambanks.

Fire

Prescribed burning in this type is an effective method of rejuvenating decadent clumps. The various willow species present in this type sprout vigorously following fire, especially in wetter stands. Quick, hot fires result in more sprouts than slower fires, which are potentially more damaging to the willows and tends to result in fewer sprouts.

Poa pratensis (Kentucky bluegrass) is damaged only by a hot, intense fire. Cool burns will have little effect on *Poa pratensis* (Kentucky bluegrass) (Volland and Dell 1981), but spring burns may lower tiller densities (Dix and Smeins 1967). Intense burns during active growing periods can be used to control stands of *Poa pratensis* (Kentucky bluegrass) (Wasser 1982).

After burning, the site should be eliminated from livestock grazing for at least 2 to 3 years to avoid attracting livestock to young, palatable regrowth.

Soil Management and Rehabilitation Opportunities

Soils and streambanks are subject to trampling damage, particularly if fine textured and wet. Grazing should be deferred until sites are drier to reduce trampling and compaction problems (Marlow 1984). Woody species provide the greatest amount of streambank protection. Herbaceous species rarely afford sufficient stream bank protection. Management should emphasize the importance of willows in protecting the streambank.

Unless water tables are restored, these sites will for all practical purposes remain with a ground cover dominated by introduced grass species. On those sites adjacent to a first or second order stream, the use of rock checkdams to aid in the rehabilitation of degraded (de-watered) sites is an excellent cost effective approach. The rock dam will

help raise the water table thereby allowing the willows and sedges to reclaim a degraded site.

Salix drummondiana (Drummond willow) is valuable in revegetating disturbed streambanks. Cuttings should be first rooted then grown in a nursery to insure survival. Cut stems of *Salix drummondiana* (Drummond willow) produce an abundance of roots, located along the entire length of the stem. Best results are obtained from cuttings taken in the spring from dormant two to four year old wood. Cuttings 30-50 cm (12-20 in) long and >1 cm (0.5 in) in diameter produce the best results. Roots and shoots from cuttings can be expected to appear 10-15 days after planting.

Recreational Uses and Considerations

These areas are frequently flooded, requiring additional consideration when planning roads or campsites.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = seasonally flooded to saturated to temporarily flooded.

OTHER STUDIES

The *Salix drummondiana* (Drummond willow) community type has been documented in the Classification and Management of Montana's Riparian and Wetland Sites (Hansen and others 1995). Other communities containing high constancies and coverages of *Salix drummondiana* (Drummond willow) have been described. These include the *Salix boothii* (Booth willow) dominated communities described by Padgett and others (1989) for Utah and southeastern Idaho, the *Salix geyeriana* (Geyer willow) dominated communities types described by Hansen and others (1989) for Montana, and the *Salix boothii* (Booth willow) dominated communities described by Youngblood and others (1985b) for eastern Idaho and western Wyoming.

Salix exigua Community Type
(Sandbar Willow Community Type)

SALEXI (SAEX)

Number Of Stands Sampled = 15

LOCATION AND ASSOCIATED LANDFORMS

The *Salix exigua* (sandbar willow) community type is a major type associated with rivers and streams in valleys and foothills throughout central and eastern Idaho. Sites range in elevation from 1,091 to 1,818 m (3,600 to 6,000 ft). This type may occur as stringer communities on floodplains in U- and V-shaped canyons and as isolated clus-

ters in wet depressions on grassy benches. On more extensive riverine systems, *Salix exigua* (sandbar willow) colonizes islands and alluvial bars prone to periodic flooding.

VEGETATION

Salix exigua (sandbar willow) may form extremely dense stands, essentially excluding other shrub species, or, where utilization is higher, may develop more open, scattered communities with greater shrub diversity. Subordinate shrubs, when present, may consist of *Rosa* spp. (rose), *Cornus stolonifera* (red-osier dogwood) and *Salix lutea* (yellow willow). The herbaceous segment is extremely diverse and generally quite robust, regardless of the growth form of the overstory *Salix exigua* (sandbar willow). Due to the regular disturbance regime of sites occupied by this type, pioneer and weedy species are prevalent. Dominant graminoids are represented by *Agrostis stolonifera* (redtop), *Agropyron repens* (quackgrass) and *Poa pratensis* (Kentucky bluegrass) while the forb element may be comprised of *Aster* spp. (aster), *Glycyrrhiza lepidota* (American licorice), *Cirsium arvense* (Canada thistle), *Rumex* spp. (dock; sorrel), and *Equisetum* spp.(horsetail). Moss may also be present where sufficient moisture is available.

Table 5. Average canopy cover, range of canopy cover, and constancy for species recorded in stands of the *Salix exigua* (sandbar willow) community type that are relatively undisturbed by livestock or wildlife (number = 15 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Trees			
Populus angustifolia (Narrowleaf Cottonwood)	<1	0-1	13
Shrubs			
Cornus stolonifera (Red-osier Dogwood)	2	0-20	20
Crataegus douglasii (Black Hawthorn)	<1	0-1	7
Ribes odoratum (Buffalo Currant)	<1	0-1	7
Ribes setosum (Missouri Gooseberry)	<1	0-3	7
Rosa woodsii (Woods Rose)	6	0-30	53
Salix exigua (Sandbar Willow)	79	40-98	100
Salix lutea (Yellow Willow)	<1	0-1	7
Solanum dulcamara (Climbing Nightshade)	2	0-30	7
Symphoricarpos occidentalis (Western Snowberry)	<1	0-1	7
Graminoids			
Agropyron intermedium (Intermediate Wheatgrass)	<1	0-1	7
Agropyron repens (Quackgrass)	5	0-40	33
Agrostis stolonifera (Redtop)	10	0-40	53
Carex atherodes (Awned Sedge)	2	0-30	7
Carex lanuginosa (Woolly Sedge)	1	0-10	7
Carex rostrata (Beaked Sedge)	1	0-10	13
Carex spp. (Sedge)	<1	0-3	13

Eleocharis palustris (Common Spikesedge)	6	0-60	20
Elymus virginicus (Virginia Wildrye)	<1	0-1	7
Hordeum brachyantherum (Meadow Barley)	<1	0-1	7
Hordeum jubatum (Foxtail Barley)	<1	0-1	13
Juncus balticus (Baltic Rush)	<1	0-3	7
Muhlenbergia asperifolia (Alkali Muhly)	2	0-20	20
Muhlenbergia minutissima (Annual Muhly)	<1	0-1	7
Phalaris arundinacea (Reed Canarygrass)	5	0-30	40
Phalaris spp. (Canarygrass)	1	0-10	7
Phleum pratense (Common Timothy)	<1	0-1	7
Poa pratensis (Kentucky Bluegrass)	5	0-40	33
Sporobolus airoides (Alkali Sacaton)	<1	0-1	7
Forbs			
Amaranthus powellii (Powell's Amaranthus)	<1	0-1	7
Anthemis cotula (Dog Fennel)	<1	0-1	13
Arctium minus (Common Burdock)	<1	0-3	7
Artemisia ludoviciana (Prairie Sagewort)	3	0-20	20
Asclepias speciosa (Showy Milkweed)	<1	0-1	7
Aster campestris (Meadow Aster)	<1	0-1	7
Aster spp. (Aster)	<1	0-3	7
Aster foliaceus (Leafy Aster)	<1	0-1	7
Aster laevis (Smooth Aster)	3	0-40	7
Aster occidentalis (Western Aster)	<1	0-1	7
Cicuta maculata (Spotted Water-hemlock)	<1	0-3	7
Cirsium arvense (Canada Thistle)	2	0-10	47
Conium maculatum (Poison Hemlock)	<1	0-3	7
Cynoglossum officinale (Common Hound's-tongue)	<1	0-3	7
Descurainia richardsonii (Richardson's Tansymustard)	<1	0-1	7
Epilobium ciliatum (Common Willow-herb)	1	0-10	20
Euphorbia esula (Leafy Spurge)	2	0-20	13
Forb (Forb)	9	0-60	53
Geranium viscosissimum (Sticky Geranium)	1	0-10	7
Geum macrophyllum (Larged-leaved Avens)	1	0-10	7
Glycyrrhiza lepidota (American Licorice)	3	0-40	13
Helenium autumnale (Sneezeweed)	<1	0-1	7
Heracleum lanatum (Cow-parsnip)	1	0-20	7
Iva axillaris (Poverty-weed)	3	0-40	20
Lactuca ludoviciana (Western Lettuce)	<1	0-3	7
Lactuca serriola (Prickly Lettuce)	<1	0-1	7
Melilotus alba (White Sweet-clover)	<1	0-1	7
Mentha arvensis (Field Mint)	1	0-10	27

Polygonum amphibium (Water Smartweed)	2	0-30	13
Ranunculus sceleratus (Blister Buttercup)	<1	0-1	7
Rumex crispus (Curly Dock)	2	0-20	33
Senecio serra (Tall Butterweed)	<1	0-1	7
Sium suave (Hemlock Water-parsnip)	<1	0-1	7
Smilacina stellata (Starry Solomon-plume)	2	0-20	13
Solidago canadensis (Canada Goldenrod)	2	0-20	13
Stachys palustris (Swamp Hedge-nettle)	<1	0-1	7
Taraxacum officinale (Common Dandelion)	<1	0-3	7
Thalictrum occidentale (Western Meadowrue)	<1	0-3	7
Urtica dioica (Stinging Nettle)	<1	0-3	13
Veronica americana (American Speedwell)	<1	0-3	13
Ferns and Allies			
Equisetum arvense (Field Horsetail)	<1	0-3	13
Equisetum laevigatum (Smooth Scouring-rush)	5	0-70	13

SUCCESSIONAL INFORMATION

Salix exigua (sandbar willow) is a pioneer species which colonizes barren, alluvial deposits on floodplains, islands and river bars. It prospers under conditions of frequent, and sometimes prolonged, flooding. *Salix exigua* (sandbar willow) may germinate with *Populus trichocarpa* (black cottonwood) or *Populus angustifolia* (narrowleaf cottonwood), and may dominate newly deposited sediments for the first few seasons. However, as cottonwoods overtake the willows to dominate the site, the shade intolerant *Salix exigua* (sandbar willow) will eventually decline. Where cottonwoods are not present, other willow species, particularly in the *Salix geyeriana* (Geyer willow) series, the *Salix lutea* (yellow willow) series, or the *Salix drummondiana* (Drummond willow) series, may become the climax vegetation, for *Salix exigua* (sandbar willow) communities promote bank building and soil development, preparing inhospitable sites for later successional stages. The *Acer negundo/ Prunus virginiana* (box-elder/common chokecherry) habitat type may represent a climax on these sites in some areas as well.

SOILS

Padgett and others (1989) indicate that soils of this type are classified as Entisols, Inceptisols, Mollisols or even Histosols. Soil textures range over a broad spectrum from silty clays to sandy loams. Nutrient rich surface horizons may extend to a depth of 45 cm (18 in) on some sites, while other sites may be characterized solely by mineral deposits such as fine or coarse sands. Underlying layers are comprised of sands, gravels, cobbles or various sized rocks. Fluctuating subsurface water tables foster conditions suitable for oxidation/reduction reactions resulting in mottled and gleyed soil characteristics in the upper horizons. Water tables are generally at or near the surface, but may occur at depths of 60 cm (24 in) or more. Surface soils are expected to be moist throughout most of the year.

ADJACENT COMMUNITIES

Because *Salix exigua* (sandbar willow) is capable of germinating on sites characterized by a broad range of sub-

strates, it is often encountered with a variety of other vegetation communities. *Eleocharis* spp. (spikesedge) and *Phalaris arundinacea* (reed canarygrass) tend to occupy adjacent inundated and/or saturated sites. Neighboring riparian shrub communities, typically mid seral stages, associated with the *Salix exigua* (sandbar willow) community type include *Crataegus douglasii* (Black Hawthorn), *Betula occidentalis* (water birch), *Salix geyeriana* (Geyer willow), *Salix lasiandra* (Pacific willow), *Salix lutea* (yellow willow), *Salix bebbiana* (Bebb willow), and *Salix boothii* (Booth willow) types. Tree-dominated types, represented by *Pseudotsuga menziesii* (Douglas fir), *Populus tremuloides* (quaking aspen), *Acer negundo* (box-elder), *Populus trichocarpa* (Black cottonwood) and *Populus angustifolia* (Narrowleaf Cottonwood), may be present as well. Uplands are often dominated by *Artemisia tridentata* (big sagebrush) steppe or *Juniperus scopulorum* (Rocky Mountain juniper)/grassland communities.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Although the dense formation of *Salix exigua* (sandbar willow) communities suggests that forage production is low to occasionally moderate (Hansen and others 1995), the lush undergrowth accompanying all stands surveyed in Idaho indicate that forage value may be high, both from the willow and herbaceous components.

Overuse by livestock will result in reduced vigor of willows, as illustrated by highlining, clubbing, or dead clumps. With continued overuse, willows show a sharp decline in vigor and may be eventually eliminated from the site. However, release from heavy grazing pressure will allow it to reestablish itself, provided it has not been totally removed from the site (Hansen and others 1995).

Frisina (1991) states that for a grazing program to be successful, it must meet the basic biological requirements of the plants such as photosynthesis, food storage, reproduction, and seedling establishment. In order to meet these requirements, long periods of rest are needed. It is during long growing season rest periods that the essential biological processes of food production and storage, reproduction, and seedling establishment take place. In some instances, additional periods of rest may be required to either improve or maintain a plant community.

Wildlife

Stands of this community type provide excellent thermal and hiding cover for many species of wildlife. *Salix exigua* (sandbar willow) is normally not as heavily browsed as other willow species. Beaver tends to heavily utilize *Salix exigua* (sandbar willow) (Hansen and others 1995).

Fisheries

Although *Salix exigua* (sandbar willow) typically provides only a limited amount of overhanging shade due to the up right growth form, it may function in a variety of capacities to promote stream health and enhance fisheries. Willows form dense root networks that stabilize streambanks against lateral cutting and erosion and provide cover in the form of overhanging banks. Although not a source of large woody debris, *Salix exigua* (sandbar willow) may trap large trees borne downstream, creating deeper pools and additional cover for fish species. *Carex* spp. (sedge) and other associated mat-forming understory species trap sediments, essentially building streambanks

and filtering steam flows.

Fire

The use of fire in this type as an improvement technique has been little studied. However, limited information indicates this type tends to sprout vigorously following fire. Quick, hot fires result in more sprouts than slower fires, which are potentially more damaging to the willows and tend to result in fewer sprouts (Hansen and others 1995).

Soil Management and Rehabilitation Opportunities

Soil compaction is usually not a problem on coarse textured substrates. Fine textured soils are subject to compaction when moist. Unlike most other willows, *Salix exigua* (sandbar willow) can send up individual stems from a complex underground root system, making it an excellent woody species for stabilizing streambanks. Woody species provide the greatest amount of streambank protection. Herbaceous species rarely afford sufficient stream bank protection. Management should emphasize the importance of willows in protecting the streambank (Hansen and others 1995).

Salix exigua (sandbar willow) is a pioneering species commonly located along irrigation ditches, cutbanks, and wet areas adjacent to roads. It has an excellent capability to rapidly colonize and spread on disturbed areas, making it useful in streambank stabilization and revegetation projects at low to mid elevations. Once *Salix exigua* (sandbar willow) has stabilized soils, other shrub and herbaceous species become established. Because of this characteristic, it would be wise for farmers, ranchers, and other land managers to maintain these stands. Once degradation occurs, rapid erosion of the streambank can occur with devastating results (Hansen and others 1995).

Salix exigua (sandbar willow) is highly adapted to most forms of disturbance. It is a prolific sprouter and will reestablish itself following release from heavy grazing pressure; provided it has not been totally removed from the site (Hansen and others 1995).

Revegetating degraded sites or exposed sand/gravel bars is feasible using *Salix exigua* (sandbar willow). Cuttings should be rooted and grown in a nursery to insure survival. *Salix exigua* (sandbar willow) produces an abundance of roots along the entire stem. Cuttings are best taken in the spring from dormant two to four year old wood. Cuttings 30-50 cm (12-20 in) long and >1 cm (0.5 in) in diameter produce the best results. Roots and shoots from cuttings can be expected to appear 10 days after planting (Hansen and others 1995).

Recreational Uses and Considerations

Salix exigua (sandbar willow) often forms dense, impenetrable stands, prohibiting access to streambanks in some locations for fishermen. This type offers little shade for campers as it is only a medium sized shrub, and may be subject to intense mosquito infestation.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = saturated to temporarily flooded.

OTHER STUDIES

Similar *Salix exigua* (sandbar willow) community types have been described by Norton and others (1981; Greys River, Wyoming), Mutz and Queiroz (1983; southeastern Idaho), Tuhy and Jensen (1982; central Idaho), Youngblood and others (1985b; eastern Idaho and western Wyoming), Padgett and others (1989; Utah and southeastern Idaho), Chadde and others (1988; northern Yellowstone National Park), and Szaro (1989; Arizona and New Mexico). Undergrowth composition varied widely but was often composed of introduced grasses such as *Agrostis stolonifera* (redtop), *Poa palustris* (fowl bluegrass), and *Poa pratensis* (Kentucky bluegrass).

Salix geyeriana/Calamagrostis canadensis Habitat Type
(Geyer Willow/Bluejoint Reedgrass Habitat Type)

SALGEY/CALCAN (SAGE2/CACA4)
Number Of Stands Sampled in Montana= 32

NOTE: The *Salix geyeriana* (Geyer willow) habitat type includes all combinations of *Salix geyeriana* (Geyer willow) and *Salix boothii* (Booth willow) due to similarities in environmental conditions and management concerns.

NOTE: The *Salix geyeriana/Calamagrostis canadensis* (Geyer willow/bluejoint reedgrass) habitat type has been documented in Idaho according to field surveys conducted in 1994. However, due to time constraints during the 1995 field season, homogeneous stand data could not be collected for this type. In the subsequent discussion, any references to physical site location or vegetation characteristics for this type in Idaho were interpreted from 1994 field surveys. The remainder of this description was taken from the Classification and Management of Montana's Riparian and Wetland Sites (Hansen and others 1995).

LOCATION AND ASSOCIATED LANDFORMS

The *Salix geyeriana/Calamagrostis canadensis* (Geyer willow/bluejoint reedgrass) habitat type is a minor type throughout mountains and valleys of Idaho, ranging in elevation from from 1,576 to 2,182 m (5,200 to 7,200 ft). This type prospers on broad, level floodplains of riverine systems, or may be found in narrow bands on alluvial terraces along streams in U-shaped canyons. Salix geyeriana (Geyer willow) may colonize grassy sites associated with seeps and springs, or dominate the periphery of beaver ponds, but wetter sites tend to be dominated by the *Salix geyeriana/Carex rostrata* (Geyer willow/beaked sedge) habitat type. Types in the *Salix geyeriana - Salix boothii* (Geyer willow - Booth willow) series occupy intermediate elevations on the landscape, between higher elevational types in the *Salix drummondiana* (Drummond willow) series and lower elevational types of the *Salix lutea*

(yellow willow) series.

VEGETATION

In Idaho, the shrub overstory is generally dominated by *Salix geyeriana* (Geyer willow) and *Salix boothii* (Booth willow); however, in some cases, only one of these species may be present. As noted earlier, these two willows occupy similar positions on the landscape with similar environmental conditions and are combined into one series for the purposes of this classification. Understory species variations are often subject to the types and levels of disturbance, but are customarily dominated by *Calamagrostis canadensis* (bluejoint reedgrass). *Juncus balticus* (Baltic rush) and *Poa pratensis* (Kentucky bluegrass) may be present on sites with some disturbance.

In Montana, the overstory is dominated by *Salix geyeriana* (Geyer willow) and *Salix boothii* (Booth willow). *Calamagrostis canadensis* (bluejoint reedgrass) and/or *Calamagrostis stricta* (narrow-spiked reedgrass) are the dominant undergrowth species. A variety of forbs are present, including *Geum macrophyllum* (large leaved avens), *Pyrola asarifolia* (pink wintergreen), *Galium trifidum* (small bedstraw), and *Epilobium ciliatum* (common willow-herb) (Table 6). Table 6 reflects vegetation surveyed on sites exclusively in Montana, and may not accurately portray species composition and canopy cover for sites identified in Idaho.

Table 6. Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax stands of the *Salix geyeriana/Calamagrostis canadensis* (Geyer willow/bluejoint reedgrass) habitat type (number = 32 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Shrubs			
Lonicera utahensis (Utah honeysuckle)	20	0-20	33
Potentilla fruticosa (shrubby cinquefoil)	10	0-10	33
Ribes spp. (currant)	5	0-10	67
Salix boothii (Booth willow)	2	0-3	67
Salix drummondiana (Drummond willow)	3	0-3	33
Salix geyeriana (Geyer willow)	70	60-80	100
Salix wolfii (Wolf's willow)	3	0-3	33
Graminoids			
Agrostis scabra (tickle-grass)	1	0-1	33
Agrostis stolonifera (redtop)	3	0-3	33
Calamagrostis canadensis (bluejoint reedgrass)	40	0-60	67
Calamagrostis stricta (narrow-spiked reedgrass)	20	0-20	33
Carex rostrata (beaked sedge)	3	0-3	33
Carex vesicaria (inflated sedge)	1	0-1	33
Deschampsia cespitosa (tufted hairgrass)	3	0-20	28
Forbs			

Arnica chamissonis (meadow arnica)	3	0-3	33
Aster foliaceus (leafy aster)	1	0-1	33
Aster occidentalis (western aster)	1	0-1	33
Cirsium arvense (Canada thistle)	10	0-10	33
Epilobium angustifolium (fireweed)	3	0-3	33
Epilobium ciliatum (common willow-herb)	2	0-3	67
Galium trifidum (small bedstraw)	2	0-3	67
Geum macrophyllum ((large-leaved avens)	1	1-3	100
Ligusticum tenuifolium (slender-leafed licorice-root)	1	0-1	33
Pyrola asarifolia (pink wintergreen)	2	0-3	67
Ranunculus repens (creeping buttercup)	1	0-1	33
Senecio integerrimus (western groundsel)	1	0-1	33
Smilacina stellata (starry Solomon-plume)	1	0-1	33
Viola spp. (violet)	10	0-10	33

SUCCESSIONAL INFORMATION

Grazing pressure by livestock will cause a decrease in the more desirable grasses such as *Calamagrostis canadensis* (bluejoint reedgrass) and *Deschampsia cespitosa* (tufted hairgrass) with a corresponding increase in either introduced or less desirable species such as *Poa palustris* (fowl bluegrass), *Poa pratensis* (Kentucky bluegrass), *Agrostis stolonifera* (redtop), or *Juncus balticus* (Baltic rush). If grazing pressures are severe enough, the site takes on the appearance of the grazing disclimax *Salix geyeriana* (Geyer willow) community type.

Personal observations tend to indicate that *Salix geyeriana* (Geyer willow) is less tolerant of browsing pressures when compared to *Salix boothii* (Booth willow). This may account for the reduced abundance and canopy cover of *Salix geyeriana* (Geyer willow) in select stands of the *Salix geyeriana/Calamagrostis canadensis* (Geyer willow/bluejoint reedgrass) habitat type.

SOILS

Youngblood and others (1985) indicate that *Salix boothii* (Booth willow) and *Salix geyeriana* (Geyer willow) dominated communities in Idaho may occur over a range of soil types generally classified as Mollisols and Histosols, or, where less soil development has occurred, Inceptisols and Entisols. Deeper alluvial mineral deposits are comprised of coarse and fine sands and gravels. Where organic surface horizons are present, they may contain a moderate fibrous root/plant material component. Soil textures are categorized as fines, generally silts and clays. Water tables are probably found near the surface for most of the growing season, within a depth of 1 m (39 in). Although mottled and gleyed soil characteristics were not observed, they may be present where water tables occur just below the surface.

ADJACENT COMMUNITIES

Adjacent sites that are slightly wetter may support the *Salix geyeriana/Carex rostrata* (Geyer willow/beaked sedge) habitat type. In other situations, wetter sites may support the *Carex rostrata* (beaked sedge) habitat type or open

water. Drier sites may support a variety of types including the *Poa pratensis* (Kentucky bluegrass) and *Juncus balticus* (Baltic rush) community types, the *Potentilla fruticosa/Deschampsia cespitosa* (shrubby cinquefoil/tufted hairgrass) habitat type or upland types.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Forage production is high, and where extensive, this type may be an important source of summer forage. Palatability of *Calamagrostis canadensis* (bluejoint reedgrass) and *Deschampsia cespitosa* (tufted hairgrass) varies from moderate to high, depending upon season and availability of other species (USDA Forest Service 1937). Foliage is most palatable when young, but wet conditions early in the grazing season limits use by livestock, especially sheep. Due to the high forage production and highly palatable grasses, many of these sites have heavy summer and fall use, especially after uplands have been grazed. Sustained grazing decreases the vigor, reproductive success, and competitive ability of *Calamagrostis canadensis* (bluejoint reedgrass) and *Deschampsia cespitosa* (tufted hairgrass) (Volland 1985). Under season long grazing, they may be replaced by *Poa pratensis* (Kentucky bluegrass). To maintain vigor and prevent damage to soils and vegetation, grazing should be deferred until soils dry. Proper levels of grazing should range from light to moderate.

Overuse by livestock will result in reduced vigor of willows, as illustrated by highlining, clubbing, or dead clumps. With continued overuse, willows show a sharp decline in vigor and may be eventually eliminated from the site.

Personal observations tends to indicate that *Salix geyeriana* (Geyer willow) is less tolerant of browsing pressures when compared to *Salix boothii* (Booth willow). This may account for the reduced abundance and canopy cover of *Salix geyeriana* (Geyer willow) in select stands of the *Salix geyeriana* (Geyer willow) dominated types.

To minimize undesired changes in community composition and structure, pasture or allotment management should be based on the forage available from stands of this and other riparian or wetland communities. This concept of the riparian or wetland pasture has had some success in maintaining or improving the health of riparian or wetland vegetation (Kinch 1987).

Frisina (1991) states that for a grazing program to be successful, it must meet the basic biological requirements of the plants such as photosynthesis, food storage, reproduction, and seedling establishment. In order to meet these requirements, long periods of rest are needed. It is during long growing season rest periods that the essential biological processes of food production and storage, reproduction, and seedling establishment take place. In some instances, additional periods of rest may be required to either improve or maintain a plant community.

Wildlife

Abundant food, cover, and proximity to water provide habitat for numerous wildlife species such as mammals and songbirds. Summer and winter use by elk may be moderate (Gaffney 1941). The linear nature of many of

these communities along waterways serve as important corridors for wildlife movement. Moose and beaver tend to heavily utilize most species of willows.

Both *Salix geyeriana* (Geyer willow) and *Salix boothii* (Booth willow) are used as browse by wildlife and livestock. However, *Salix geyeriana* (Geyer willow) seems to be less tolerant of repeated browsing than *Salix boothii* (Booth willow). This may account for the reduced canopy cover and occurrence of *Salix geyeriana* (Geyer willow) in select stands of the *Salix geyeriana* (Geyer willow) dominated types.

Beaver perform a vital role in the health and maintenance of riparian ecosystems. Beaver dams assist in controlling the downcutting of channels, bank erosion, and the movement of sediment downstream (Gordon and others 1992). When beaver construct a dam, they raise the water table in the area, which provides water for hydrophytic plants such as willows and sedges. The beaver dam also slows down the water in the channel, which allows suspended sediment to be deposited behind the dam. The combination of sediment deposition and plant reproduction raises the channel bed, creating a wetland environment which is excellent waterfowl and fish habitat. It has often been the policy of land managers to trap and kill beaver because they can be a nuisance. However, because beaver produce such desirable habitat and provide many beneficial stream functions, their removal from a riparian system needs to be closely evaluated.

Fisheries

Where adjacent to streams, this type effectively stabilizes soils and forms overhanging banks, enhancing fisheries quality. The importance of willows in streambank protection, cover, and thermal protection for fisheries cannot be emphasized enough. The herbaceous understory aids in filtering out sediments during high flows thereby contributing to the overall building of the streambanks. Some stands may be so dense as to hinder most forms of recreational fishing. If fishing access is important, dense stands may be opened by the use of livestock as a management tool.

Fire

Prescribed burning in this type is an effective method of rejuvenating decadent clumps. The various willow species present in this type sprout vigorously following fire, especially in wetter stands (Kovalchik 1986 and 1987). Quick, hot fires result in more sprouts than slower fires, which are potentially more damaging to the willows and tends to result in fewer sprouts.

Calamagrostis canadensis (bluejoint reedgrass) propagates itself by both seeds and rhizomes, making this species an aggressive invader of moist, burned sites (Crane and Fischer 1986). These features also make it a valuable species for stabilizing or rehabilitating mountain streams.

Deschampsia cespitosa (tufted hairgrass) is resistant to damage from fire (DeBenedetti and Parsons 1984). Root crowns are rarely damaged, even by hot, intense fires. However, repeated burning favors rhizomatous species such as *Poa pratensis* (Kentucky bluegrass).
After burning, the site should be eliminated from livestock grazing for at least 2 to 3 years to avoid attracting livestock to young, palatable regrowth.

Soil Management and Rehabilitation Opportunities

Wet, fine textured soils are highly susceptible to trampling damage by cattle. Grazing should be deferred until soils are drier to protect streambanks and minimize damage (Marlow 1984). Woody species provide the greatest amount of streambank protection. Herbaceous species rarely afford sufficient stream bank protection. Management should emphasize the importance of willows in protecting the streambank.

Salix geyeriana (Geyer willow) is valuable in revegetating disturbed streambanks. Cuttings should be first rooted then grown in a nursery to insure survival. Cuttings, however, may be more difficult to root than *Salix boothii* (Booth willow). Cut stems of *Salix geyeriana* (Geyer willow) produce low to moderate numbers of roots, located along the entire length of the stem. Best results are obtained from cuttings taken in the spring from dormant two to four year old wood. Cuttings 30-50 cm (12-20 in) long and >1 cm (0.5 in) in diameter produce the best results. Roots and shoots from cuttings can be expected to appear 10-15 days after planting.

Recreational Uses and Considerations

Fishing opportunities are good in streams associated with this type. Moist soils and streambanks are subject to trampling damage. Some stands may be so dense as to hinder most forms of recreational fishing. If fishing access is important, dense stands may be opened by the use of livestock as a management tool.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = saturated to temporarily flooded.

OTHER STUDIES

Based upon an increased understanding, the *Salix geyeriana/Deschampsia cespitosa* (Geyer willow/tufted hairgrass) habitat type described in earlier regional draft documents has been combined with the *Salix geyeriana/Calamagrostis canadensis* (Geyer willow/bluejoint reedgrass) habitat type (Hansen and others 1995). Similar communities have been described for Idaho and western Wyoming (Tuhy and Jensen 1982), eastern Idaho and western Wyoming (Youngblood and others 1985b), and for Utah and southeastern Idaho (Padgett and others 1989).

Salix geyeriana/Carex rostrata Habitat Type
(Geyer Willow/Beaked Sedge Habitat Type)

SALGEY/CARROS (SAGE2/CARO6)

Number Of Stands Sampled = 2

Note: The *Salix geyeriana* (Geyer willow) habitat type includes all combinations of *Salix geyeriana* (Geyer willow) and *Salix boothii* (Booth willow) due to similarities in environmental conditions and management concerns.

LOCATION AND ASSOCIATED LANDFORMS

The *Salix geyeriana/Carex rostrata* (Geyer willow/beaked sedge) habitat type is a major type throughout mountains and valleys of Idaho, ranging in elevation from from 1,576 to 2,182 m (5,200 to 7,200 ft). This type prospers on broad, level floodplains of riverine systems, or may be found in narrow bands along smaller streams in open, U-shaped canyons. Salix geyeriana (Geyer willow) may colonize grassy sites associated with seeps and springs, or dominate the periphery of beaver ponds. Types in the *Salix geyeriana - Salix boothii* (Geyer willow - Booth willow) series occupy intermediate elevations on the landscape, between higher elevational types in the *Salix drummondiana* (Drummond willow) series and lower elevational types of the *Salix lutea* (yellow willow) series.

VEGETATION

In Idaho, the shrub overstory is generally dominated by *Salix geyeriana* (Geyer willow) and *Salix boothii* (Booth willow); however, in some cases, only one of these species may be present. As indicated earlier, these two willows occupy similar positions on the landscape with similar environmental conditions and are combined into one series for the purposes of this classification. Other shrub species which assume only a subordinate role in this type include *Betula occidentalis* (water birch), *Alnus incana* (mountain alder), *Salix exigua* (sandbar willow), and *Salix drummondiana* (Drummond willow). The understory is dominated by *Carex rostrata* (beaked sedge) and/or *Carex aquatilis* (water sedge), although in similar fashion to the diagnostic willows, only one of these species may be present on site. A variety of herbaceous species may be found in this community type, including *Aster eatonii* (Eaton's aster), *Mentha arvensis* (field mint), and *Equisetum arvense* (field horsetail). Understory species variations are often subject to the types and levels of disturbance. Pristine stands of this type may display a dense and nearly impenetrable shrub element.

Table 7. Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax stands of the *Salix geyeriana/Carex rostrata* (Geyer willow/beaked sedge) habitat type (number = 2 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Shrubs			
Ribes lacustre (Swamp Currant)	2	0-3	50
Salix boothii (Booth Willow)	40	10-70	100
Salix drummondiana (Drummond Willow)	15	0-30	50
Salix exigua (Sandbar Willow)	5	0-10	50
Salix geyeriana (Geyer Willow)	35	0-70	50
Graminoids			

Agrostis stolonifera (Redtop)	15	0-30	50
Carex aquatilis (Water Sedge)	15	0-30	50
Carex rostrata (Beaked Sedge)	17	3-30	100
Poa palustris (Fowl Bluegrass)	<1	0-1	50
Forbs			
Aster eatonii (Eaton's Aster)	5	0-10	50
Cirsium arvense (Canada Thistle)	<1	0-1	50
Epilobium watsonii (Watson's Willow-herb)	2	0-3	50
Erigeron spp. (Daisy; Fleabane)	2	0-3	50
Geum macrophyllum (Larged-leaved Avens)	2	0-3	50
Mentha arvensis (Field Mint)	2	1-3	100
Pyrola asarifolia (Pink Wintergreen)	2	0-3	50
Smilacina stellata (Starry Solomon-plume)	2	0-3	50
Thalictrum occidentale (Western Meadowrue)	2	0-3	50
Ferns and Allies			
Equisetum arvense (Field Horsetail)	5	0-10	50

SUCCESSIONAL INFORMATION

The *Salix geyeriana/Carex rostrata* (Geyer willow/beaked sedge) habitat type is the wettest type of the *Salix geyeriana* (Geyer willow) series. Prolonged, intense utilization by livestock and wild ungulates may shift the site potential to the drier grazing disclimax, the *Salix geyeriana* (Geyer willow) community type. This type is characterized by more open stands and a preponderance of *Agrostis stolonifera* (redtop), *Poa pratensis* (Kentucky bluegrass), and other disturbance induced species. Beaver may exert a significant influence on sites as well, especially concerning physical parameters. Active dams raise water tables as impoundments develop, increasing the potential for the *Salix geyeriana/Carex rostrata* (Geyer willow/beaked sedge) habitat type. However, sustained removal of willows by beaver for forage and dam materials reduce the site to a *Carex* spp. (sedge) community. When beaver abandon a site, dams eventually deteriorate. Water tables drop as ponds disappear and sites dry out, shifting the site potential to favor the *Salix geyeriana/Calamagrostis canadensis* (Geyer willow/bluejoint reedgrass) habitat type

Hansen and others (1995) observed trends that indicate that *Salix geyeriana* (Geyer willow) is less tolerant of browsing pressures when compared to *Salix boothii* (Booth willow). This may account for the reduced abundance and canopy cover of *Salix geyeriana* (Geyer willow) in select stands of the *Salix geyeriana/Carex rostrata* (Geyer willow/beaked sedge) habitat type.

SOILS

Youngblood and others (1985) indicate that *Salix boothii* (Booth willow) and *Salix geyeriana* (Geyer willow) dominated communities may occur over a range of soil types generally classified as Mollisols and Histosols, or, where less soil development has occurred, Inceptisols and Entisols. Deeper alluvial mineral deposits are comprised of coarse and fine sands and gravels. Organic surface horizons, often extending to a depth of 45 cm (18 in) or more, are riddled with fibrous root and plant material. Soil textures are categorized as fines, generally silts and clays. Water tables are found at or just below the surface and usually not below 60 cm (2 ft). Although mottled and

gleyed soil characteristics were not observed, they are thought to be present due to presence of water throughout the soil solum for much of the growing season.

ADJACENT COMMUNITIES

Carex rostrata (beaked sedge), *Eleocharis* spp. (spikesedge), and *Phalaris arundinacea* (reed canarygrass) occupy adjacent sites where surface water is readily available. The *Salix geyeriana/Calamagrostis canadensis* (Geyer willow/bluejoint reedgrass) habitat type or the *Salix geyeriana* (Geyer willow) community type may occupy adjacent drier sites, depending on the level of disturbance. Due to differences in moisture, substrate composition, flooding frequency and a variety of other physical site factors, riparian corridors are often characterized by a diversity of species forming a mosaic of distinct, localized communities. The *Salix geyeriana/Carex rostrata* (Geyer willow/beaked sedge) habitat type may be associated with a variety of other *Salix spp.* (willow) communities, or *Prunus virginiana* (common chokecherry), *Cornus stolonifera* (red-osier dogwood), *Betula occidentalis* (water birch), and *Populus tremuloides* (quaking aspen) types. Uplands are dominated by conifers such as *Pseudotsuga menziesii* (Douglas fir), *Pinus contorta* (lodgepole pine), and *Abies lasiocarpa* (subalpine fir) or by *Artemisia tridentata* (big sagebrush) steppe and grasslands.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Forage value of *Carex rostrata* (beaked sedge) and *Carex aquatilis* (water sedge) is variable, depending upon season, previous grazing use, and the extent of the site. On narrow riparian or wetland sites within extensive rangelands, sedge species are heavily utilized, particularly when upland species are cured, or stock distribution is poor. Overuse by livestock will result in a reduced vigor by the willows present, as illustrated by highlining, clubbing, or dead clumps. With continued overuse, willows show a sharp decline in vigor and may be eventually eliminated from the site (Hansen and others 1995).

Myers (1989) found that deferred and rest rotation grazing systems generally favor sedge species over willow species since woody species are vulnerable to longer duration treatments and to late summer/fall treatments. Woody species are vulnerable to pruning damage, while sedges are protected by a root reserve. Late summer and fall grazing should be carefully controlled with duration of treatments limited to less than 30 days and frequency of this treatment to about one year in three or four (Myers 1989).

Marlow (Pers. Comm. 1995) also feels that fall (October) grazing will have a negative impact on willows due to limited regrowth at the end of the growing season. However, he feels that rest and deferred rotation can have a positive effect on willows when cattle are properly managed. High use by wildlife in the fall can limit the amount of regrowth.

To minimize undesired changes in community composition and structure, pasture or allotment management should be based on the forage available from stands of this and other riparian or wetland communities. This concept of the riparian or wetland pasture has had some success in maintaining or improving the health of riparian

or wetland vegetation (Kinch 1987).

Frisina (1991) states that for a grazing program to be successful, it must meet the basic biological requirements of the plants such as photosynthesis, food storage, reproduction, and seedling establishment. In order to meet these requirements, long periods of rest are needed. It is during long growing season rest periods that the essential biological processes of food production and storage, reproduction, and seedling establishment take place. In some instances, additional periods of rest may be required to either improve or maintain a plant community.

Wildlife

A diversity of wildlife species, ranging from large mammals to rodents and songbirds, use this type for food, cover, and nesting (Dittberner and Olson 1983). Moose and beaver have been observed to use *Salix spp.* (willow) extensively in places.

Both *Salix geyeriana* (Geyer willow) and *Salix boothii* (Booth willow) are used as browse by wildlife and livestock. However, *Salix geyeriana* (Geyer willow) seems to be less tolerant of repeated browsing than *Salix boothii* (Booth willow). This may account for the reduced canopy cover and occurrence of *Salix geyeriana* (Geyer willow) in select stands of the *Salix geyeriana* (Geyer willow) dominated types (Hansen and others 1995).

Beaver perform a vital role in the health and maintenance of riparian ecosystems. Beaver dams assist in controlling the downcutting of channels, bank erosion, and the movement of sediment downstream (Gordon and others 1992). When beaver construct a dam, they raise the water table in the area, which provides water for hydrophytic plants such as willows and sedges. The beaver dam also slows down the water in the channel, which allows suspended sediment to be deposited behind the dam. The combination of sediment deposition and plant reproduction raises the channel bed, creating a wetland environment which is excellent waterfowl and fish habitat. It has often been the policy of land managers to trap and kill beaver because they can be a nuisance. However, because beaver produce such desirable habitat and provide many beneficial stream functions, their removal from a riparian system needs to be closely evaluated (Hansen and others 1995).

Fisheries

Salix spp. (willow) communities function in a variety of capacities to promote stream health and enhance fisheries. Willows form dense root networks that stabilize streambanks against lateral cutting and erosion, provide cover in the form of overhanging branches and banks, and shade channels, effectively moderating extreme temperature fluctuations. *Carex* spp. (sedge) and other associated mat-forming understory species trap sediments, essentially building streambanks and filtering steam flows, and strengthening overhanging banks. As a source of food and building material *Salix* spp. (willow) attract beaver. Beaver ponds may provide excellent fishing opportunities if free of dense aquatic vegetation and numerous snags.

Fire

Prescribed burning in the *Salix geyeriana/Carex rostrata* (Geyer willow/beaked sedge) habitat type is an effective method of rejuvenating decadent clumps. The various willow species present in this type sprout vigorously following fire, especially in wetter stands. Quick, hot fires result in more sprouts than slower fires, which are poten-

tially more damaging to the willows and tend to result in fewer sprouts (Hansen and others 1995).

Burning of this type can temporarily increase productivity of *Carex rostrata* (beaked sedge), *Carex aquatilis* (water sedge), and *Carex vesicaria* (inflated sedge). However, nonuse by livestock during the year prior to burning is essential. Residual cover burns well in the spring, prior to the growing season. After burning, the site should be eliminated from livestock grazing for at least 2 to 3 years to avoid attracting livestock to young, palatable regrowth. Care should be taken when burning stands along streambanks because of the excellent erosion protection provided by the *Salix geyeriana/Carex rostrata* (Geyer willow/beaked sedge) habitat type (Hansen and others 1995).

Soil Management and Rehabilitation Opportunities

The wet nature of these soils makes them highly susceptible to damage by livestock and heavy machinery. These disturbances often lead to soil compaction, streambank sloughing, damage to vegetation, and premature drying of the soil surface. Woody species provide the greatest amount of streambank protection. Herbaceous species rarely afford sufficient stream bank protection. Management should emphasize the importance of willows in protecting the streambank (Hansen and others 1995).

Salix geyeriana (Geyer willow) is valuable in revegetating disturbed streambanks. Cuttings should be first rooted, then grown in a nursery to insure survival. *Salix geyeriana* (Geyer willow) cuttings, however, may be more difficult to root than *Salix boothii* (Booth willow) cuttings. Cut stems of *Salix geyeriana* (Geyer willow) produce low to moderate numbers of roots, located along the entire length of the stem. Best results are obtained from cuttings taken in the spring from dormant two to four year old wood. Cuttings 30-50 cm (12-20 in) long and >1 cm (0.5 in) in diameter produce the best results. Roots and shoots from cuttings can be expected to appear 10-15 days after planting (Hansen and others 1995).

Carex rostrata (beaked sedge), and *Carex aquatilis* (water sedge), and *Carex vesicaria* (inflated sedge) all form a dense, thick sod that is highly resistant to erosion. Along the stream, the sod may be undercut and sag into the water, providing additional protection to streambanks. However, if grazing or trailing impacts are severe, the heavy weight of the sod makes it susceptible to damage, and streambank sloughing can occur (Hansen and others 1995).

Recreational Uses and Considerations

This habitat type is commonly adjacent to fisheries and streamside trails may develop. Some stands may be so dense as to hinder most forms of recreational fishing. If fishing access is important, dense stands may be opened by the use of livestock as a management tool (Hansen and others 1995). Elevated mosquito populations may discourage campers from using these sites.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = seasonally flooded to saturated.

OTHER STUDIES

Similar communities, codominated by *Salix geyeriana* (Geyer willow) and *Salix boothii* (Booth willow), have been described by a number of researchers: Norton and others (1981; Greys River, Wyoming), Mutz and Queiroz (1983; southeastern Idaho), Youngblood and others (1985b; eastern Idaho and western Wyoming), Chadde and others (1988; Yellowstone National Park), Padgett and others (1989; Utah), and Hansen and others (1995; Montana).

Salix geyeriana Community Type
(Geyer Willow Community Type)

SALGEY (SAGE2)
Number Of Stands Sampled = 2

NOTE: The *Salix geyeriana* (Geyer willow) community type includes all combinations of *Salix geyeriana* (Geyer willow) and *Salix boothii* (Booth willow) due to similarities in environmental conditions and management concerns.

LOCATION AND ASSOCIATED LANDFORMS

The *Salix geyeriana* (Geyer willow) community type is a major type throughout mountains and valleys of Idaho, ranging in elevation from from 1,576 to 2,182 m (5,200 to 7,200 ft). This type prospers on broad, level floodplains of riverine systems and in narrow bands along smaller streams in open, U-shaped canyons. Salix geyeriana (Geyer willow) may colonize grassy alpine sites associated with seeps and springs, or dominate the periphery of beaver ponds. Types in the *Salix geyeriana - Salix boothii* (Geyer willow - Booth willow) series occupy intermediate elevations on the landscape, between higher elevational types in the *Salix drummondiana* (Drummond willow) series and lower elevational types of the *Salix lutea* (yellow willow) series.

VEGETATION

In Idaho, the *Salix geyeriana* (Geyer willow) community type may contain a variety of shrub species, particularly *Rosa woodsii* (woods rose) and *Ribes* spp. (currant), in addition to the dominant *Salix boothii* (Booth willow) and *Salix geyeriana* (Geyer willow). Due to wildlife and livestock utilization, this grazing/browsing disclimax tends to develop more open stands. Numerous, diverse graminoids and forbs, such as *Poa pratensis* (Kentucky bluegrass), *Bromus vulgaris* (Columbia brome), *Achillea millefolium* (common yarrow), and *Angelica arguta* (sharptooth angelica), may be present (See Table 8). The levels and types of disturbances may account for the species composition and variability.

Table 8. Average canopy cover, range of canopy cover, and constancy for those species recorded in sampled

stands of the grazing disclimax *Salix geyeriana* (Geyer willow) community type (number = 2 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Shrubs			
Lonicera involucrata (Twin-berry)	2	0-3	50
Ribes inerme (Whitestem Gooseberry)	2	0-3	50
Ribes lacustre (Swamp Currant)	10	0-20	50
Ribes odoratum (Buffalo Currant)	2	0-3	50
Rosa woodsii (Woods Rose)	5	0-10	50
Salix boothii (Booth Willow)	17	3-30	100
Salix geyeriana (Geyer Willow)	70	60-80	100
Graminoids			
Agrostis stolonifera (Redtop)	2	0-3	50
Bromus vulgaris (Columbia Brome)	15	0-30	50
Carex aquatilis (Water Sedge)	<1	0-1	50
Carex crawfordii (Crawford's Sedge)	<1	0-1	50
Carex praticola (Meadow Sedge)	<1	0-1	50
Carex rostrata (Beaked Sedge)	2	0-3	50
Grass perennial (Perennial Grass)	10	0-20	50
Poa pratensis (Kentucky Bluegrass)	15	0-30	50
Forbs			
Achillea millefolium (Common Yarrow)	10	0-20	50
Allium geyeri (Geyer's Onion)	10	0-20	50
Angelica arguta (Sharptooth Angelica)	10	0-20	50
Aster spp. (Aster)	<1	0-1	50
Aster laevis (Smooth Aster)	5	0-10	50
Castilleja miniata (Scarlet Paintbrush)	<1	0-1	50
Cirsium arvense (Canada Thistle)	5	0-10	50
Cynoglossum officinale (Common Hound's-tongue)	<1	0-1	50
Fragaria virginiana (Virginia Strawberry)	10	0-20	50
Geranium viscosissimum (Sticky Geranium)	5	0-10	50
Geum macrophyllum (Larged-leaved Avens)	3	3-3	100
Mentha arvensis (Field Mint)	<1	0-1	50
Myosotis sylvatica (Wood Forget-me-not)	<1	0-1	50
Osmorhiza occidentalis (Western Sweet-cicely)	<1	0-1	50
Perideridia bolanderi (Bolander's Yampah)	<1	0-1	50
Polygonum bistortoides (American Bistort)	<1	0-1	50
Potentilla diversifolia (Diverse-leaved Cinquefoil)	5	0-10	50
Ranunculus spp. (Buttercup)	5	0-10	50

Senecio serra (Tall Butterweed)	2	0-3	50
Smilacina stellata (Starry Solomon-plume)	2	0-3	50
Taraxacum officinale (Common Dandelion)	<1	0-1	50
Thalictrum occidentale (Western Meadowrue)	12	3-20	100
Trifolium longipes (Long-stalked Clover)	5	0-10	50
Ferns and Allies			
Equisetum hyemale (Common Scouring-rush)	2	0-3	50

SUCCESSIONAL INFORMATION

The *Salix geyeriana* (Geyer willow) community type is the driest type of the *Salix geyeriana* (Geyer willow) series. Prolonged, intense utilization by livestock and wild ungulates have probably shifted the site potential from the wetter *Salix geyeriana/Carex rostrata* (Geyer willow/beaked sedge) habitat type, or the slightly drier *Salix geyeriana/Calamagrostis canadensis* (Geyer willow/bluejoint reedgrass) habitat type. Continued grazing pressure may eliminate the willow component entirely, resulting in *Carex* spp. (sedge) dominated communities on saturated sites and *Agrostis stolonifera* (redtop), *Poa pratensis* (Kentucky bluegrass) and other disturbance -induced species dominating communities on drier sites.

Hansen and others (1995) indicate that personal observations tend to indicate that *Salix geyeriana* (Geyer willow) is less tolerant of browsing pressures when compared to *Salix boothii* (Booth willow). This may account for the reduced abundance and canopy cover of *Salix geyeriana* (Geyer willow) in select stands of the *Salix geyeriana* (Geyer willow) community type.

SOILS

Youngblood and others (1985) indicate that *Salix boothii* (Booth willow) and *Salix geyeriana* (Geyer willow) dominated communities may occur over a range of soil types generally classified as Mollisols and Histosols, or, where less soil development has occurred, Inceptisols and Entisols. Deeper alluvial mineral deposits are comprised of coarse and fine sands and gravels. Organic surface horizons, often extending to a depth of 45 cm (18 in) or more, may be riddled with fibrous root and plant material. Soil textures are categorized as fines, generally silts and clays. Water tables may be at or just below the surface, or may be as deep as 1 m (39 in). Although mottled and gleyed soil characteristics were not observed, they are thought to be present where water tables are near the surface.

ADJACENT COMMUNITIES

Carex rostrata (beaked sedge), *Eleocharis* spp. (spikesedge), and *Phalaris arundinacea* (reed canarygrass) occupy adjacent sites where surface water is readily available. The *Salix geyeriana/Calamagrostis canadensis* (Geyer willow/bluejoint reedgrass) habitat type or the *Salix geyeriana/Carex rostrata* (Geyer willow/beaked sedge) habitat type may occupy adjacent less disturbed sites. Due to differences in moisture, substrate composition, flooding frequency and a variety of other physical site factors, riparian corridors are often characterized by a diversity of species forming a mosaic of distinct, localized communities. The *Salix geyeriana* (Geyer willow) community type may be associated with a variety of other *Salix* spp. (willow) communities, or *Prunus virginiana* (common chokecherry),

Cornus stolonifera (red-osier dogwood), *Betula occidentalis* (water birch), or *Populus tremuloides* (quaking aspen) types. Uplands are dominated by conifers such as *Pseudotsuga menziesii* (Douglas fir), *Pinus contorta* (lodgepole pine), and *Abies lasiocarpa* (subalpine fir) or by *Artemisia tridentata* (big sagebrush) steppe and grasslands.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Stands of this type are often open, allowing for easy livestock access. Forage productivity is also high, resulting in potentially heavy utilization, especially as upland vegetation dries. *Poa pratensis* (Kentucky bluegrass) is a palatable and moderately productive grass, especially when soil moisture levels are high, and tolerates a high degree of defoliation. Herbage production is moderate. *Poa pratensis* (Kentucky bluegrass) is well adapted to grazing and is considered an increaser or an invader, especially if grazing intensities and durations are severe (Wasser 1982). This species can produce new shoots from both existing tillers or rhizomes. Grazing practices influence the type of growth form present (Volland 1978). A high density of weak, low vigor tillers results under season long grazing. Stem densities are emphasized over aboveground biomass. Grazing practices incorporating early season rest increase the vigor of individual plants. Fewer shoots may be produced, but total aboveground biomass tends to be greater (Hansen and others 1995).

Overuse by livestock will result in reduced vigor of willows, as illustrated by highlining, clubbing, or dead clumps. With continued overuse, willows show a sharp decline in vigor and may be eventually eliminated from the site (Hansen and others 1995).

To minimize undesired changes in community composition and structure, pasture or allotment management should be based on the forage available from stands of this and other riparian or wetland communities. This concept of the riparian or wetland pasture has had some success in maintaining or improving the health of riparian or wetland vegetation (Kinch 1987).

Frisina (1991) states that for a grazing program to be successful, it must meet the basic biological requirements of the plants such as photosynthesis, food storage, reproduction, and seedling establishment. In order to meet these requirements, long periods of rest are needed. It is during long growing season rest periods that the essential biological processes of food production and storage, reproduction, and seedling establishment take place. In some instances, additional periods of rest may be required to either improve or maintain a plant community.

Wildlife

The species and structural diversity of this type make it a valuable cover and food source for a wide range of wildlife species, including deer, moose, waterfowl, upland game, songbirds, and small mammals (Dittberner and Olson 1983). Moose and beaver have been observed to use *Salix* spp. (willow) extensively in places.

Beaver perform a vital role in the health and maintenance of riparian ecosystems. Beaver dams assist in controlling the downcutting of channels, bank erosion, and the movement of sediment downstream (Gordon and others

1992). When beaver construct a dam, they raise the water table in the area, which provides water for hydrophytic plants such as willows and sedges. The beaver dam also slows down the water in the channel, which allows suspended sediment to be deposited behind the dam. The combination of sediment deposition and plant reproduction raises the channel bed, creating a wetland environment which is excellent waterfowl and fish habitat. It has often been the policy of land managers to trap and kill beaver because they can be a nuisance. However, because beaver produce such desirable habitat and provide many beneficial stream functions, their removal from a riparian system needs to be closely evaluated (Hansen and others 1995).

Fisheries

Salix spp. (willow) communities function in a variety of capacities to promote stream health and enhance fisheries. Willows form dense root networks that stabilize streambanks against lateral cutting and erosion, provide cover in the form of overhanging branches and banks, and shade channels, effectively moderating extreme temperature fluctuations. Although not a source of large woody debris, willows may trap large trees borne downstream, creating deeper pools and additional cover for fish species. As a source of food and building material *Salix* spp. (willow) attract beaver. Beaver ponds may provide excellent fishing opportunities if free of dense aquatic vegetation and numerous snags.

Fire

Prescribed burning in this type is an effective method of rejuvenating decadent clumps. The various willow species present in this type sprout vigorously following fire, especially in wetter stands (Kovalchik 1986 and 1987). Quick, hot fires result in more sprouts than slower fires, which are potentially more damaging to the willows and tends to result in fewer sprouts.

Poa pratensis (Kentucky bluegrass) is damaged only by a hot, intense fire. Cool burns will have little effect on *Poa pratensis* (Kentucky bluegrass) (Volland and Dell 1981), but spring burns may lower tiller densities (Dix and Smeins 1967). Intense burns during active growing periods can be used to control stands of *Poa pratensis* (Kentucky bluegrass) (Wasser 1982).

After burning, the site should be eliminated from livestock grazing for at least 2 to 3 years to avoid attracting livestock to young, palatable regrowth (Hansen and others 1995).

Soil Management and Rehabilitation Opportunities

Soils and streambanks are subject to trampling damage, particularly if fine textured and wet. Grazing should be deferred until sites are drier to reduce trampling and compaction problems (Marlow 1984). Woody species provide the greatest amount of streambank protection. Herbaceous species rarely afford sufficient stream bank protection. Management should emphasize the importance of willows in protecting the streambank (Hansen and others 1995).

Unless water tables are restored, these sites will for all practical purposes remain with a ground cover dominated by introduced grass species. On those sites adjacent to a first or second order stream, the use of rock checkdams to aid in the rehabilitation of degraded (de-watered) sites is an excellent cost effective approach. The rock dam will

help raise the water table thereby allowing the willows and sedges to reclaim a degraded site (Hansen and others 1995).

Salix geyeriana (Geyer willow) is valuable in revegetating disturbed streambanks. Cuttings should be first rooted then grown in a nursery to insure survival. Cuttings, however, may be more difficult to root than *Salix boothii* (Booth willow). Cut stems of *Salix geyeriana* (Geyer willow) produce low to moderate numbers of roots, located along the entire length of the stem. Best results are obtained from cuttings taken in the spring from dormant two to four year old wood. Cuttings 30-50 cm (12-20 in) long and >1 cm (0.5 in) in diameter produce the best results. Roots and shoots from cuttings can be expected to appear 10-15 days after planting (Hansen and others 1995).

Recreational Uses and Considerations

When locating structures for camping or other purposes in this community type, avoid active floodplains or other sites that may be prone to disturbance.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = saturated to temporarily flooded.

OTHER STUDIES

This type has been documented in the Classification and Management of Montana's Riparian and Wetland Sites (Hansen and others 1995). In eastern Idaho and western Wyoming, Youngblood and others (1985b) identified several similar community types (*Salix geyeriana/Poa palustris* (Geyer willow/fowl bluegrass), *Salix boothii/Poa palustris* (Booth willow/fowl bluegrass) community types) indicating disturbed conditions.

Salix lasiandra Community Type
(Pacific Willow Community Type)

SALLAS (SALA5)

Number Of Stands Sampled = 5

LOCATION AND ASSOCIATED LANDFORMS

The *Salix lasiandra* (Pacific willow) community type is an incidental type at low to mid elevations in southern and eastern Idaho. Sites range from 1,394 to 2,000 m (4,600 to 6,600 ft). Stands of this type may be located in proximity to seeps and low swampy depressional areas or, more frequently, occur as part of a diverse mosaic with other willow species in riparian corridors. *Salix lasiandra* (Pacific willow) appears in U- and V-shaped drainages on nar-

row swaths of alluvial deposits or establishes as more extensive stands on broader, level, riverine floodplains.

VEGETATION

Salix lasiandra (Pacific willow) exhibits two major growth forms in Idaho: medium-sized trees with boles up to 45 cm (18 in) in diameter that may reach heights upwards of 7 m (21 ft), or arborescent shrubs. Brunsfeld and Johnson (1985) indicate that the tree form is more prevalent at lower elevations while the shrub form predominates at moderately higher elevations. This willow represents one of the taller *Salix* spp. (willow) and typically forms extremely dense overhead canopies, often precluding the development of lush understory shrub or herbaceous layers. Stands of the *Salix lasiandra* (Pacific willow) community type may contain trace amounts of a variety of other shrub species, including *Salix bebbiana* (Bebb willow), *Salix lutea* (yellow willow), *Salix exigua* (sandbar willow), *Salix geyeriana* (Geyer willow), *Rosa* spp. (rose) and *Ribes* spp. (currant). The sparse herbaceous component may be composed of *Agropyron repens* (quackgrass), *Poa pratensis* (Kentucky bluegrass), *Aster occidentalis* (western aster), *Mentha arvensis* (field mint) and *Heracleum lanatum* (cow-parsnip). Local disturbances may cause species compositions to diverge between sites. The ground surface may be littered with woody debris, and patches of moss may occur sporadically where sufficient moisture is available.

Table 9. Average canopy cover, range of canopy cover, and constancy for species recorded in stands of the *Salix lasiandra* (Pacific willow) community type that are relatively undisturbed by livestock or wildlife (number = 5 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Shrubs			
Cornus stolonifera (Red-osier Dogwood)	12	0-40	40
Ribes lacustre (Swamp Currant)	2	0-10	20
Salix lasiandra (Pacific Willow)	91	80-98	100
Salix lutea (Yellow Willow)	2	0-10	40
Solanum dulcamara (Climbing Nightshade)	4	0-20	40
Graminoids			
Agropyron caninum (Bearded Wheatgrass)	1	0-3	20
Agrostis exarata (Spike Bentgrass)	2	0-10	20
Agropyron repens (Quackgrass)	12	0-60	40
Agrostis stolonifera (Redtop)	4	0-20	20
Alopecurus aequalis (Short-awn Foxtail)	<1	0-1	20
Carex aquatilis (Water Sedge)	1	0-3	20
Carex lanuginosa (Woolly Sedge)	<1	0-1	20
Carex microptera (Small-winged Sedge)	<1	0-1	20
Carex rostrata (Beaked Sedge)	1	0-3	20
Carex vesicaria (Inflated Sedge)	<1	0-1	20
Glyceria striata (Fowl Mannagrass)	<1	0-1	20

Juncus balticus (Baltic Rush)	2	0-10	20
Muhlenbergia asperifolia (Alkali Muhly)	<1	0-1	20
Phalaris arundinacea (Reed Canarygrass)	<1	0-1	20
Poa pratensis (Kentucky Bluegrass)	1	0-3	40
Forbs			
Actaea rubra (Baneberry)	1	0-3	20
Artemisia ludoviciana (Prairie Sagewort)	<1	0-1	20
Asclepias speciosa (Showy Milkweed)	16	0-80	20
Aster occidentalis (Western Aster)	1	0-3	40
Bidens vulgata (Tall Beggar-ticks)	2	0-10	20
Cardamine breweri (Brewer's Bittercress)	<1	0-1	20
Cicuta maculata (Spotted Water-hemlock)	1	0-3	20
Cirsium arvense (Canada Thistle)	<1	0-1	20
Epilobium ciliatum (Common Willow-herb)	<1	0-1	40
Forb (Forb)	2	0-10	20
Galium triflorum (Sweetscented Bedstraw)	<1	0-1	20
Geum macrophyllum (Larged-leaved Avens)	1	0-3	20
Helenium autumnale (Sneezeweed)	<1	0-1	20
Heracleum lanatum (Cow-parsnip)	6	0-30	20
Lycopus americanus (Cut-leaved Water Horehound)	2	0-10	20
Mentha arvensis (Field Mint)	3	0-10	40
Mimulus guttatus (Common Monkey-flower)	1	0-3	20
Montia chamissoi (Water Montia)	<1	0-1	20
Plantago major (Common Plantain)	1	0-3	20
Polygonum amphibium (Water Smartweed)	1	0-3	20
Scutellaria galericulata (Marsh Skullcap)	<1	0-1	20
Senecio serra (Tall Butterweed)	1	0-3	20
Smilacina stellata (Starry Solomon-plume)	1	0-3	20
Urtica dioica (Stinging Nettle)	1	0-3	20
Veronica americana (American Speedwell)	1	0-3	20
Ferns and Allies			
Equisetum arvense (Field Horsetail)	<1	0-1	20

SUCCESSIONAL INFORMATION

Brunsfeld and Johnson (1985) indicate that at lower elevations where *Salix lasiandra* (Pacific willow) forms a medium sized tree-like shrub, it is common in open *Populus trichocarpa* (black cottonwood) stands or as a fringe around dense cottonwood stands. *Salix lasiandra* (Pacific willow) appears to be an early to mid-seral species and may favor environmental site conditions similar to those of cottonwoods and *Salix exigua* (sandbar willow). In Montana, many stands seem to represent an early seral stage of the *Pseudotsuga menziesii/Cornus stolonifera* (Douglas fir/red-osier dogwood) habitat type (Hansen and others (1995). *Salix geyeriana* (Geyer willow) and *Salix lutea*

(yellow willow) are often associated with *Salix lasiandra* (Pacific willow) and might represent climax types on certain sites. Due to the limited number of observations in Idaho, the successional status of this community type has yet to be fully explored.

SOILS

Salix lasiandra (Pacific willow) germinates on a variety of alluvial materials. Soil textures range from silty clay loam to fine sand. Where infrequent disturbance allows its accumulation, a litter/duff layer may be up to 15 cm (6 in) deep and contributes to the high concentration of organic matter often present in the upper surface horizons. Underlying layers, composed of coarse grain sands, gravels, and cobbles of assorted sizes, form irregular bands and pockets in an unconsolidated matrix. Soils are probably classified as Entisols, Inceptisols or Mollisols. Water tables are commonly at the surface, but may be 60 cm (24 in) or more in depth and are thought to provide moisture to the upper horizons throughout the growing season. Mottled and gleyed soil characteristics may be present due to the elevated water tables which promote oxidation/reduction reactions.

ADJACENT COMMUNITIES

Shrubs typically form mosaic patterns throughout drainages such that individual species dominate particular microsites. *Salix lasiandra* (Pacific willow) is often accompanied by *Salix bebbiana* (Bebb willow), *Salix lutea* (yellow willow), *Salix exigua* (sandbar willow), *Salix geyeriana* (Geyer willow) and/or *Salix boothii*(Booth willow) in riparian zones to create such matrices. Other affiliated shrubs include *Prunus virginiana* (common chokecherry), *Cornus stolonifera* (red-osier dogwood, or *Alnus incana* (mountain alder). Cottonwoods may be present as well on broader floodplains. *Populus tremuloides* (quaking aspen) and *Pseudotsuga menziesii* (Douglas fir) may integrate into these riparian complexes, but may also dominate drier, adjacent upland sites. Pasture/grasslands, *Artemisia tridentata* (big sagebrush) steppe and sand dunes may border riparian zones vegetated with the *Salix lasiandra* (Pacific willow) community type.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Stands of the *Salix lasiandra* (Pacific willow) community type typically form narrow, often discontinuous bands of limited extent. Forage productivity is often low due to disturbance by frequent flooding (Hansen and others 1995).

Stands of the *Salix lasiandra* (Pacific willow) community type are typically heavily impacted by livestock. Because of their location, most stands at lower elevations receive season long grazing and are commonly used as a winter feed ground by ranchers. Overuse by livestock will result in a reduced vigor by the willows present, as illustrated by highlining, clubbing, or dead clumps. With continued overuse, willows show a sharp decline in vigor and may be eventually eliminated from the site (Hansen and others 1995).

Frisina (1991) states that for a grazing program to be successful, it must meet the basic biological requirements of the plants such as photosynthesis, food storage, reproduction, and seedling establishment. In order to meet these requirements, long periods of rest are needed. It is during long growing season rest periods that the essential bio-

logical processes of food production and storage, reproduction, and seedling establishment take place. In some instances, additional periods of rest may be required to either improve or maintain a plant community.

Wildlife

The *Salix lasiandra* (Pacific willow) community type provides browse and cover for moose, deer, birds, and small mammals. Beaver tend to heavily utilize most species of willows. It is also provides diversity for other mammals and songbirds (Hansen and others 1995).

Fisheries

Salix spp. (willow) communities function in a variety of capacities to promote stream health and enhance fisheries. *Salix lasiandra* (Pacific willow) forms dense root networks that stabilize streambanks against lateral cutting and erosion, provides cover in the form of overhanging branches and banks, and shades channels, effectively moderating extreme temperature fluctuations. It may be a source of large woody debris or may trap large trees borne downstream, creating deeper pools and additional cover for fish species. Where the herbaceous species are lush, they may act to trap sediments, essentially building streambanks and filtering steam flows. As a source of food and building material *Salix* spp. (willow) attract beaver. Beaver ponds may provide excellent fishing opportunities if free of dense aquatic vegetation and numerous snags.

Fire

The response of *Salix lasiandra* (Pacific willow) to fire and its sprouting capabilities are poorly documented (Hansen and others 1995).

Soil Management and Rehabilitation Opportunities

Coarse textured soils generally do not have compaction problems. However, many stands are currently heavily impacted by livestock resulting in large amounts of bare ground. These degraded stands are vulnerable to erosion problems during high water periods. Management should emphasize the importance of willows in protecting the streambank. Woody species provide the greatest amount of streambank protection. Herbaceous species rarely afford sufficient streambank protection (Hansen and others 1995).

Use of *Salix lasiandra* (Pacific willow) for stabilizing streambanks is recommended on appropriate sites. It is easily rooted and forms abundant roots on planted cuttings approximately 10 days after planting (Platts and others 1987).

Recreational Uses and Considerations

The *Salix lasiandra* (Pacific willow) community type may provide access to rivers and streams for recreational fishing. When locating structures for camping or other purposes in this community type, avoid active floodplains or other sites that may be prone to disturbance. However, the often open understory and shade offered by *Salix lasiandra* (Pacific willow) provides excellent opportunities for picnicking and primitive camping.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is list-

ed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded.

OTHER STUDIES

This type has been documented in the Classification and Management of Montana's Riparian and Wetland Sites (Hansen and others 1995).

Salix lutea/Calamagrostis canadensis Habitat Type (Yellow Willow/Bluejoint Reedgrass Habitat Type)

SALLUT/CALCAN (SALU2/CACA4)
Number Of Stands Sampled in Montana = 5

NOTE: The *Salix lutea/Calamagrostis canadensis* (yellow willow/bluejoint reedgrass) habitat type has been documented in Idaho according to field surveys conducted in 1994. However, due to time constraints during the 1995 field season, homogeneous stand data could not be collected for this type. In the subsequent discussion, any references to physical site location or vegetation characteristics for this type in Idaho were interpreted from 1994 field surveys. The remainder of this description was taken from the Classification and Management of Montana's Riparian and Wetland Sites (Hansen and others 1995).

LOCATION AND ASSOCIATED LANDFORMS

The *Salix lutea/Calamagrostis canadensis* (yellow willow/bluejoint reedgrass) habitat type ranges in elevation from 1,364 to 1,818 m (4,600 to 6000 ft), and is a major type at low to mid elevations throughout the foothills and valleys of central and eastern Idaho. This type may be part of a diverse mosaic of shrub and tree communities occupying riparian corridors along streams in U- and V-shaped canyons, or may establish broader stands on wide floodplains associated with riverine systems. It may also occupy grassy, upper floodplains with high water tables or be associated with beaver dams. The habitat requirements of *Salix lutea* (yellow willow) generally correspond with those of *Salix drummondiana* (Drummond willow) and *Salix geyeriana - Salix boothii* (Geyer willow - Booth willow). However, these three species are distributed across an elevational gradient, with types in the *Salix lutea* (yellow willow) series occupying the lowest elevations, types in the *Salix geyeriana - Salix boothii* (Geyer willow - Booth willow) appearing at intermediate ranges and *Salix drummondiana* (Drummond willow) types dominating higher altitudes.

VEGETATION

In Idaho, *Salix lutea* (yellow willow) has two growth forms: it may occur as single trunked, medium sized trees, or as multi-stalked shrubs. However, the individual trunks of the shrub form may be tree-sized themselves, arising from bases up to 1 m (39 in) in diameter before diverging. *Salix lutea* (yellow willow) dominates the upper shrub

layer but may be accompanied by subordinate shrubs including other *Salix* spp. (willow), *Prunus virginiana* (common chokecherry), *Cornus stolonifera* (red-osier dogwood), and *Betula occidentalis* (water birch). The herbaceous layer is dominated by the signature species *Calamagrostis canadensis* (bluejoint reedgrass), although *Poa pratensis* (Kentucky bluegrass) may also be well represented. Depending on the extent and nature of disturbance, the composition of other forbs and graminoids varies.

The major shrub species of this habitat type in Montana are the relatively tall *Salix lutea* (yellow willow), with varying amounts of *Salix bebbiana* (Bebb willow) also present. Major herbaceous species include *Calamagrostis canadensis* (bluejoint reedgrass) and/or *Calamagrostis stricta* (narrow-spiked reedgrass). Lesser amounts of *Deschampsia cespitosa* (tufted hairgrass) are also present. Although Table 10 reflects vegetation surveyed on sites exclusive to Montana, it provides a fairly accurate interpretation of species composition and canopy cover for sites identified in Idaho during the 1994 inventory.

Table 10. Average canopy cover, range of canopy cover, and constancy for those species recorded in the sampled stands of the *Salix lutea/Calamagrostis canadensis* (yellow willow/bluejoint reedgrass) habitat type (number = 5 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Shrubs			
Betula occidentalis (water birch)	1	0-1	40
Cornus stolonifera (red-osier dogwood)	20	0-40	40
Rosa woodsii (woods rose)	2	0-3	60
Salix bebbiana (Bebb willow)	54	0-80	60
Salix lutea (yellow willow)	11	1-20	100
Graminoids			
Agrostis stolonifera (redtop)	7	0-10	40
Calamagrostis canadensis (bluejoint reedgrass)	30	0-40	40
Calamagrostis stricta (narrow-spiked reedgrass)	1	0-1	20
Deschampsia cespitosa (tufted hairgrass)	5	0-10	60
Festuca rubra (red fescue)	2	0-3	40
Juncus balticus (Baltic rush)	40	0-60	40
Phleum pratense (common timothy)	3	0-3	40
Poa pratensis (Kentucky bluegrass)	40	0-60	40
Forbs			
Allium schoenoprasum (chives)	2	0-3	40
Aster chilensis (long-leaved aster)	3	0-3	40
Geranium spp. (geranium)	3	0-3	40
Geum macrophyllum (large-leaved avens)	1	0-1	40
Mentha arvensis (field mint)	5	0-10	40

Viola spp. (violet)	5	0-10	40

SUCCESSIONAL INFORMATION

If browsing pressure is heavy, willow coverages will decrease, resulting in more open communities. Grazing pressure by livestock will cause a decrease in the more desirable grasses such as *Calamagrostis canadensis* (bluejoint reedgrass), *Calamagrostis stricta* (narrow-spiked reedgrass), and *Deschampsia cespitosa* (tufted hairgrass) with a corresponding increase in either introduced or less desirable species such as *Poa pratensis* (Kentucky bluegrass), *Agrostis stolonifera* (redtop), or *Juncus balticus* (Baltic rush). If grazing pressures are severe enough, the site takes on the appearance of the grazing induced *Salix lutea* (yellow willow) community type.

SOILS

Brichta (1987) indicates that soils in Idaho may be classified as Entisols (Fluvents) or Mollisols. Soil textures of the upper surface horizons range from silty clays to sandy loams. These surface layers may be 45 cm (18 in) or more deep and are often integrated with high quantities of organic material. Underlying substrates are generally fine or coarse sands and gravels. Water tables may be at the surface or as deep as 1 m (39 in), but are expected to provide soil moisture to the upper horizons for the majority of the growing season. Oxidation/reduction reactions produce mottled or gleyed features in the soil solum where groundwater is prevalent. Litter/duff layers may occur on sites with infrequent disturbance, and may be 5 cm (2 in) thick.

ADJACENT COMMUNITIES

Adjacent sites that are slightly wetter may support the *Salix lutea/Carex rostrata* (yellow willow/beaked sedge) habitat type. In other situations, wetter sites may support the *Carex rostrata* (beaked sedge) habitat type or open water. Drier sites may support a variety of types including the *Poa pratensis* (Kentucky bluegrass) and *Juncus balticus* (Baltic rush) community types, the *Potentilla fruticosa/Deschampsia cespitosa* (shrubby cinquefoil/tufted hairgrass) habitat type or upland types.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Forage production is high, and where extensive, this type may be an important source of summer forage. Palatability of *Calamagrostis canadensis* (bluejoint reedgrass) and *Deschampsia cespitosa* (tufted hairgrass) varies from moderate to high, depending upon season and availability of other species (USDA Forest Service 1937). Foliage is most palatable when young, but wet conditions early in the grazing season limits use by livestock, especially sheep. Due to the high forage production and highly palatable grasses, many of these sites have heavy summer and fall use, especially after uplands have been grazed. Sustained grazing decreases the vigor, reproductive success, and competitive ability of *Calamagrostis canadensis* (bluejoint reedgrass) and *Deschampsia cespitosa* (tufted hairgrass) (Volland 1985). Under season long grazing, they may be replaced by *Poa pratensis* (Kentucky bluegrass). To maintain vigor and prevent damage to soils and vegetation, grazing should be deferred until soils dry. Proper levels of grazing should range from light to moderate.

Overuse by livestock will result in a reduced vigor by the willows present, as illustrated by highlining, clubbing, or dead clumps. With continued overuse, willows show a sharp decline in vigor and may be eventually eliminated from the site.

To minimize undesired changes in community composition and structure, pasture or allotment management should be based on the forage available from stands of this and other riparian or wetland communities. This concept of the riparian or wetland pasture has had some success in maintaining or improving the health of riparian or wetland vegetation (Kinch 1987).

Frisina (1991) states that for a grazing program to be successful, it must meet the basic biological requirements of the plants such as photosynthesis, food storage, reproduction, and seedling establishment. In order to meet these requirements, long periods of rest are needed. It is during long growing season rest periods that the essential biological processes of food production and storage, reproduction, and seedling establishment take place. In some instances, additional periods of rest may be required to either improve or maintain a plant community.

Wildlife

Big game utilize this type for both summer and winter forage and browse. Winter elk use may be heavy (Gaffney 1941). Dense stands provide excellent thermal and hiding cover for many wildlife species.

Beaver perform a vital role in the health and maintenance of riparian ecosystems. Beaver dams assist in controlling the downcutting of channels, bank erosion, and the movement of sediment downstream (Gordon and others 1992). When beaver construct a dam, they raise the water table in the area, which provides water for hydrophytic plants such as willows and sedges. The beaver dam also slows down the water in the channel, which allows suspended sediment to be deposited behind the dam. The combination of sediment deposition and plant reproduction raises the channel bed, creating a wetland environment which is excellent waterfowl and fish habitat. It has often been the policy of land managers to trap and kill beaver because they can be a nuisance. However, because beaver produce such desirable habitat and provide many beneficial stream functions, their removal from a riparian system needs to be closely evaluated.

Fisheries

Where adjacent to streams, this type effectively stabilizes soils and forms overhanging banks, enhancing fisheries quality. The importance of willows in streambank protection, cover, and thermal protection for fisheries can not be emphasized enough. The herbaceous understory aids in filtering out sediments during high flows thereby contributing to the overall building of the streambanks. Some stands may be so dense as to hinder most forms of recreational fishing. If fishing access is important, dense stands may be opened by the use of livestock as a management tool.

Fire

Prescribed burning in this type is an effective method of rejuvenating decadent clumps. The various willow species present in this type sprout vigorously following fire, especially in wetter stands. Quick, hot fires result in

more sprouts than slower fires, which are potentially more damaging to the willows and tends to result in fewer sprouts.

Calamagrostis canadensis (bluejoint reedgrass) propagates itself by both seeds and rhizomes, making this species an aggressive invader of moist, burned sites (Crane and Fischer 1986). These features also make it a valuable species for stabilizing or rehabilitating mountain streams.

Deschampsia cespitosa (tufted hairgrass) is resistant to damage from fire (DeBenedetti and Parsons 1984). Root crowns are rarely damaged, even by hot, intense fires. However, repeated burning favors rhizomatous species such as *Poa pratensis* (Kentucky bluegrass).

After burning, the site should be eliminated from livestock grazing for at least 2 to 3 years to avoid attracting livestock to young, palatable regrowth.

Soil Management and Rehabilitation Opportunities

Soils are easily damaged from trampling by livestock if grazed when moist. This disturbance often leads to soil compaction, streambank sloughing, damage to vegetation, and premature drying of the soil surface. Woody species provide the greatest amount of streambank protection. Herbaceous species rarely afford sufficient stream bank protection. Management should emphasize the importance of willows in protecting the streambank.

Salix lutea (yellow willow) is useful in streambank stabilization and revegetation projects (Platts and others 1987). Cuttings should be first rooted then grown in a nursery to insure survival. *Salix lutea* (yellow willow) produces an abundance of roots, mostly along the lower one-third of the cut stem. Cuttings are best taken in the spring from dormant two to four year old wood. Cuttings 30-50 cm (12-20 in) long and >1 cm (0.5 in) in diameter produce the best results. Roots and shoots from cuttings can be expected to appear 10 days after planting.

Recreational Uses and Considerations

Recreational opportunities are limited because of the small size and high density of *Salix lutea* (yellow willow). These areas are frequently flooded, requiring additional consideration when planning roads or campsites. Some stands may be so dense as to hinder most forms of recreational fishing. If fishing access is important, dense stands may be opened by the use of livestock as a management tool.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = saturated to temporarily flooded.

OTHER STUDIES

Youngblood and others (1985b) identified a comparable *Salix lutea* (yellow willow) community type.

Salix lutea/Carex rostrata Habitat Type
(Yellow Willow/Beaked Sedge Habitat Type)

SALLUT/CARROS (SALU2/CARO6)
Number Of Stands Sampled in Montana =14

NOTE: The *Salix lutea/Carex rostrata* (yellow willow/beaked sedge) habitat type has been documented in Idaho according to field surveys conducted in 1994. However, due to time constraints during the 1995 field season, homogeneous stand data could not be collected for this type. In the subsequent discussion, any references to physical site location or vegetation characteristics for this type in Idaho were interpreted from 1994 field surveys. The remainder of this description was taken from the Classification and Management of Montana's Riparian and Wetland Sites (Hansen and others 1995).

LOCATION AND ASSOCIATED LANDFORMS

The *Salix lutea/Carex rostrata* (yellow willow/beaked sedge) habitat type ranges in elevation from 1,364 to 1,818 m (4,600 to 6000 ft), and is a major type at low to mid elevations throughout the foothills and valleys of central and eastern Idaho. This type may be part of a diverse mosaic of shrub and tree communities occupying riparian corridors along streams in U- and V-shaped canyons, or may establish broader stands on wide floodplains associated with riverine systems. It may also occupy grassy, upper floodplains with high water tables or be be found associated with beaver dams. The habitat requirements of *Salix lutea* (yellow willow) generally correspond with those of *Salix drummondiana* (Drummond willow and *Salix geyeriana - Salix boothii* (Geyer willow - Booth willow). However, these three species are distributed across an elevational gradient, with types in the *Salix lutea* (yellow willow) series occupying the lowest elevations, types in the *Salix geyeriana - Salix boothii* (Geyer willow - Booth willow) appearing at intermediate ranges and *Salix drummondiana* (Drummond willow) types dominating higher altitudes.

VEGETATION

Salix lutea (yellow willow) has two growth forms in Idaho: it may occur as single trunked, medium sized trees, or as multi-stalked shrubs. However, the individual trunks of the shrub form may be tree-sized themselves, arising from bases up to 1 m (39 in) in diameter before diverging. *Salix lutea* (yellow willow) dominates the upper shrub layer, although occasional *Pseudotsuga menziesii* (Douglas fir) or *Populus tremuloides* (quaking aspen) may be present. Subordinate understory shrubs may be represented by other *Salix* spp. (willow), *Ribes* spp. (currant) or *Rosa* spp. (rose). *Carex rostrata* (beaked sedge), the diagnostic understory species, dominates the herbaceous layer, often with other *Carex* spp. (sedge). A diversity of understory species, such as *Poa pratensis* (Kentucky bluegrass) and *Juncus* spp. (rush), may be present depending on the intensity and type of disturbance.

The major shrub species of this habitat type in Montana are the relatively tall *Salix lutea* (yellow willow). The

major herbaceous species is *Carex rostrata* (beaked sedge) and/or *Carex vesicaria* (inflated sedge). Limited amounts of *Carex aquatilis* (water sedge) may be present (Table 11). Although Table 11 reflects vegetation surveyed on sites exclusive to Montana, it provides a fairly accurate representation of species composition and canopy cover for sites identified in Idaho during the 1994 inventory.

Table 11. Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax stands of the *Salix lutea/Carex rostrata* (yellow willow/beaked sedge) habitat type (number = 3 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Shrubs			
Betula glandulosa (bog birch)	1	0-1	33
Lonicera involucrata (twin-berry)	1	0-1	33
Potentilla fruticosa (shrubby cinquefoil)	1	0-1	67
Salix bebbiana (Bebb willow)	3	0-3	33
Salix exigua (sandbar willow)	1	0-1	33
Salix lutea (yellow willow)	40	20-80	100
Graminoids			
Bromus ciliatus (fringed brome)	1	0-1	33
Calamagrostis stricta (narrow-spiked reedgrass)	2	0-3	67
Carex aquatilis (water sedge)	60	0-60	33
Carex atherodes (awned sedge)	3	0-3	7
Carex rostrata (beaked sedge)	67	40-80	100
Carex vesicaria (inflated sedge)	70	0-70	7
Glyceria grandis (American mannagrass)	1	0-1	33
Poa palustris (fowl bluegrass)	1	0-1	67
Forbs			
Epilobium ciliatum (common willow-herb)	3	0-3	33
Mentha arvensis (field mint)	3	0-3	33
Polygonum amphibium (water smartweed)	3	0-3	33
Senecio hydrophilus (alkali-marsh butterweed)	1	0-1	33
Viola spp. (violet)	3	0-3	33
Ferns and Allies			
Equisetum arvense (field horsetail)	1	0-1	33

SUCCESSIONAL INFORMATION

With prolonged disturbance, herbaceous species such as *Carex nebrascensis* (Nebraska sedge), *Equisetum arvense* (field horsetail), and *Juncus balticus* (Baltic rush) tend to increase (Table 12). If browsing is heavy, willow coverages will decrease, resulting in more open communities. The site may then become occupied by the *Salix lutea*

(yellow willow) community type which represents a grazing disclimax.

Table 12. Average canopy cover, range of canopy cover, and constancy for species recorded in disturbed and/or early to mid-seral stands of the *Salix lutea/Carex rostrata* (yellow willow/beaked sedge) habitat type (number = 11 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Shrubs			
Betula glandulosa (bog birch)	18	0-40	36
Betula occidentalis (water birch)	40	0-60	18
Cornus stolonifera (red-osier dogwood)	10	0-40	55
Potentilla fruticosa (shrubby cinquefoil)	9	0-20	45
Ribes spp. (currant)	1	0-1	9
Ribes setosum (Missouri gooseberry)	1	0-1	9
Rosa woodsii (woods rose)	2	0-3	36
Rubus idaeus (red raspberry)	3	0-3	9
Salix bebbiana (Bebb willow)	23	0-50	55
Salix boothii (Booth willow)	10	0-10	9
Salix brachycarpa (short-fruited willow)	10	0-10	9
Salix candida (hoary willow)	40	0-40	18
Salix geyeriana (Geyer willow)	20	0-20	18
Salix glauca (glaucous willow)	30	0-30	9
Salix lutea (yellow willow)	18	0-40	100
Salix planifolia (planeleaf willow)	10	0-30	36
Salix pseudomonticola (mountain willow)	20	0-20	9
Salix serissima (autumn willow)	11	0-20	27
Graminoids			
Agropyron caninum (bearded wheatgrass)	2	0-3	18
Agrostis spp. (bentgrass)	1	0-1	18
Agrostis scabra (tickle-grass)	1	0-1	9
Agrostis stolonifera (redtop)	8	0-20	27
Alopecurus pratensis (meadow foxtail)	10	0-10	9
Bromus ciliatus (fringed brome)	1	0-1	27
Calamagrostis canadensis (bluejoint reedgrass)	20	0-20	9
Calamagrostis stricta (narrow-spiked reedgrass)	8	0-20	27
Carex aquatilis (water sedge)	48	0-80	27
Carex atherodes (awned sedge)	3	0-3	9
Carex aurea (golden sedge)	3	0-3	9
Carex capillaris(hair sedge)	1	0-1	9

Carex diandra (lesser-panicled sedge)	3	0-3	9
Carex interior (inland sedge)	20	0-30	18
Carex lanuginosa (woolly sedge)	20	0-20	9
Carex leptalea (bristle-stalked sedge)	10	0-10	9
Carex nebrascensis (Nebraska sedge)	10	0-20	18
Carex praegracilis (clustered field sedge)	20	0-20	9
Carex rostrata (beaked sedge)	23	0-60	73
Carex simulata (short-beaked sedge)	1	0-3	36
Carex vesicaria (inflated sedge)	70	0-70	9
Deschampsia cespitosa (tufted hairgrass)	7	0-20	45
Eleocharis compressa (flatstem spike-rush)	1	0-1	9
Eriophorum polystachion (many-spiked cotton-grass)	1	0-1	9
Festuca rubra (red fescue)	40	0-40	9
Glyceria grandis (American mannagrass)	1	0-1	9
Holcus lanatus (common velvet-grass)	1	0-1	9
Juncus alpinus (northern rush)	1	0-1	9
Juncus balticus (Baltic rush)	14	0-40	55
Muhlenbergia spp. (muhly)	1	0-1	9
Phleum pratense (common timothy)	1	0-1	9
Poa palustris (fowl bluegrass)	7	0-10	18
Poa pratensis (Kentucky bluegrass)	1	0-1	9
Forbs			
Achillea millefolium (common yarrow)	1	0-1	9
Angelica arguta (sharptooth angelica)	10	0-10	9
Antennaria anaphaloides (tall pussy-toes)	1	0-1	9
Aster chilensis (long-leaved aster)	3	0-3	9
Aster spp. (aster)	20	0-20	9
Aster junciformis (rush aster)	1	0-1	9
Aster modestus (few-flowered aster)	10	0-10	9
Aster occidentalis (western aster)	1	0-1	27
Castilleja spp. (paintbrush)	3	0-3	9
Cicuta maculata (spotted water-hemlock)	5	0-10	18
Delphinium virescens (prairie larkspur)	1	0-1	9
Epilobium ciliatum (common willow-herb)	1	0-1	27
Fragaria virginiana (Virginia strawberry)	5	0-10	18
Galium aparine (goose-grass)	10	0-10	9
Galium boreale (northern bedstraw)	1	0-1	18
Galium triflorum (sweetscented bedstraw)	1	0-1	18
Galium trifidum (small bedstraw)	40	0-40	9
Gentianella detonsa (smaller fringed gentian)	1	0-1	9
Geranium spp. (geranium; crane's bill)	1	0-1	9

Geum macrophyllum (large-leaved avens)	1	0-3	36
Helianthus nuttallii (Nuttall's sunflower)	1	0-1	9
Heracleum lanatum (cow-parsnip)	10	0-10	9
Lysimachia ciliata (fringed loosestrife)	1	0-1	9
Mentha arvensis (field mint)	1	0-1	27
Mimulus guttatus (common monkey-flower)	20	0-20	9
Parnassia palustris (northern grass-of-parnassus)	1	0-1	18
Petasites sagittatus (arrowleaf coltsfoot)	20	0-20	9
Plantago major (common plantain)	1	0-1	18
Potentilla anserina (common silverweed)	1	0-1	9
Rumex spp. (dock; sorrel)	1	0-1	9
Senecio triangularis (arrowleaf groundsel)	3	0-3	9
Smilacina stellata (starry Solomon-plume)	1	0-1	18
Solidago canadensis (Canada goldenrod)	8	0-20	27
Solidago gigantea (late goldenrod)	3	0-3	9
Sonchus spp. (sow-thistle)	1	0-1	9
Swertia perennis (swertia)	1	0-1	9
Taraxacum officinale (common dandelion)	3	0-3	9
Thalictrum fendleri (fendler's meadowrue)	3	0-1	9
Thalictrum spp.(meadowrue)	1	0-1	9
Thalictrum occidentale (western meadowrue)	2	0-3	18
Triglochin palustre (marsh arrow-grass)	1	0-1	18
Typha latifolia (common cattail)	1	0-1	18
Urtica dioica (stinging nettle)	1	0-1	9
Valeriana occidentalis (western valerian)	1	0-1	9
Vicia americana (American vetch)	2	0-3	18
Viola adunca (hook violet)	5	0-10	18
Viola spp. (violet)	5	0-10	36
Ferns and Allies			
Equisetum arvense (field horsetail)	37	0-80	27

Heavy cutting of the willows by beaver may lead to dominance by the graminoids. If beaver leave the area because of the lack of food, or are removed by trapping, major storm events or seasonal runoff can cause the dams to be washed out. With the elimination of beaver, the dams will not be repaired, resulting in downcutting and eventually, a lowering of the water table. The lowering of the water table can result in the changing of the site's potential. If the water table equilibrates at a new but lower (drier) state, the site's potential changes to the *Salix lutea/Calamagrostis canadensis* (yellow willow/bluejoint reedgrass) habitat type. The *Salix lutea/Calamagrostis canadensis* (yellow willow/bluejoint reedgrass) habitat type occupies a slightly drier position on the landscape than that of the *Salix lutea/Carex rostrata* (yellow willow/beaked sedge) habitat type.

SOILS

Brichta (1987) indicates that soils may be classified as Entisols (Fluvents) or, more commonly, Mollisols. Soil textures of the upper surface horizons range from silty clays to sandy loams. Surface layers may be 45 cm (18 in) or more deep and are often integrated with high quantities of organic material. Underlying substrates are often composed of fine or coarse sands and gravels. Water tables are generally at the surface, providing soil moisture to the upper horizons for the majority of the growing season. Oxidation/reduction reactions produce mottled or gleyed features in the soil solum where groundwater is prevalent. Litter/duff layers occur on sites with infrequent disturbance, and may be 5 cm (2 in) or more thick.

ADJACENT COMMUNITIES

Adjacent wetter sites that are slightly wetter support the *Carex rostrata* (beaked sedge) habitat type, the *Typha latifolia* (common cattail) habitat type, or open water. The *Salix lutea/Calamagrostis canadensis* (yellow willow/bluejoint reedgrass) habitat type or the *Salix lutea* (yellow willow) community type may occupy adjacent drier sites, along with *Poa pratensis* (Kentucky bluegrass) and *Juncus balticus* (Baltic rush) community types and the *Potentilla fruticosa/Deschampsia cespitosa* (shrubby cinquefoil/tufted hairgrass) habitat type.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Forage value of *Carex rostrata* (beaked sedge) and *Carex aquatilis* (water sedge) is variable, depending upon season, previous grazing use, and the extent of the site. On narrow riparian or wetland sites within extensive rangelands, sedge species are heavily utilized, particularly when upland species are cured, or stock distribution is poor.

Overuse by livestock will result in a reduced vigor by the willows present, as illustrated by highlining, clubbing, or dead clumps. With continued overuse, willows show a sharp decline in vigor and may be eventually eliminated from the site.

Myers (1989) found that deferred and rest rotation grazing systems generally favor sedge species over willow species since woody species are vulnerable to longer duration treatments and to late summer/fall treatments. Woody species are vulnerable to pruning damage, while sedges are protected by a root reserve. Late summer and fall grazing should be carefully controlled.

Marlow (Hansen and others 1995) also feels that fall (October) grazing will have a negative impact on willows due to limited regrowth at the end of the growing season. However, he feels that rest and deferred rotation can have a positive effect on willows when cattle are properly managed. High use by wildlife in the fall can limit the amount of regrowth.

To minimize undesired changes in community composition and structure, pasture or allotment management should be based on the forage available from stands of this and other riparian or wetland communities. This concept of the riparian or wetland pasture has had some success in maintaining or improving the health of riparian

or wetland vegetation (Kinch 1987).

Frisina (1991) states that for a grazing program to be successful, it must meet the basic biological requirements of the plants such as photosynthesis, food storage, reproduction, and seedling establishment. In order to meet these requirements, long periods of rest are needed. It is during long growing season rest periods that the essential biological processes of food production and storage, reproduction, and seedling establishment take place. In some instances, additional periods of rest may be required to either improve or maintain a plant community.

Wildlife

Big game utilize this type for both summer and winter forage and browse. Winter elk use may be heavy (Gaffney 1941). Dense stands provide excellent thermal and hiding cover for many wildlife species.

Beaver perform a vital role in the health and maintenance of riparian ecosystems. Beaver dams assist in controlling the downcutting of channels, bank erosion, and the movement of sediment downstream (Gordon and others 1992). When beaver construct a dam, they raise the water table in the area, which provides water for hydrophytic plants such as willows and sedges. The beaver dam also slows down the water in the channel, which allows suspended sediment to be deposited behind the dam. The combination of sediment deposition and plant reproduction raises the channel bed, creating a wetland environment which is excellent waterfowl and fish habitat. It has often been the policy of land managers to trap and kill beaver because they can be a nuisance. However, because beaver produce such desirable habitat and provide many beneficial stream functions, their removal from a riparian system needs to be closely evaluated.

Fisheries

The importance of willows in streambank protection, cover, and thermal protection for fisheries can not be emphasized enough. The herbaceous understory aids in filtering out sediments during high flows thereby contributing to the overall building of the streambanks. Some stands may be so dense as to hinder most forms of recreational fishing. If fishing access is important, dense stands may be opened by the use of livestock as a management tool.

Fire

Prescribed burning in the *Salix lutea/Carex rostrata* (yellow willow/beaked sedge) habitat type is an effective method of rejuvenating decadent clumps. The various willow species present in this type sprout vigorously following fire, especially in wetter stands. Quick, hot fires result in more sprouts than slower fires, which are potentially more damaging to the willows and tends to result in fewer sprouts.

Burning of this type can temporarily increase productivity of *Carex rostrata* (beaked sedge), *Carex aquatilis* (water sedge), and *Carex vesicaria* (inflated sedge). However, nonuse by livestock during the year prior to burning is essential. Residual cover burns well in the spring, prior to the growing season. After burning, the site should be eliminated from livestock grazing for at least 2 to 3 years to avoid attracting livestock to young, palatable regrowth. Care should be taken when burning stands along streambanks because of the excellent erosion protection provided by the *Salix lutea/Carex rostrata* (yellow willow/beaked sedge) habitat type.

Soil Management and Rehabilitation Opportunities

Soils are easily damaged from trampling by livestock if grazed when moist. This disturbance often leads to soil compaction, streambank sloughing, damage to vegetation, and premature drying of the soil surface. Woody species provide the greatest amount of streambank protection. Herbaceous species rarely afford sufficient stream bank protection. Management should emphasize the importance of willows in protecting the streambank.

Salix lutea (yellow willow) is useful in streambank stabilization and revegetation projects (Platts and others 1987). Cuttings should be first rooted then grown in a nursery to insure survival. *Salix lutea* (yellow willow) produces an abundance of roots, mostly along the lower one-third of the cut stem. Cuttings are best taken in the spring from dormant two to four year old wood. Cuttings 30 to 50 cm (12 to 20 in) long and >1 cm (0.5 in) in diameter produce the best results. Roots and shoots from cuttings can be expected to appear 10 days after planting.

Recreational Uses and Considerations

Recreational opportunities are limited because of the small size and high density of *Salix lutea* (yellow willow). These areas are frequently flooded, requiring additional consideration when planning roads or campsites. Some stands may be so dense as to hinder most forms of recreational fishing. If fishing access is important, dense stands may be opened by the use of livestock as a management tool.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = seasonally flooded to saturated.

OTHER STUDIES

Youngblood and others (1985b) identified a comparable *Salix lutea* (yellow willow) community type.

Salix lutea Community Type
(Yellow Willow Community Type)

SALLUT (SALU2)

Number Of Stands Sampled = 7

LOCATION AND ASSOCIATED LANDFORMS

The *Salix lutea* (yellow willow) community type ranges in elevation from 1,364 to 1,818 m (4,600 to 6000 ft), and is a major type at low to mid elevations throughout the foothills and valleys of central and eastern Idaho. This type

may be part of a diverse mosaic of shrub and tree communities occupying riparian corridors along streams in U- and V-shaped canyons, or as broader stands on wide floodplains associated with riverine systems. It may also occupy grassy, upper floodplains with high water tables or be be found associated with beaver dams. The habitat requirements of *Salix lutea* (yellow willow) generally correspond with those of *Salix drummondiana* (Drummond willow) and *Salix geyeriana - Salix boothii* (Geyer willow - Booth willow). However, these three species are distributed across an elevational gradient, with types in the *Salix lutea* (yellow willow) series occupying the lowest elevations, types in the *Salix geyeriana - Salix boothii* (Geyer willow - Booth willow) appearing at intermediate ranges and *Salix drummondiana* (Drummond willow) types dominating higher altitudes.

VEGETATION

Salix lutea (yellow willow) has two growth forms: it may occur as single trunked, medium sized trees, or as multi-stalked shrubs. However, the individual trunks of the shrub form may be tree-sized themselves, arising from bases up to 1 m (39 in) in diameter before diverging. This community type represents a grazing disclimax. *Salix lutea* (yellow willow) dominates the upper shrub layer, with varying amounts of *Salix exigua* (sandbar willow), *Cornus stolonifera* (red-osier dogwood), *Ribes* spp. (currant) and *Rosa* spp. (rose) composing the lower shrub level. Common herbaceous species include *Agrostis stolonifera* (redtop), *Phalaris arundinacea* (reed canarygrass), *Polygonum* spp. (smartweed), and *Equisetum* spp. (horsetail)

Table 13. Average canopy cover, range of canopy cover, and constancy for indicator species and those species recorded in 40 percent or more of the sampled stands of the grazing disclimax *Salix lutea* (yellow willow) community type (number = 7 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Trees			
Populus angustifolia (Narrowleaf Cottonwood)	<1	0-1	29
Populus trichocarpa (Black Cottonwood)	1	0-10	14
Shrubs			
Cornus stolonifera (Red-osier Dogwood)	10	0-30	71
Elaeagnus commutata (Silverberry)	5	0-30	17
Ribes lacustre (Swamp Currant)	2	0-10	29
Ribes odoratum (Buffalo Currant)	1	0-3	43
Ribes setosum (Missouri Gooseberry)	<1	0-1	14
Rosa woodsii (Woods Rose)	7	0-20	57
Salix exigua (Sandbar Willow)	17	0-70	71
Salix lasiandra (Pacific Willow)	13	0-80	33
Salix lutea (Yellow Willow)	49	10-90	100
Solanum dulcamara (Climbing Nightshade)	1	0-10	14
Graminoids			
Agropyron caninum (Bearded Wheatgrass)	<1	0-3	14

Agrostis stolonifera (Redtop)	23	0-80	29
Carex rostrata (Beaked Sedge)	<1	0-1	14
Carex spp. (Sedge)	<1	0-1	14
Grassx (Grass)	<1	0-1	14
Muhlenbergia asperifolia (Alkali Muhly)	1	0-10	14
Muhlenbergia cuspidata (Plains Muhly)	<1	0-3	14
Phalaris arundinacea (Reed Canarygrass)	6	0-40	29
Phleum pratense (Common Timothy)	<1	0-1	14
Poa pratensis (Kentucky Bluegrass)	1	0-3	29
Forbs			
Achillea millefolium (Common Yarrow)	<1	0-1	14
Aster laevis (Smooth Aster)	<1	0-3	14
Aster occidentalis (Western Aster)	<1	0-3	14
Cardamine spp. (Bittercress)	1	0-10	14
Cirsium arvense (Canada Thistle)	2	0-10	57
Cynoglossum officinale (Common Hound's-tongue)	<1	0-3	14
Erigeron glabellus (Smooth Daisy)	<1	0-1	14
Forbxx (Forb)	1	0-10	14
Galium aparine (Goose-grass)	1	0-10	14
Geranium viscosissimum (Sticky Geranium)	<1	0-1	14
Mentha arvensis (Field Mint)	<1	0-3	14
Plantago major (Common Plantain)	<1	0-3	14
Polygonum amphibium (Water Smartweed)	11	0-80	14
Rumex crispus (Curly Dock)	<1	0-3	14
Smilacina racemosa (False Spikenard)	<1	0-1	14
Smilacina stellata (Starry Solomon-plume)	2	0-10	29
Solidago canadensis (Canada Goldenrod)	1	0-3	43
Stachys palustris (Swamp Hedge-nettle)	<1	0-1	14
Urtica dioica (Stinging Nettle)	1	0-10	14
Ferns and Allies			
Equisetum hyemale (Common Scouring-rush)	1	0-10	14
Equisetum laevigatum (Smooth Scouring-rush)	2	0-10	29

SUCCESSIONAL INFORMATION

The *Salix lutea* (yellow willow) community type represents an early/mid-seral grazing disclimax of the *Salix lutea/Calamagrostis canadensis* (yellow willow/bluejoint reedgrass) habitat type or the *Salix lutea/Carex rostrata* (yellow willow/beaked sedge) habitat type. Physiological site changes may shift the potential climax vegetation to types in the *Populus tremuloides* (quaking aspen) series or the *Juniperus scopulorum* (Rocky Mountain juniper) series.

SOILS

Brichta (1987) indicates that soils may be classified as Entisols (Fluvents) or Mollisols. Soil textures of the upper surface horizons range from silty clays to sandy loams. Surface layers may be 45 cm (18 in) or more deep and are often integrated with high quantities of organic material. Underlying substrates are generally fine or coarse sands and gravels. Water tables may be at the surface or as deep as 1 m (39 in), but are expected to provide soil moisture to the upper horizons for the majority of the growing season. Oxidation/reduction reactions produce mottled or gleyed features in the soil solum where groundwater is prevalent. Litter/duff layers occur on sites with infrequent disturbance, and may be 5 cm (2 in) or more thick.

ADJACENT COMMUNITIES

Carex spp. (sedge), *Juncus* spp. (rush), *Eleocharis* spp. (spikesedge), and *Phalaris arundinacea* (reed canarygrass) occupy adjacent sites where surface water is readily available. Less disturbed sites may be occupied by either the *Salix lutea/Calamagrostis canadensis* (yellow willow/bluejoint reedgrass) habitat type, or, under more saturated conditions, the *Salix lutea/Carex rostrata* (yellow willow/beaked sedge) habitat type. The *Populus tremuloides/Cornus stolonifera* (quaking aspen/red-osier dogwood) habitat type or the *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type may occur on drier, upper floodplains.Where *Salix lutea* (yellow willow) is present as part of a mosaic, other *Salix* spp. (willow) and a variety of shrubs such as *Crataegus douglasii* (Black Hawthorn) and *Betula occidentalis* (water birch), may be present. Uplands may be dominated by *Juniperus scopulorum* (Rocky Mountain juniper)/grassland or *Artemisia tridentata* (big sagebrush)/grassland.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Where stands of this type are open and allow access for livestock, forage productivity may be high, resulting in potentially heavy utilization, especially as upland vegetation dries. *Poa pratensis* (Kentucky bluegrass) is a palatable and moderately productive grass, especially when soil moisture levels are high, and tolerates a high degree of defoliation. Herbage production is moderate. *Poa pratensis* (Kentucky bluegrass) is well adapted to grazing and is considered an increaser or an invader, especially if grazing intensities and durations are severe (Wasser 1982). This species can produce new shoots from both existing tillers or rhizomes. Grazing practices influence the type of growth form present (Volland 1978). A high density of weak, low vigor tillers results under season long grazing. Stem densities are emphasized over aboveground biomass. Grazing practices incorporating early season rest increase the vigor of individual plants. Fewer shoots may be produced, but total aboveground biomass tends to be greater (Hansen and others 1995).

Overuse by livestock will result in a reduced vigor by the willows present, as illustrated by highlining, clubbing, or dead clumps. With continued overuse, willows show a sharp decline in vigor and may be eventually eliminated from the site (Hansen and others 1995).

To minimize undesired changes in community composition and structure, pasture or allotment management should be based on the forage available from stands of this and other riparian or wetland communities. This con-

cept of the riparian or wetland pasture has had some success in maintaining or improving the health of riparian or wetland vegetation (Kinch 1987).

Frisina (1991) states that for a grazing program to be successful, it must meet the basic biological requirements of the plants such as photosynthesis, food storage, reproduction, and seedling establishment. In order to meet these requirements, long periods of rest are needed. It is during long growing season rest periods that the essential biological processes of food production and storage, reproduction, and seedling establishment take place. In some instances, additional periods of rest may be required to either improve or maintain a plant community.

Wildlife

Big game utilize this type for both summer and winter forage and browse. Winter elk use may be heavy (Gaffney 1941).

Beaver perform a vital role in the health and maintenance of riparian ecosystems. Beaver dams assist in controlling the downcutting of channels, bank erosion, and the movement of sediment downstream (Gordon and others 1992). When beaver construct a dam, they raise the water table in the area, which provides water for hydrophytic plants such as willows and sedges. The beaver dam also slows down the water in the channel, which allows suspended sediment to be deposited behind the dam. The combination of sediment deposition and plant reproduction raises the channel bed, creating a wetland environment which is excellent waterfowl and fish habitat. It has often been the policy of land managers to trap and kill beaver because they can be a nuisance. However, because beaver produce such desirable habitat and provide many beneficial stream functions, their removal from a riparian system needs to be closely evaluated. (Hansen and others 1995)

Fisheries

Salix spp. (willow) communities function in a variety of capacities to promote stream health and enhance fisheries. *Salix lutea* (yellow willow) forms dense root networks that stabilize streambanks against lateral cutting and erosion, provides cover in the form of overhanging branches and banks, and shades channels, effectively moderating extreme temperature fluctuations. It may act as a source of large woody debris or may trap large trees borne downstream, creating deeper pools and additional cover for fish species. Herbaceous understory species trap sediments, essentially building streambanks and filtering steam flows. As a source of food and building material *Salix* spp. (willow) attract beaver. Beaver ponds may provide excellent fishing opportunities if free of dense aquatic vegetation and numerous snags.

Fire

Prescribed burning in this type is an effective method of rejuvenating decadent clumps. The various willow species present in this type sprout vigorously following fire, especially in wetter stands. Quick, hot fires result in more sprouts than slower fires, which are potentially more damaging to the willows and tends to result in fewer sprouts (Hansen and others 1995).

Poa pratensis (Kentucky bluegrass) is damaged only by a hot, intense fire. Cool burns will have little effect on *Poa pratensis* (Kentucky bluegrass) (Volland and Dell 1981), but spring burns may lower tiller densities (Dix and

Smeins 1967). Intense burns during active growing periods can be used to control stands of *Poa pratensis* (Kentucky bluegrass) (Wasser 1982).

After burning, the site should be eliminated from livestock grazing for at least 2 to 3 years to avoid attracting livestock to young, palatable regrowth.

Soil Management and Rehabilitation Opportunities

Soils are easily damaged from trampling by livestock if grazed when moist. This disturbance often leads to soil compaction, streambank sloughing, damage to vegetation, and premature drying of the soil surface. Woody species provide the greatest amount of streambank protection. Herbaceous species rarely afford sufficient stream bank protection. Management should emphasize the importance of willows in protecting the streambank (Hansen and others 1995).

Salix lutea (yellow willow) is useful in streambank stabilization and revegetation projects (Platts and others 1987). Cuttings should be first rooted then grown in a nursery to insure survival. *Salix lutea* (yellow willow) produces an abundance of roots, mostly along the lower one-third of the cut stem. Cuttings are best taken in the spring from dormant two to four year old wood. Cuttings 30-50 cm (12-20 in) long and >1 cm (0.5 in) in diameter produce the best results. Roots and shoots from cuttings can be expected to appear 10 days after planting.

Recreational Uses and Considerations

Salix lutea (yellow willow) may form dense stands, preventing fishing access to anglers. However, where disturbance is prevalent, stands may become more open and provide greater opportunities for recreational activities When locating structures for camping or other purposes in this community type, avoid active floodplains or other sites that may be prone to disturbance.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = saturated to temporarily flooded.

OTHER STUDIES

Youngblood and others (1985b) identified a comparable *Salix lutea* (yellow willow) community type in eastern Idaho and western Wyoming. Hansen and others (1995) also document this type for the state of Montana in the Classification and Management of Montana's Riparian and Wetland Sites.

Acer grandidentatum Community Type

ACEGRA(ACGR)
Number Of Stands Sampled = 4

CAUTION—Not all sites currently dominated by *Acer grandidentatum* (bigtooth maple) are considered riparian or wetland sites. In some instances, they are considered upland sites. The topographic position of the site must match the description as presented in the Location and Associated Landform section.

LOCATION AND ASSOCIATED LANDFORMS

The *Acer grandidentatum* (bigtooth maple) community type is an incidental type at mid elevations throughout foothills and valleys across eastern and southern Idaho. Stands may be located on hillsides immediately below springs and seeps or on secondary floodplains of narrow canyon drainages characterized by surface or ephemeral flow. This community type occupies marginally riparian zones as small dense thickets, narrow stingers, or irregular patches, and appears intolerant of prolonged or frequent flooding. Sites range in elevation from 1,600 to 1,950 m (5,280 to 6,435 ft).

VEGETATION

An arborescent shrub, *Acer grandidentatum* (bigtooth maple) may reach heights of 10 m (33 ft) or more, often forming a dense, overhead canopy. Understory layers are extremely variable in terms of species constancy, composition and overall coverage. *Urtica dioica* (stinging nettle), *Osmorhiza chilensis* (mountain sweet-cicely), and *Heracleum lanatum* (cow-parsnip) may exhibit extremely lush growth on some sites while other sites may be essentially bereft of understory species, exhibiting only trace amounts of various forbs such as *Thalictrum occidentale* (western meadowrue) or *Smilacina stellata* (Solomon's seal). The levels and types of disturbances may account for the discrepancies between species composition and variability between sites. *Galium* spp.(bedstraw) are fairly constant understory species, and *Prunus virginiana* (common choke-cherry) appears on most stands, although often in a decadent state.

Table 1. Average canopy cover, range of canopy cover, and constancy for indicator species of the sampled stands of the *Acer grandidentatum*(bigtooth maple) community type (number = 4 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Trees			
Populus tremuloides (Quaking Aspen)	<1	0-1	25
Shrubs			
Acer glabrum (Rocky Mountain Maple)	<1	0-1	25
Acer grandidentatum (Bigtooth Maple)	89	80-98	100
Amelanchier alnifolia (Western Serviceberry)	3	0-10	25
Berberis repens (Creeping Oregongrape)	6	0-10	75
Cornus stolonifera (Red-osier Dogwood)	<1	0-1	25

Prunus virginiana (Common Chokecherry)	9	3-20	100
Ribes lacustre (Swamp Currant)	<1	0-1	25
Ribes setosum (Missouri Gooseberry)	1	0-3	25
Rosa woodsii (Woods Rose)	<1	0-1	25
Rubus parviflorus (Thimbleberry)	5	0-20	25
Sambucus racemosa (Red Elderberry)	1	0-3	25
Symphoricarpos oreophilus (Mountain Snowberry)	1	0-3	25
Graminoids			
Bromus inermis (Smooth Brome)	2	0-3	50
Bromus tectorum (Cheatgrass)	1	0-3	25
Carex backii (Back's Sedge)	<1	0-1	25
Elymus glaucus (Blue Wildrye)	3	0-10	50
Festuca subulata (Bearded Fescue)	<1	0-1	25
Grass perennial (Perennial Grass)	1	0-3	25
Poa bulbosa (Bulbous Bluegrass)	1	0-3	25
Forbs			
Actaea rubra (Baneberry)	1	0-3	25
Epilobium ciliatum (Common Willow-herb)	<1	0-1	25
Galium aparine (Goose-grass)	15	0-50	50
Galium triflorum (Sweetscented Bedstraw)	8	0-30	25
Geum aleppicum (Yellow Avens)	1	0-3	25
Heracleum lanatum (Cow-parsnip)	5	0-20	25
Lactuca serriola (Prickly Lettuce)	1	0-3	50
Leonurus cardiaca (Motherwort)	1	0-3	25
Montia perfoliata (Miner's Lettuce)	1	0-3	25
Onopordum acanthium (Scotch Thistle)	<1	0-1	25
Osmorhiza chilensis (Mountain Sweet-cicely)	8	0-20	50
Rudbeckia occidentalis (Black Head)	1	0-3	25
Silene menziesii (Menzies' Silene)	1	0-3	25
Smilacina racemosa (False Spikenard)	3	0-10	50
Smilacina stellata (Starry Solomon-plume)	1	0-3	25
Taraxacum officinale (Common Dandelion)	1	0-3	25
Thalictrum occidentale (Western Meadowrue)	2	0-3	50
Tragopogon dubius (Goat's Beard)	<1	0-1	25
Urtica dioica (Stinging Nettle)	5	0-20	50

SUCCESSIONAL INFORMATION

The *Acer grandidentatum* (bigtooth maple) community type appears to be a successional phase of the *Acer negundo/Prunus virginiana* (box-elder/common chokecherry) habitat type, but may represent a grazing disclimax for this type in some areas. In other regions it may act as an early to mid-seral stage for types in the *Populus tremu-*

loides (quaking aspen) series. *Acer grandidentatum* (bigtooth maple) attains greater heights than *Prunus virginiana* (common chokecherry) and may replace it completely in locations where these species converge. Due to the limited number of observations in Idaho, the successional status of this community type has yet to be fully explored.

SOILS

Soils are probably classified as Mollisols or Entisols. On sites where disturbance is infrequent, a comprehensive litter/duff layer 5 cm (2 in) or more thick, composed of leaf material and twigs, blends into an organic (O_a or O_e) horizon. Surface soil textures range from silt loams to silty clay loams, although *Acer grandidentatum* (bigtooth maple) appears able to occupy sandy sites outside of the riparian zone as well. Alluvial sand, gravel and cobble occur sporadically at the surface and generally constitute the main body of subsurface materials. *Acer grandidentatum* (bigtooth maple) may prefer well drained, older, more developed soils that afford good rooting depth and higher fertility, similar to sites occupied by *Prunus virginiana* (common chokecherry). Water tables are generally well below the surface, but may occur within 60 cm (24 in) on some sites. *Acer grandidentatum* (bigtooth maple) appears to be intolerant of frequent or prolonged flooding.

ADJACENT COMMUNITIES

Riparian corridors are often characterized by a diversity of species forming a mosaic of distinct, localized communities, in response to differences in moisture regimes, substrate composition, flooding frequency and a variety of other physical site factors. The *Acer grandidentatum* (bigtooth maple) community type may be associated with a variety of other shrub communities dominated by *Salix* spp. (willow), *Prunus virginiana* (common chokecherry), *Cornus stolonifera* (red-osier dogwood), *Betula occidentalis* (water birch), and *Crataegus douglasii* (Black Hawthorn). *Populus tremuloides* (quaking aspen), *Pseudotsuga menziesii* (Douglas fir), *Populus angustifolia* (Narrowleaf Cottonwood) and *Acer negundo* (box-elder) types may occupy neighboring sites along riparian corridors as well. Adjacent drier communities are typically dominated by *Juniperus scopulorum* (Rocky Mountain juniper) and *Artemisia tridentata* (big sagebrush)/grasslands.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

The forage potential of the *Acer grandidentatum* (bigtooth maple) community type is unknown, but probably ranges from low to moderate depending on the composition and coverage of the understory species. Although *Acer glabrum* (Rocky Mountain maple) is browsed by elk and moose (Lackschewitz 1991), *Acer grandidentatum* (bigtooth maple) appears to be less palatable .

Wildlife

The literature is limited regarding the use of the *Acer grandidentatum* (bigtooth maple) community type by wildlife. *Acer glabrum* (Rocky Mountain maple) provides valuable browse for elk and moose and the seeds are eaten by grosbeaks and small mammals (Lackschewitz 1991). The *Acer grandidentatum* (bigtooth maple) community type may provide cover and possibly minor browsing opportunities for wild ungulates and small mammals as well as a seed source for small birds and rodents.

Fisheries

Acer grandidentatum (bigtooth maple) stands forms dense overhead canopies and should maintain cooler water temperatures during hot summer months where they occur adjacent to stream channels. The understory component varies considerably, and although root systems of *Acer grandidentatum* (bigtooth maple) may stabilize streambanks, a sparse understory component may not contribute to sediment filtering or erosion control.

Fire

Fire tolerance for this community type is unknown at this time. However, *Prunus virginiana* (common chokecherry) will survive all but a hot, intense fire and has an aggressive root system that sprouts vigorously from surviving root crowns after fire (Hansen and others 1995). *Acer grandidentatum* (bigtooth maple) and *Prunus virginiana* (common chokecherry) seem to occupy somewhat similar locations on the landscape and may have developed similar strategies to survive fires.

Soil Management and Rehabilitation Opportunities

The litter/duff layer may protect surface soils from minor compaction; however, during the spring when soils are saturated and susceptible to compaction, livestock and vehicle use should be restricted in riparian zones.

Hansen and others (1995) indicate that *Acer negundo* (box-elder) is well adapted to planting on disturbed sites. The *Acer grandidentatum* (bigtooth maple) community type may be a seral stage to the *Acer negundo/Prunus virginiana* (box-elder/common chokecherry) habitat type. Where disturbance has reduced the vigor and density of stands of *Acer grandidentatum* (bigtooth maple), rooted cuttings of *Acer negundo* (box-elder) and possibly *Acer grandidentatum* (bigtooth maple) may be planted on moist, well-drained soils to restabilize riparian corridors.

Recreational Uses and Considerations

Acer grandidentatum (bigtooth maple) produces seeds and provides cover attractive to a variety of wildlife species and may offer decent viewing opportunities for bird watchers and other naturalists. A member of the maple (*Acer*) family, *Acer grandidentatum* (bigtooth maple) may exhibit vibrant fall foliage. Where the understory is sparse, picnicking and primitive camping are also an option on this type.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

OTHER STUDIES

This community has not been described in other classifications.

Alnus incana Community Type
(Mountain Alder Community Type)

ALNINC (ALIN2)
Number Of Stands Sampled = 2

LOCATION AND ASSOCIATED LANDFORMS

The *Alnus incana* (mountain alder) community type appears throughout mountains, foothills and valleys of eastern Idaho. This major type ranges in elevation from 1,576 to 2,100 m (5,200 to 6,930 ft). It forms narrow stringers on banks and floodplains of fast moving streams in canyon bottoms, irregular clusters near hillside springs and seeps, or bands along the perimeter of beaver ponds. The *Alnus incana* (mountain alder) community type generally represents one of any number of discreet riparian communities that occupy microsites along stream and riverine systems and form the mosaic pattern of vegetation common to so many riparian corridors.

VEGETATION

In Idaho, *Alnus incana* (mountain alder) establishes a dense overstory canopy in the upper tier of the two-tiered shrub segment characteristic of this community type. Less well-represented shrubs in the lower strata include *Cornus stolonifera* (red-osier dogwood) and *Ribes lacustre* (swamp currant). A variety of graminoids and forbs compose the undergrowth, including, but not limited to, *Carex* spp. (sedge), *Poa pratensis* (Kentucky bluegrass), *Heracleum lanatum* (cow-parsnip), and *Actaea rubra* (baneberry). Moss may be present in scattered pockets where sufficient moisture is available. Trunks of *Alnus incana* (mountain alder) often parallel the ground for a number of feet before attaining a more vertical growth form, developing nearly impenetrable stands in some locations. Types and levels of disturbance may account for inconsistencies in species compositions between sites.

Table 2. Average canopy cover, range of canopy cover, and constancy for species recorded in stands of the *Alnus incana* (mountain alder) community type that are relatively undisturbed by livestock or wildlife (number = 2 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Trees			
Juniperus scopulorum (Rocky Mountain Juniper)	<1	0-1	50
Shrubs			
Alnus incana (Mountain Alder)	84	70-98	100
Betula occidentalis (Water Birch)	<1	0-1	50
Cornus stolonifera (Red-osier Dogwood)	15	0-30	50
Ribes inerme (Whitestem Gooseberry)	<1	0-1	50
Ribes lacustre (Swamp Currant)	25	1-50	100

Ribes odoratum (Buffalo Currant)	2	0-3	50
Rosa woodsii (Woods Rose)	5	0-10	50
Symphoricarpos occidentalis (Western Snowberry)	2	0-3	50
Graminoids			
Agropyron repens (Quackgrass)	5	0-10	50
Carex spp. (Sedge)	2	0-3	50
Carex microptera (Small-winged Sedge)	2	0-3	50
Glyceria striata (Fowl Mannagrass)	<1	0-1	50
Poa palustris (Fowl Bluegrass)	2	0-3	50
Poa pratensis (Kentucky Bluegrass)	5	0-10	50
Forbs			
Achillea millefolium (Common Yarrow)	2	0-3	50
Actaea rubra (Baneberry)	1	1-1	100
Cardamine oligosperma (Few-seeded Bittercress)	<1	0-1	50
Cynoglossum officinale (Common Hound's-tongue)	<1	0-1	50
Epilobium watsonii (Watson's Willow-herb)	<1	0-1	50
Geranium viscosissimum (Sticky Geranium)	5	0-10	50
Geum macrophyllum (Larged-leaved Avens)	<1	0-1	50
Heracleum lanatum (Cow-parsnip)	5	0-10	50
Lactuca serriola (Prickly Lettuce)	<1	0-1	50
Lappula redowskii (Western Stickseed)	<1	0-1	50
Mimulus guttatus (Common Monkey-flower)	<1	0-1	50
Montia chamissoi (Water Montia)	<1	0-1	50
Nepeta cataria (Catnip)	2	0-3	50
Smilacina stellata (Starry Solomon-plume)	<1	0-1	50
Stellaria calycantha (Northern Starwort)	<1	0-1	50
Taraxacum officinale (Common Dandelion)	2	0-3	50
Thalictrum occidentale (Western Meadowrue)	<1	0-1	50
Ferns and Allies			
Equisetum hyemale (Common Scouring-rush)	2	0-3	50

SUCCESSIONAL INFORMATION

Types in the *Populus tremuloides* (quaking aspen) series or the *Salix geyeriana* (Geyer willow) series may represent the climax vegetation on sites occupied by the *Alnus incana* (mountain alder) community type. However, where beaver have decimated stands of either of these types to an unrecoverable state, *Alnus incana* (mountain alder) may persist as the dominant species for many years. Slightly drier locations occupied by the *Alnus incana* (mountain alder) community type may climax to either the *Pseudotsuga menziesii/Cornus stolonifera* (Douglas fir/red-osier dogwood) or *Juniperus scopulorum /Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) habitat types, although *Alnus incana* (mountain alder) often remains present as an understory component. Hansen and others (1995) indicate that the *Alnus incana* (mountain alder) community type appears to be a mid-seral dis-

turbance community type and tends to established after severe disturbance. Stands in Montana are located along mined streams (placer mining), streams with yearly ice jam problems, or streams that were used historically in transporting logs to mills (streams with a high occurrence of splash dams).

SOILS

Soils are typically Entisols (Fluvents) and Mollisols (Borolls), although Inceptisols (Ochrepts) may be present on some sites (Padgett and others 1989). Nutrient rich surface horizons, extending to depths of 25 cm (10 in) or more, have a silty clay or silty clay loam texture. Underlying substrates are predominantly alluvial sands, gravels and cobbles, or in some cases, bedrock. *Alnus incana* (mountain alder) may tolerate frequent or prolonged flooding, and seems to prefer sites containing unconsolidated coarse fragments in the lower soil profile that promote subsurface flow of aerated ground water (Padgett and others 1989). *Alnus* spp. (alder) cycle nitrogen into the soil through root nodules and nitrogen-rich leaf litter, increasing soil fertility. Where sites occur above the active floodplain, leaf litter may accumulate in excess of 5 cm (2 in).

ADJACENT COMMUNITIES

Alnus incana (mountain alder) seldom dominates an entire drainage as a single monotype, but is generally distributed throughout riparian corridors with a variety of other species, each occupying specific microsites according to moisture, substrate and a variety of other physical factors. Associated shrub communities may include *Cornus stolonifera* (red-osier dogwood), *Betula occidentalis* (water birch), *Salix geyeriana* (Geyer willow), *Salix lasiandra* (Pacific willow), and *Salix boothii*(Booth willow). *Carex* spp. (sedge) and *Eleocharis* spp. (spikesedge) types colonize the streamside zone and immediate shallows. *Pseudotsuga menziesii* (Douglas fir) and *Populus tremuloides* (quaking aspen) forests may occupy both the riparian corridors or the adjacent drier uplands. *Juniperus scopulorum* (Rocky Mountain juniper)/grasslands and *Artemisia tridentata* (big sagebrush) steppe establish on upland hillsides and plains.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Hansen and others (1995) note that this type is of limited value for livestock because of the typically dense shrub layer. More open stands provide moderate amounts of forage, and are used as a source of summer shade. *Alnus incana* (mountain alder) is infrequently browsed by livestock but is susceptible to trampling damage as animals search for palatable plants (Kovalchik 1986, Kovalchik 1987). Dense stands of *Alnus incana* (mountain alder) hinder access by cattle, but heavy grazing can result in the loss of this type by creating a dish-shaped stream channel and a water regime unsuitable for *Alnus incana* (mountain alder).

Wildlife

Browsing of older *Alnus incana* (mountain alder) stems is typically low but use of young twigs, sprouts, and associated shrubs and grasses may be heavy. The high structural diversity of this community type provides thermal and hiding cover for ungulates such as whitetail and mule deer (Healy and Gill 1974). Elk may make light to moderate use of *Alnus incana* (mountain alder) community type during the summer and fall (Kufeld 1973). Asso-

ciated shrub and herbaceous species also provide browse and forage. Numerous bird species use this type for both food and nesting (Hansen and others 1995).

Fisheries

Alnus incana (mountain alder), more than other shrub species, exhibits a horizontal growth form at the ground level that provides excellent cover and shade for fisheries. This community type helps to stabilize streambanks, creates overhanging banks, and lessens erosion caused by spring floods. Streams lined with this community type may develop deep and narrow channels, providing cover, spawning sites, food, and the cool temperatures favored by trout and other salmonoids (Hansen and others 1995).

Fire

In the *Alnus incana* (mountain alder) community type, all but light ground fires should be avoided. Intense burns will kill the shrub, leaving only a sparse herbaceous understory to protect the site from erosion and bank destabilization (Kovalchik 1986, Kovalchik 1987). However, *Alnus incana* (mountain alder) sprouts readily and retains its vigor when cut at four or five year intervals. Cutting in spring and winter results in rapid growth of sprouts, while cutting in mid summer produces fewer, slower growing sprouts. (Hansen and others 1995)

Soil Management and Rehabilitation Opportunities

Coarse textured soils and high coarse fragment contents minimize most soil compaction problems associated with development. Management should greatly consider maintaining this type because of its excellent streambank stabilization values (Hansen and others 1995)

Recreational Uses and Considerations

Recreational values of this community type are primarily connected with the associated high quality fishery. Dense stands limit canoe or raft access, and camping sites are often unsuitable due to moist or wet conditions (Hansen and others 1995).

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded.

OTHER STUDIES

Similar communities have been described for Idaho and western Wyoming by Tuhy and Jensen (1982), Mutz and Queiroz (1983), Youngblood and others (1985b), and Chadde and others (1988). *Alnus incana* (mountain alder) dominated communities were also described for Utah and southeastern Idaho by Padgett and others (1989), and for portions of Oregon by Kovalchik (1987). Finally, a somewhat similar community type was described by Szaro (1989) for Arizona and New Mexico.

Artemisia cana/Agropyron smithii Habitat Type
(Silver Sagebrush/Western Wheatgrass Habitat Type)

ARTCAN/AGRSMI (ARCA13/AGSM)
Number Of Stands Sampled In Montana = 43

CAUTION—Not all sites currently dominated by *Artemisia cana* (silver sagebrush) are considered riparian or wetland sites. In some instances, they are considered upland sites. The topographic position of the site must match the description as presented in the Location and Associated Landform section.

NOTE: The *Artemisia cana/Agropyron smithii* (silver sagebrush/western wheatgrass) habitat type has been documented in Idaho according to field surveys conducted in 1994. However, due to time constraints during the 1995 field season, homogeneous stand data could not be collected for this type. In the subsequent discussion, any references to physical site location or vegetation characteristics for this type in Idaho were interpreted from 1994 field surveys. The remainder of this description was taken from the Classification and Management of Montana's Riparian and Wetland Sites (Hansen and others 1995).

LOCATION AND ASSOCIATED LANDFORMS

The *Artemisia cana/Agropyron smithii* (silver sagebrush/western wheatgrass) habitat type occupies nearly level, older alluvial terraces on both broad and narrow floodplains and coalescing alluvial fans in valleys. It is a minor type throughout central and eastern Idaho. The *Artemisia cana/Agropyron smithii* (silver sagebrush/western wheatgrass) habitat type represents one of the driest extremes of the riparian or wetland zone. Sites are either located in deep, loamy, alluvial soils, or where either overland flow or soil conditions (fine textured soils), or a combination of both, allow for a greater than normal moisture regime. In many situations, the fine textured soils have resulted in a perched water table. The *Artemisia cana/Agropyron smithii* (silver sagebrush/western wheatgrass) habitat type has been found to function as a disturbance-caused (disclimax) habitat type where site potential has changed due to prolonged heavy grazing. Site elevations were recorded in the vicinity from 1,697 m (5,600 ft).

VEGETATION

In Montana, *Artemisia cana* (silver sagebrush) dominates the shrub layer and *Agropyron smithii* (western wheatgrass) dominates the herbaceous layer. *Stipa viridula* (green needlegrass) is important in undisturbed sites (Table 3). Table 3 reflects vegetation surveyed on sites in Montana only, and may not accurately portray species composition and canopy cover for sites identified in Idaho.

In Idaho, *Artemisia cana* (silver sagebrush) dominates the shrub layer. *Ribes odoratum* (buffalo currant) and *Rosa woodsii* (woods rose) may also be present in scattered clumps. Understory species generally consist of *Agrostis stolonifera* (redtop), *Juncus balticus* (Baltic rush), and *Poa pratensis* (Kentucky bluegrass). The signature species *Agropyron smithii* (western wheatgrass) is often absent.

Table 3. Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax stands of the *Artemisia cana/Agropyron smithii* (silver sagebrush/western wheatgrass) habitat type (number = 5 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Shrubs			
Artemisia cana (silver sagebrush)	38	30-40	100
Artemisia frigida (fringed sage)	1	0-1	20
Ceratoides lanata (winterfat)	1	0-1	20
Gutierrezia sarothrae (broom snakeweed)	1	0-1	20
Graminoids			
Agropyron caninum (bearded wheatgrass)	3	0-3	20
Agropyron smithii (western wheatgrass)	85	50-98	100
Bouteloua gracilis (blue grama)	1	0-1	20
Bromus japonicus (Japanese brome)	10	0-10	20
Calamagrostis stricta (narrow-spiked reedgrass)	1	0-1	40
Distichlis spicata (inland saltgrass)	1	0-1	20
Koeleria cristata (prairie junegrass)	1	0-1	20
Stipa comata (needle-and-thread)	1	0-1	20
Stipa viridula (green needlegrass)	9	0-30	80
Forbs			
Achillea millefolium (common yarrow)	1	0-1	20
Conyza canadensis (horseweed)	1	0-1	20
Erigeron strigosus (branching daisy)	1	0-1	20
Grindelia squarrosa (curlycup gumweed)	1	0-1	20
Lactuca oblongifolia (blue lettuce)	1	0-1	20
Melilotus officinalis (yellow sweet-clover)	1	0-3	60
Parietaria pensylvanica (Pennsylvania pellitory)	1	0-1	20
Ratibida columnifera (prairie coneflower)	1	0-1	20
Sisymbrium altissimum (tumblemustard)	1	0-1	20
Sphaeralcea coccinea (red globe-mallow)	1	0-1	20
Taraxacum officinale (common dandelion)	1	0-1	20
Tragopogon dubius (goat's beard)	1	0-1	20
Vicia americana (American vetch)	1	0-1	20

SUCCESSIONAL INFORMATION

Following disturbance, *Poa pratensis* (Kentucky bluegrass), *Bromus japonicus* (Japanese brome), *Bouteloua gracilis*

(blue grama), *Achillea millefolium* (common yarrow), and *Taraxacum officinale* (common dandelion) increase dramatically. Cover of *Agropyron smithii* (western wheatgrass) and *Stipa viridula* (green needlegrass) decreases noticeably. Palatable species still present in severely overgrazed stands are restricted to areas beneath the canopies of *Artemisia cana* (silver sagebrush) (Table 4).

Table 4. Average canopy cover, range of canopy cover, and constancy for species recorded in disturbed and/or early to mid-seral stands of the *Artemisia cana/Agropyron smithii* (silver sagebrush/western wheatgrass) habitat type (number = 38 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Trees			
Juniperus scopulorum (Rocky Mountain juniper)	2	0-3	5
Populus deltoides (Great Plains cottonwood)	10	0-20	5
Salix amygdaloides (peach-leaf willow)	1	0-1	3
Shrubs			
Artemisia cana (silver sagebrush)	31	0-60	100
Artemisia frigida (fringed sagewort)	3	0-20	43
Artemisia tridentata (big sagebrush)	1	0-1	3
Atriplex confertifolia (shadscale)	3	0-3	3
Ceratoides lanata (winterfat)	3	0-3	3
Chrysothamnus nauseosus (common rabbitbrush)	12	0-20	5
Chrysothamnus viscidiflorus (green rabbitbrush)	3	0-3	5
Clematis ligusticifolia (western virgins-bower)	20	0-20	3
Crataegus succulenta (succulent hawthorn)	70	0-70	3
Gutierrezia sarothrae (broom snakeweed)	1	0-1	3
Rhus aromatica (fragrant sumac)	1	0-1	8
Rosa spp. (rose)	3	0-3	3
Rosa woodsii (woods rose)	5	0-40	24
Sarcobatus vermiculatus (black greasewood)	13	0-20	11
Shepherdia argentea (thorny buffaloberry)	20	0-20	3
Symphoricarpos occidentalis (western snowberry)	18	0-60	50
Tamarix chinensis (salt cedar)	1	0-1	3
Graminoids			
Agropyron caninum (bearded wheatgrass)	21	0-40	13
Agropyron cristatum (crested wheatgrass)	30	0-60	5
Agropyron repens (quackgrass)	22	0-40	5
Agropyron smithii (western wheatgrass)	49	0-90	95
Bouteloua gracilis (blue grama)	16	0-60	18
Bromus inermis (smooth brome)	8	0-20	11

Bromus japonicus (Japanese brome)	23	0-60	29
Calamovilfa longifolia (prairie sandgrass)	18	0-40	18
Carex brevior (short-beaked sedge)	3	0-3	3
Carex filifolia (thread-leaved sedge)	1	0-1	3
Distichlis spicata (inland saltgrass)	16	0-60	18
Elymus canadensis (Canada wildrye)	6	0-20	11
Elymus cinereus (basin wildrye)	70	0-70	3
Elymus spp. (wildrye)	1	0-1	3
Festuca octoflora (six-weeks fescue)	1	0-1	3
Hordeum spp. (barley)	1	0-1	3
Hordeum jubatum (foxtail barley)	1	0-1	3
Koeleria cristata (prairie Junegrass)	1	0-1	3
Muhlenbergia racemosa(Satin grass)	5	0-20	11
Panicum capillare (common witchgrass)	1	0-1	3
Poa arida (plains bluegrass)	20	0-20	3
Poa bulbosa (bulbous bluegrass)	22	0-40	5
Poa fendleriana (muttongrass)	3	0-3	3
Poa glaucifolia (pale-leaf bluegrass)	1	0-1	3
Poa interior (inland bluegrass)	12	0-20	5
Poa palustris (fowl bluegrass)	2	0-3	5
Poa pratensis (Kentucky bluegrass)	28	0-60	39
Poa sandbergii (Sandberg's bluegrass)	20	0-20	3
Poa spp. (bluegrass)	7	0-20	8
Puccinellia nuttalliana (Nuttall's alkaligrass)	3	0-3	3
Setaria viridis (green bristlegrass)	1	0-1	3
Spartina gracilis (alkali cordgrass)	1	0-1	5
Spartina pectinata (prairie cordgrass)	34	0-90	8
Sporobolus airoides (alkali sacaton)	3	0-3	3
Sporobolus cryptandrus (sand dropseed)	15	0-40	8
Stipa comata (needle-and-thread)	11	0-20	13
Stipa viridula (green needlegrass)	11	0-40	53
Forbs			
Achillea millefolium (common yarrow)	5	0-20	37
Agoseris glauca (pale agoseris)	1	0-1	3
Alyssum alyssoides (pale alyssum)	1	0-1	3
Arnica latifolia (broadleaf arnica)	1	0-1	3
Artemisia dracunculus (tarragon)	1	0-1	3
Artemisia ludoviciana (prairie sagewort)	10	0-20	24
Asclepias speciosa (showy milkweed)	1	0-1	3
Astragalus agrestis (field milk-vetch)	1	0-1	3
Aster ericoides (white aster)	1	0-1	3

Aster spp. (aster)	1	0-1	3
Aster oblongifolius (aromatic aster)	1	0-1	3
Bassia hyssopifolia (fivehook bassia)	3	0-3	5
Calystegia sepium (hedge bindweed)	3	0-3	3
Camelina microcarpa (gold-of-pleasure)	1	0-1	3
Chenopodium album (lambsquarter)	1	0-1	5
Chenopodium leptophyllum (slimleaf goosefoot)	1	0-1	5
Chenopodium spp. (goosefoot)	2	0-3	5
Chrysopsis villosa (hairy golden-aster)	1	0-1	5
Cirsium arvense (Canada thistle)	3	0-3	3
Cirsium vulgare (bull thistle)	3	0-3	3
Conyza canadensis (horseweed)	3	0-3	3
Coryphantha vivipara (pincushion cactus)	1	0-1	3
Cynoglossum officinale (common hounds-tongue)	1	0-1	5
Descurainia sophia (flixweed tansymustard)	1	0-1	3
Euphorbia esula (leafy spurge)	20	0-20	3
Euphorbia spathulata (spatulate-leaved spurge)	1	0-1	3
Galium aparine (goose-grass)	1	0-1	3
Gaura coccinea (scarlet gaura)	2	0-3	13
Glycyrrhiza lepidota (American licorice)	10	0-50	16
Grindelia squarrosa (curlycup gumweed)	1	0-3	8
Hedeoma hispidum (rough pennyroyal)	1	0-1	5
Helianthus rigidus (showy sunflower)	1	0-1	3
Kochia scoparia (summer cypress)	1	0-1	11
Lactuca oblongifolia (blue lettuce)	7	0-20	11
Lappula echinata (bristly stickseed)	1	0-1	3
Lappula redowskii (western stickseed)	1	0-1	3
Lepidium densiflorum (prairie pepper weed)	1	0-1	3
Lepidium spp. (pepperweed)	1	0-1	3
Lepidium perfoliatum (clasping pepperweed)	5	0-10	8
Linum perenne (blue flax)	2	0-3	5
Medicago sativa (alfalfa)	1	0-1	3
Melilotus alba (white sweet-clover)	4	0-10	8
Melilotus officinalis (yellow sweet-clover)	1	0-3	11
Mentzelia nuda (bractless mentzelia)	1	0-1	3
Monarda fistulosa (horsemint)	1	0-1	3
Monolepis nuttalliana (poverty weed)	2	0-3	8
Oenothera biennis (common evening-primrose)	1	0-1	3
Opuntia fragilis (brittle prickly-pear)	10	0-20	5
Opuntia polyacantha (plains prickly-pear)	5	0-20	13
Parietaria pensylvanica (Pennsylvania pellitory)	2	0-3	8

Plantago patagonica (Indian-wheat)	1	0-1	3
Polygonum aviculare (prostrate knotweed)	1	0-1	3
Psoralea argophylla (silver-leaved scurf-pea)	1	0-1	3
Ratibida columnifera (prairie coneflower)	1	0-1	5
Salsola iberica (Russian thistle)	20	0-20	3
Sisymbrium altissimum (tumblemustard)	1	0-1	3
Sisymbrium loeselii (Loeselii tumblemustard)	1	0-1	5
Smilacina stellata (starry Solomon-plume)	1	0-1	5
Solidago canadensis (Canada goldenrod)	1	0-1	3
Solidago gigantea (late goldenrod)	1	0-1	3
Solidago missouriensis (Missouri goldenrod)	3	0-3	3
Solidago mollis (velvety goldenrod)	3	0-3	3
Solidago rigida (stiff goldenrod)	1	0-1	3
Sphaeralcea coccinea (red globe-mallow)	2	0-3	8
Taraxacum officinale (common dandelion)	3	0-10	18
Thalictrum dasycarpum (purple meadowrue)	1	0-1	3
Thlaspi arvense (field pennycress)	5	0-10	11
Tragopogon dubius (goat's beard)	2	0-3	8
Trifolium spp. (clover)	1	0-1	3
Vicia americana (American vetch)	3	0-10	21
Xanthium strumarium (common cocklebur)	1	0-1	3

Some sites may currently be dominated by widely spaced, decadent cottonwood communities with an understory of *Artemisia cana* (silver sagebrush) and *Agropyron smithii* (western wheatgrass). In some situations, *Symphoricarpos occidentalis* (western snowberry) may be present. These widely spaced, decadent cottonwood communities with an understory of *Artemisia cana* (silver sagebrush) and *Agropyron smithii* (western wheatgrass) represent a mid/late seral primary successional stage of the *Artemisia cana/Agropyron smithii* (silver sagebrush/western wheatgrass) habitat type.

SOILS

Soil texture varies little between clay loam to loam. *Artemisia cana* (silver sagebrush) is very tolerant of imperfect drainage, high water tables and periodic flooding. Overland flows caused by spring runoff and storm events help to recharge the water table. Redox concentrations (mottles) are common, indicating a fluctuating water table. Available water is estimated at moderate. Soil reaction ranges between slightly acid to moderately alkaline (pH 6.0 to 8.0). Some sites sampled occurred on weakly saline soils.

ADJACENT COMMUNITIES

Adjacent wetter sites may be the *Fraxinus pennsylvanica/Prunus virginiana* (green ash/common chokecherry) or the *Acer negundo/Prunus virginiana* (box-elder/common chokecherry) habitat types. In other situations, wetter sites may be dominated by cottonwood or willows. Adjacent drier sites are dominated by a variety of upland shrub

and/or grassland communities.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Forage production is moderate to high. Palatability of *Artemisia cana* (silver sagebrush) is rated as low for cattle and fair for sheep. However, *Agropyron smithii* (western wheatgrass) is highly desired by livestock. *Agropyron smithii* (western wheatgrass) is palatable and nutritious when green in the spring, and moderately so during other times of the year (Johnson and Nichols 1982). Vigorous rhizomes make *Agropyron smithii* (western wheatgrass) one of the more tolerant of the desirable and abundant grasses to grazing pressure and drought. However, overgrazing in May and June will decrease its abundance. When growing conditions improve, as is the case following drought or overgrazing, it may rapidly colonize areas previously occupied.

Use in winter by all types of grazing animals may be especially heavy when snow covers low growing vegetation. Many sites are used as winter grounds for livestock due to the availability of water sources (e.g. springs, streams, etc.).

Herbicides have been effective in eliminating *Artemisia cana* (silver sagebrush) and releasing the various grass species if applied when *Artemisia cana* (silver sagebrush) is phenologically active. If grazing has eliminated the more desirable grasses, broadleaf forbs may become dominant.

Wildlife

Palatability of *Artemisia cana* (silver sagebrush) is rated as good for deer, elk, and antelope, especially is the winter and when snow covers low growing vegetation. However, *Agropyron smithii* (western wheatgrass) is highly desired by wildlife such as deer and antelope. *Agropyron smithii* (western wheatgrass) is palatable and nutritious when green in the spring, and moderately so during other times of the year (Johnson and Nichols 1982).

The moderate structural diversity of the *Artemisia cana* (silver sagebrush) provides thermal and hiding cover for big game and upland bird species. The *Artemisia cana/Agropyron smithii* (silver sagebrush/western wheatgrass) habitat type provides food and nesting cover for sage grouse, and is an important winter habitat for antelope. Therefore, heavy grazing pressure by livestock in this habitat type may have serious consequences for antelope.

Fire

Artemisia cana (silver sagebrush) usually sprouts vigorously from root suckers following spring burns, with associated increases in the cover of the palatable grasses (White and Currie 1982). Fall burns typically have higher shrub mortality rates and reduce the vigor of *Artemisia cana* (silver sagebrush) sprouts.

Agropyron smithii (western wheatgrass) has a good tolerance to fire in the dormant state. It usually survives fires during the growing season but recovery may be delayed (Wasser 1982).

Soil Management and Rehabilitation Opportunities

Artemisia cana (silver sagebrush) may be useful in revegetating some degraded wetland sites. It is well adapted to newly exposed soils and tolerates short periods of flooding. *Artemisia cana* (silver sagebrush) is used in seed mixtures for big game range restoration, highway stabilization and beautification, and in mine reclamation work (Wasser 1982). Establishment is through direct seeding or the use of seedlings. Seedling success rates are typically high and growth rates are rapid. It is important to reduce competition in preparing a seedbed and to reduce animal stocking and weed competition during seedling establishment period. Established plants provide a fair measure of soil stability.

Agropyron smithii (western wheatgrass) is potentially valuable for revegetating disturbed or degraded wetland sites. Using transplants will speed the recovery process as seedlings are typically slow growing. However, once established, plants will quickly spread by rhizomes.

Recreational Uses and Considerations

Recreational opportunities are excellent for both big game and upland bird hunting. Sites may offer excellent opportunities for campsites or nature trails, as long as soils do not have much clay.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

OTHER STUDIES

This discussion is an expanded description of the *Artemisia cana/Agropyron smithii* (silver sagebrush/western wheatgrass) habitat type as defined by Hansen and others (1984) and Hansen and Hoffman (1988). Similar types have been described for the northern Great Plains by Hanson and Whitman (1938), Mackie (1970), and Jorgensen (1979).

Betula occidentalis Community Type
(Water Birch Community Type)

BETOCC (BEOC2)

Number Of Stands Sampled = 7

LOCATION AND ASSOCIATED LANDFORMS

The *Betula occidentalis* (water birch) community type is a major type at low to mid elevations throughout valleys

and foothills of central and eastern Idaho. Sites range from 1,550 to 1,879 m (5,200 to 6,200 ft). This type develops on a wide range of landforms, from islands and broad floodplains associated with riverine systems to alluvial terraces along fast-flowing streams at the bottom of narrow U-and V-shaped canyons In some instances, it is also located below springs and seeps on rocky hillsides. Stands of *Betula occidentalis* (water birch) may appear as irregular clusters near seeps, occur as bands along narrow alluvial shelves or develop into broader swaths on extensive riverine floodplains.

VEGETATION

The *Betula occidentalis* (water birch) community type may exhibit a diversity of growth forms. *Betula occidentalis* (water birch) may appear as an arborescent shrub in some locales or as a single-trunked, medium sized tree elsewhere. Where a robust secondary shrub layer is present, this type may display a two-tiered profile, yet where it occurs on disturbed sites, such as active floodplains, understory species may be essentially absent. In general, however, *Betula occidentalis* (water birch) appears in shrub form, establishing a closed overhead canopy. *Rosa woodsii* (woods rose), *Salix exigua* (sandbar willow), and *Cornus stolonifera* (red-osier dogwood) are commonly affiliated subordinate shrubs. The graminoid and forb component, which is quite diverse, is usually dominated by disturbance-induced species, often represented by *Agrostis stolonifera* (redtop), *Poa pratensis* (Kentucky bluegrass), *Smilacina stellata* (starry Solomon-plume), *Glycyrrhiza lepidota* (American licorice) and *Equisetum* spp. (horsetail).

Table 5. Average canopy cover, range of canopy cover, and constancy for species recorded in sampled stands of the *Betula occidentalis* (water birch) community type (number = 7 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Trees			
Juniperus scopulorum (Rocky Mountain Juniper)	<1	0-1	14
Populus angustifolia (Narrowleaf Cottonwood)	<1	0-3	14
Pseudotsuga menziesii (Douglas Fir)	<1	0-1	14
Shrubs			
Amelanchier alnifolia (Western Serviceberry)	<1	0-1	14
Berberis repens (Creeping Oregongrape)	<1	0-1	14
Betula occidentalis (Water Birch)	78	40-98	100
Clematis ligusticifolia (Western Virgins-bower)	1	0-10	14
Cornus stolonifera (Red-osier Dogwood)	19	0-50	86
Ribes lacustre (Swamp Currant)	2	0-10	29
Ribes odoratum (Buffalo Currant)	<1	0-1	14
Ribes setosum (Missouri Gooseberry)	<1	0-3	14
Rosa woodsii (Woods Rose)	8	0-30	57
Salix bebbiana (Bebb Willow)	<1	0-3	14
Salix boothii (Booth Willow)	1	0-10	14
Salix exigua (Sandbar Willow)	3	0-20	29

Salix lutea (Yellow Willow)	2	0-10	29
Graminoids			
Agrostis exarata (Spike Bentgrass)	<1	0-1	14
Agropyron smithii (Western Wheatgrass)	<1	0-1	14
Agrostis stolonifera (Redtop)	20	0-70	43
Carex spp. (Sedge)	<1	0-1	14
Carex microptera (Small-winged Sedge)	<1	0-1	14
Dactylis glomerata (Orchard-grass)	<1	0-1	14
Elymus cinereus (Basin Wildrye)	<1	0-1	14
Elymus glaucus (Blue Wildrye)	<1	0-3	14
Grass perennial (Perennial Grass)	1	0-10	14
Juncus balticus (Baltic Rush)	<1	0-3	14
Phalaris arundinacea (Reed Canarygrass)	1	0-10	14
Poa pratensis (Kentucky Bluegrass)	25	0-70	71
Stipa viridula (Green Needlegrass)	<1	0-3	14
Forbs			
Aquilegia flavescens (Yellow Columbine)	<1	0-3	14
Arctium minus (Common Burdock)	<1	0-3	14
Artemisia ludoviciana (Prairie Sagewort)	<1	0-3	14
Astragalus cicer (Chick-pea Milk-vetch)	<1	0-1	14
Aster eatonii (Eaton's Aster)	<1	0-3	14
Aster spp. (Aster)	<1	0-1	14
Aster laevis (Smooth Aster)	<1	0-3	14
Aster modestus (Few-flowered Aster)	1	0-10	14
Astragalus spp. (Milk-vetch; Orophaca)	<1	0-1	14
Berula erecta (Cut-leaved Water-parsnip)	<1	0-1	14
Cicuta maculata (Spotted Water-hemlock)	<1	0-3	14
Cirsium arvense (Canada Thistle)	2	0-10	71
Cirsium vulgare (Bull Thistle)	<1	0-3	14
Cynoglossum officinale (Common Hound's-tongue)	<1	0-3	14
Epilobium alpinum (Alpine Willow-herb)	<1	0-1	14
Epilobium ciliatum (Common Willow-herb)	<1	0-3	14
Erigeron glabellus (Smooth Daisy)	<1	0-1	29
Galium aparine (Goose-grass)	<1	0-1	14
Geranium viscosissimum (Sticky Geranium)	1	0-3	29
Geum macrophyllum (Larged-leaved Avens)	<1	0-3	14
Glycyrrhiza lepidota (American Licorice)	6	0-40	14
Lactuca serriola (Prickly Lettuce)	<1	0-1	29
Mertensia ciliata (Mountain Bluebell)	<1	0-1	14
Myosotis scorpioides (Common Forget-me-not)	<1	0-1	14
Nasturtium officinale (Water-cress)	<1	0-1	14

Osmorhiza chilensis (Mountain Sweet-cicely)	<1	0-3	14
Rumex obtusifolius (Bitterdock)	<1	0-1	14
Senecio serra (Tall Butterweed)	1	0-10	14
Silene menziesii (Menzies' Silene)	<1	0-1	29
Smilacina stellata (Starry Solomon-plume)	3	0-10	43
Solidago canadensis (Canada Goldenrod)	3	0-10	29
Taraxacum officinale (Common Dandelion)	<1	0-3	14
Tragopogon dubius (Goat's Beard)	<1	0-1	14
Trifolium dubium (Least Hop Clover)	2	0-10	29
Trifolium spp. (Clover)	<1	0-1	14
Urtica dioica (Stinging Nettle)	<1	0-3	14
Ferns and Allies			
Equisetum arvense (Field Horsetail)	5	0-30	29
Equisetum laevigatum (Smooth Scouring-rush)	<1	0-1	43

SUCCESSIONAL INFORMATION

The *Betula occidentalis* (water birch) community type may function as a seral stage for a variety of different climax communities. The presence of species representing climax vegetation types generally indicates the successional potential for a particular site, and should be noted. Conifers, particularly in the *Pseudotsuga menziesii/Cornus stolonifera* (Douglas fir/red-osier dogwood) habitat type or *Juniperus scopulorum /Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) type, may eventually dominate slightly drier riparian zones. On alluvial shelves of mountain streams and saturated zones adjacent to beaver ponds, types in the *Populus tremuloides* (quaking aspen) series, the *Salix lutea* (yellow willow) series or the *Salix geyeriana* (Geyer willow) series may represent the climax vegetation. *Betula occidentalis* (water birch) may in turn function as a later seral stage, succeeding shorter-statured riparian shrubs such as *Alnus incana* (mountain alder), *Cornus stolonifera* (red-osier dogwood), or *Prunus virginiana* (common chokecherry).

SOILS

Padgett and others (1989) indicate that this community type typically occupies soils classified as Entisols (Fluvents) and Mollisols (Borolls). Sites located above the active floodplain may be covered with a litter/duff layer up to 15 cm (6 in) thick. Surface horizons vary considerably both in composition and depth; nutrient rich silty clay soils may extend to depths of 75 cm (30 in) or more at one location, while fine sands comprise a surface layer only 20 cm (8 in) thick in another. Subsurface layers are consistently sands, gravels and cobbles, or occasionally rock. Sporadic bands or pockets of alluvial coarse-grained material may be scattered throughout the soil profile. Water tables, which may be present at the surface, are generally 30 to 60 cm (12 to 24 in) deep, but may be lower. *Betula occidentalis* (water birch) appears able withstand periodic flooding.

ADJACENT COMMUNITIES

Betula occidentalis (water birch) may colonize riparian corridors with a variety of other species, often creating patchy mosaics of distinct, individual communities. Associated communities may include *Cornus stolonifera* (red-

osier dogwood), *Prunus virginiana* (common chokecherry), *Salix* spp. (willow), or *Populus angustifolia* (Narrowleaf Cottonwood) types. *Pseudotsuga menziesii* (Douglas fir), *Juniperus scopulorum* (Rocky Mountain juniper) and *Populus tremuloides* (quaking aspen) forests may occupy sites both in the riparian corridors or on the adjacent drier uplands. *Carex* spp. (sedge) and *Phalaris arundinacea* (reed canarygrass) types establish on the adjacent streamside zones. *Artemisia tridentata* (big sagebrush) steppe and grasslands dominate upland hillsides and plateaus.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Hansen and others (1995) indicate that forage productivity varies with the density of the stand. Dense stands limit livestock use. Herbaceous species such as *Agrostis stolonifera* (redtop) and *Poa pratensis* (Kentucky bluegrass) provide spring forage. *Poa pratensis* (Kentucky bluegrass) is a palatable and moderately productive grass, especially when soil moisture levels are high, and tolerates a high degree of defoliation. Herbage production is moderate. *Poa pratensis* (Kentucky bluegrass) is well adapted to grazing and is considered an increaser or an invader, especially if grazing intensities and durations are severe (Wasser 1982). This species can produce new shoots from both existing tillers or rhizomes. Grazing practices influence the type of growth form present (Volland 1978). A high density of weak, low vigor tillers results under season long grazing. Stem densities are emphasized over aboveground biomass. Grazing practices incorporating early season rest increase the vigor of individual plants. Fewer shoots may be produced, but total aboveground biomass tends to be greater.

Agrostis stolonifera (redtop) is rated as fairly good to good forage for livestock (USDA Forest Service 1937). It is tolerant of close use due to its somewhat prostrate growth form, rhizomatous growth habit, and lower palatability than associated species.

Wildlife

Linear communities of *Betula occidentalis* (water birch) provide shade and hiding cover and travel corridors for numerous wildlife species. *Betula occidentalis* (water birch) is normally only lightly browsed, but if other woody species are scarce, use will occur (Hansen and others 1995). Its structural diversity also has high wildlife habitat values, especially for avian species (Youngblood and others 1985a).

Fisheries

Betula occidentalis (water birch) may function in a variety of capacities to promote stream health and enhance fisheries. It forms dense root networks that stabilize streambanks against lateral cutting and erosion, provides cover in the form of overhanging branches and banks, and shades channels, effectively moderating extreme summer temperature fluctuations. *Betula occidentalis* (water birch) may serve as a source of large woody debris or may trap large trees borne downstream, creating deeper pools and additional cover for fish species. *Carex* spp. (sedge) and other associated mat-forming understory species trap sediments, essentially building streambanks and filtering steam flows.

Fire

Shoots of the thin barked *Betula occidentalis* (water birch) are readily killed by fire but plants resprout from uninjured basal buds. *Poa pratensis* (Kentucky bluegrass) is damaged only by a hot, intense fire. Cool burns will have little effect on *Poa pratensis* (Kentucky bluegrass) (Volland and Dell 1981), but spring burns may lower tiller densities (Dix and Smeins 1967). Intense burns during active growing periods can be used to control stands of *Poa pratensis* (Kentucky bluegrass) (Wasser 1982).

Soil Management and Rehabilitation Opportunities

Coarse textured soils and high coarse fragment contents minimize most soil compaction problems associated with development. Management should greatly consider maintaining this type because of its excellent streambank stabilization values (Hansen and others 1995).

Recreational Uses and Considerations

This community type offers excellent camping opportunities where it occurs on level ground and the understory is sparse. More dense stands may limit streamside access to anglers.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded.

OTHER STUDIES

Chadde and others (1988) and Hansen and others (1995) described a *Betula occidentalis* (water birch) community type having a variety of undergrowth species. Padgett and others (1989) identified several *Betula occidentalis* (water birch) community types for Utah. They are *Betula occidentalis/Cornus stolonifera* (water birch/red-osier dogwood), *Betula occidentalis*/Mesic Forb (water birch/Mesic Forb), and *Betula occidentalis/Poa pratensis* (water birch/Kentucky bluegrass) community types.

Cornus stolonifera Community Type
(Red-Osier Dogwood Community Type)

CORSTO (COST4)

Number Of Stands Sampled = 5

LOCATION AND ASSOCIATED LANDFORMS

The *Cornus stolonifera* (red-osier dogwood) community type is an incidental type throughout foothills and valleys of Idaho. Sites range in elevation from 1,152 to 1,879 m (3,800 to 6,200 ft). It occupies a diversity of landforms and

may appear as linear bands on alluvial benches of narrow canyon drainages or broad thickets on islands and floodplains of major stream and riverine systems. In some cases, it may even develop as a dense fringe around the perimeter of beaver ponds.

VEGETATION

Cornus stolonifera(red-osier dogwood) generally forms a closed canopy, often excluding understory shrub and herbaceous species. Disturbed stands tend to exhibit a more open structure and a greater diversity of species, although many of these are considered weedy varieties. *Rosa woodsii* (woods rose), *Salix exigua* (sandbar willow), and *Prunus virginiana* (common chokecherry) are common subordinate shrubs associated with this type. The herbaceous layer may be dominated by graminoids, particularly *Muhlenbergia asperifolia* , *Poa pratensis* (Kentucky bluegrass), *Elymus glaucus* (Blue Wildrye) or *Agrostis stolonifera* (redtop), although forbs such as *Smilacina racemosa* (False Spikenard) are also present with low coverages.

Table 6. Average canopy cover, range of canopy cover, and constancy for species recorded in stands of the *Cornus stolonifera* (red-osier dogwood) community type that are relatively undisturbed by livestock or wildlife (number = 5 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Shrubs			
Alnus incana (Mountain Alder)	2	0-10	20
Berberis repens (Creeping Oregongrape)	2	0-10	20
Betula occidentalis (Water Birch)	1	0-3	20
Clematis ligusticifolia (Western Virgins-bower)	1	0-3	20
Cornus stolonifera (Red-osier Dogwood)	81	30-98	100
Prunus virginiana (Common Chokecherry)	<1	0-1	40
Ribes odoratum (Buffalo Currant)	<1	0-1	20
Rosa woodsii (Woods Rose)	1	0-3	60
Salix exigua (Sandbar Willow)	<1	0-1	40
Salix lutea (Yellow Willow)	1	0-3	20
Graminoids			
Agrostis stolonifera (Redtop)	6	0-30	40
Bromus inermis (Smooth Brome)	2	0-10	40
Bromus tectorum (Cheatgrass)	<1	0-1	20
Carex spp. (Sedge)	<1	0-1	20
Elymus glaucus (Blue Wildrye)	9	0-40	40
Elymus virginicus (Virginia Wildrye)	<1	0-1	20
Muhlenbergia asperifolia (Alkali Muhly)	10	0-50	20
Poa pratensis (Kentucky Bluegrass)	5	0-20	60
Stipa occidentalis (Western Needlegrass)	4	0-20	20

Forbs			
Arctium minus (Common Burdock)	<1	0-1	20
Cirsium arvense (Canada Thistle)	2	0-10	80
Cirsium vulgare (Bull Thistle)	<1	0-1	20
Euphorbia esula (Leafy Spurge)	<1	0-1	20
Forb (Forb)	<1	0-1	20
Galium triflorum (Sweetscented Bedstraw)	<1	0-1	40
Geranium viscosissimum (Sticky Geranium)	1	0-3	40
Geum macrophyllum (Larged-leaved Avens)	1	0-3	20
Heracleum lanatum (Cow-parsnip)	<1	0-1	20
Lactuca serriola (Prickly Lettuce)	1	0-3	20
Senecio serra (Tall Butterweed)	<1	0-1	20
Smilacina racemosa (False Spikenard)	2	0-10	20
Smilacina stellata (Starry Solomon-plume)	1	0-3	60
Solidago occidentalis (Western Goldenrod)	2	0-10	20
Taraxacum officinale (Common Dandelion)	<1	0-1	20
Urtica dioica (Stinging Nettle)	1	0-3	40

SUCCESSIONAL INFORMATION

Cornus stolonifera (red-osier dogwood) is the signature shrub species associated with an assortment of coniferous and deciduous tree habitat types. An early primary successional stage, it may colonize stream banks, adjacent floodplains and other disturbed sites characterized by alluvial materials and available moisture. Moderate soil development may alter the potential of the site to favor the gradual succession of climax stands, such as the *Picea/Cornus stolonifera* (spruce/red-osier dogwood) habitat type, the *Pseudotsuga menziesii/Cornus stolonifera* (Douglas fir/red-osier dogwood) habitat type, the *Juniperus scopulorum/Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) or the *Populus tremuloides / Cornus stolonifera* (quaking aspen/red-osier dogwood). Willow communities, particularly *Salix geyeriana* (Geyer willow), *Salix lutea* (yellow willow), or *Salix drummondiana* (Drummond willow) habitat types, may represent climax phases on some sites as well.

SOILS

Soils of the *Cornus stolonifera* (red-osier dogwood) community type are classified as Inceptisols, Entisols or Mollisols (Padgett and others 1989). Where sites are located outside of the active floodplain, a litter/duff layer 5 cm (2 in) or more thick may accumulate. Surface horizons are comprised of a wide range of alluvial materials with textures ranging from silty clays to sandy loams. These layers may be relatively shallow or as deep as 1.5 m (5 ft) in some locations. Underlying layers are typically coarse sands, gravels and cobbles that facilitate the movement of aerated groundwater through the subsurface layers which may be important for the longevity of stands of this type. Water availability ranges from high, where this type occupies floodplains immediately adjacent to active channels, to low on upper, remote floodplain sites where water tables may be 1 m (39 in) below the surface. Mottled and gleyed soil characteristics may be observed where near surface water tables promote oxidation /reduction reactions.

ADJACENT COMMUNITIES

On riverine systems, the *Cornus stolonifera* (red-osier dogwood) community type may border *Populus angustifolia* (Narrowleaf Cottonwood) forests on expansive floodplains or monotypic stands of *Phalaris arundinacea* (reed canarygrass) at the water's edge. *Pseudotsuga menziesii* (Douglas fir), *Juniperus scopulorum* (Rocky Mountain juniper), or *Populus tremuloides* (quaking aspen) may occupy adjacent sites in narrow canyon defiles. Beaver impoundments may exhibit a variety of *Salix* spp. (willow) communities interspersed with a variety of other shrub types in addition to the *Cornus stolonifera* (red-osier dogwood) community type.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Forage production is moderate to high. Dense stands may limit access by livestock. *Cornus stolonifera* (red-osier dogwood) is considered an "ice cream" plant by livestock and wildlife and its utilization is a direct indication of past and current use levels. In some areas, livestock browsing of *Cornus stolonifera* (red-osier dogwood) may be quite high (Hansen and others 1995).

Wildlife

Cornus stolonifera (red-osier dogwood) is often eaten by moose (Costain 1989) and is heavily utilized by deer. Beaver may use it for food and building materials (Allen 1983). The dense shrub stratum provides hiding and thermal cover for small mammals and avian species.

Fisheries

Cornus stolonifera (red-osier dogwood) may function in a variety of capacities to promote stream health and enhance fisheries. It forms dense root networks that stabilize streambanks against lateral cutting and erosion, provides cover in the form of overhanging branches and banks, and shades channels, effectively moderating extreme summer temperature fluctuations. Understory species trap sediments, essentially building streambanks and filtering stream flows.

Fire

Cornus stolonifera (red-osier dogwood) and the associated shrub species can survive all but the most severe fires that remove duff and cause extended heating of the upper layer of soil. After a fire, the shrubs sprouts from the surviving rhizomes or stolons (runners) (Fischer and Bradley 1987).

Soil Management and Rehabilitation Opportunities

Sites characterized with predominantly fine-textured soils should be avoided during periods of saturation during the spring and late fall. Coarse textured soils and high coarse fragment contents minimize most soil compaction problems associated with development. This community type is subject to recurring scouring by floods and alluvial deposition. Stands are relatively stable because of strong roots and stems. Management should emphasize the importance of *Cornus stolonifera* (red-osier dogwood) for streambank stabilization. This is particularly important

on higher gradient stream channels with scouring seasonal floods (Hansen and others 1995).

For revegetation of degraded sites, *Cornus stolonifera* (red-osier dogwood) is valuable as it is readily established along stream edges by direct seeding or by transplanting rooted cuttings or nursery grown seedlings. Its rapid growth quickly stabilizes deteriorated streambanks (Hansen and others 1995).

Recreational Uses and Considerations

The *Cornus stolonifera* (red-osier dogwood) community type may offer excellent opportunities for viewing wildlife, but is often dense, restricting streambank access to anglers and placement of camping and picnicking sites.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

OTHER STUDIES

Youngblood and others (1985b) described two similar community types for eastern Idaho and western Wyoming. Padgett and others (1989) also described a *Cornus stolonifera* (red-osier dogwood) community type for Utah and southeastern Idaho.

Crataegus succulenta Community Type
(Succulent Hawthorn Community Type)

CRASUC (CRSU5)
Number Of Stands Sampled = 6

CAUTION—Not all sites currently dominated by *Crataegus succulenta* (succulent hawthorn) are considered riparian or wetland sites. In some instances, they are considered upland sites. The topographic position of the site must match the description as presented in the Location and Associated Landform section.

NOTE—The *Crataegus succulenta* (succulent hawthorn) community type includes all combinations of *Crataegus succulenta* (succulent hawthorn) and *Crataegus douglasii* (Douglas hawthorn) due to similarities in environmental conditions and management concerns.

LOCATION AND ASSOCIATED LANDFORMS

An incidental type, the *Crataegus succulenta* (succulent hawthorn) community type ranges in elevation from 1,340

to 1,727 m (4,422 to 5,700 ft.) across foothills and valleys of central and southeastern Idaho. It occurs along major stream and riverine systems, occupying islands and upper floodplains or bordering oxbows and active channels. Stands may also be located on alluvial terraces in V-shaped ravines with a variety of other vegetation types to form a complex mosaic pattern.

VEGETATION

The presence of *Crataegus* spp. (hawthorn) often indicates past or present disturbance on a site. This community type, considered a grazing disclimax, is dominated by *Crataegus* spp. (hawthorn) which is armored with sharp spines and often forms dense, impenetrable thickets that appear able to withstand heavy grazing pressures. *Rosa woodsii* (woods rose) and *Cornus stolonifera* (red-osier dogwood) may be present in the interior of dense thickets where they are protected from browsing. Over time, physical abuse may cause stands to open, resulting in a two-tiered profile with umbrelled *Crataegus* spp.(hawthorn) in the overstory and herbaceous species such as *Poa pratensis* (Kentucky bluegrass), *Agrostis stolonifera* (redtop), *Urtica dioica* (stinging nettle), and *Arctium minus* (Common Burdock) dominating the understory.

Table 7. Average canopy cover, range of canopy cover, and constancy for species recorded in the sampled stands of the grazing disclimax *Crataegus succulenta* (succulent hawthorn) community type (number = 6 stands)

	% Canopy Cover		
Species	Average	Range	Constancy
Trees			
Populus angustifolia (Narrowleaf Cottonwood)	<1	0-1	17
Shrubs			
Amelanchier alnifolia (Western Serviceberry)	3	0-20	17
Clematis ligusticifolia (Western Virgins-bower)	1	0-3	17
Cornus stolonifera (Red-osier Dogwood)	9	0-40	67
Crataegus douglasii (Black Hawthorn)	73	20-98	100
Crataegus succulenta (Succulent Hawthorn)	1	0-3	17
Ribes lacustre (Swamp Currant)	4	0-10	50
Ribes odoratum (Buffalo Currant)	1	0-3	17
Rosa woodsii (Woods Rose)	15	0-30	83
Rubus idaeus (Red Raspberry)	2	0-10	17
Salix lutea (Yellow Willow)	3	0-20	17
Solanum dulcamara (Climbing Nightshade)	15	0-70	50
Symphoricarpos occidentalis (Western Snowberry)	2	0-10	17
Graminoids			
Agrostis stolonifera (Redtop)	4	0-20	50
Bromus inermis (Smooth Brome)	2	0-10	33
Dactylis glomerata (Orchard-grass)	2	0-10	33
Elymus cinereus (Basin Wildrye)	<1	0-1	17

Elymus virginicus (Virginia Wildrye)	1	0-3	33
Phalaris arundinacea (Reed Canarygrass)	10	0-60	17
Phleum pratense (Common Timothy)	3	0-20	17
Poa pratensis (Kentucky Bluegrass)	27	0-80	33
Forbs			
Achillea millefolium (Common Yarrow)	<1	0-1	17
Arctium minus (Common Burdock)	7	0-30	83
Aster laevis (Smooth Aster)	1	0-3	17
Campanula rotundifolia (Lady's-thimble)	<1	0-1	17
Carduus nutans (Musk Thistle)	1	0-3	17
Cirsium arvense (Canada Thistle)	9	0-30	67
Cynoglossum officinale (Common Hound's-tongue)	<1	0-1	17
Echinocystis lobata (Wild Cucumber)	<1	0-1	17
Epilobium alpinum (Alpine Willow-herb)	<1	0-1	17
Erigeron glabellus (Smooth Daisy)	<1	0-1	17
Forb (Forb)	1	0-3	17
Galium aparine (Goose-grass)	5	0-30	17
Galium triflorum (Sweetscented Bedstraw)	5	0-20	33
Geum macrophyllum (Larged-leaved Avens)	1	0-3	17
Heracleum lanatum (Cow-parsnip)	5	0-30	33
Osmorhiza chilensis (Mountain Sweet-cicely)	1	0-3	17
Rumex crispus (Curly Dock)	<1	0-1	17
Senecio serra (Tall Butterweed)	1	0-3	17
Smilacina stellata (Starry Solomon-plume)	4	0-10	67
Solidago canadensis (Canada Goldenrod)	1	0-3	17
Tanacetum vulgare (Common Tansy)	<1	0-1	17
Taraxacum officinale (Common Dandelion)	<1	0-1	33
Thalictrum occidentale (Western Meadowrue)	2	0-10	17
Tragopogon dubius (Goat's Beard)	<1	0-1	17
Trifolium spp. (Clover)	<1	0-1	17
Urtica dioica (Stinging Nettle)	6	0-20	67
Ferns and Allies			
Equisetum laevigatum (Smooth Scouring-rush)	<1	0-1	33

SUCCESSIONAL INFORMATION

The *Crataegus succulenta* (succulent hawthorn) community type often occurs on more disturbed sites along riparian corridors in a matrix with a variety of other communities. It may act as a seral stage for types in the *Salix lutea* (Yellow Willow) or *Populus tremuloides* (quaking aspen) series under these conditions. On wider floodplains, it may be associated with *Populus trichocarpa* (Black cottonwood) or *Populus angustifolia* (Narrowleaf Cottonwood) stands which may climax to the *Juniperus scopulorum /Cornus stolonifera* (Rocky Mountain juniper/Red-osier Dog-

wood) habitat type. Trace amounts of later seral and climax species in the immediate area may reveal the potential of a site and should be noted.

SOILS

Approximately 2.5 to 5 cm (1 to 2 in) of leaf litter may accumulate over a nutrient rich surface horizon on relatively undisturbed sites above active floodplains. Upper layers may be black or brown and range in texture from silty clays to silt loams, extending to depths of 60 cm (24 in) or more. On active floodplains and other sites characterized by more frequent disturbance where a litter/duff is absent, soil textures range from silt loams to sandy loams. Fines generally dominate the underlying layers, probably throughout most of the rooting zone. Soils appear to be placed into the Entisol or Mollisol categories. Water tables were observed within 30 cm (12 in) from the surface, but may be as deep as 2 m (6.5 ft) or more for part of the year. Neither mottled nor gleyed soil features were observed in the soil profiles, although they might be present where water tables occur near the surface.

ADJACENT COMMUNITIES

Phalaris arundinacea (reed canarygrass) and *Typha* (cattail) occupy adjacent streamside zones. *Populus trichocarpa* (Black cottonwood) or *Populus angustifolia* (Narrowleaf Cottonwood) forests may occur as adjacent communities on broad floodplains. In riparian corridors where the *Crataegus succulenta* (succulent hawthorn) community type integrates with a diversity of other communities to form a mosaic pattern, *Salix* spp. (willow), *Rosa* spp. (rose), *Cornus stolonifera* (red-osier dogwood), and *Betula occidentalis* (water birch) are common. *Juniperus scopulorum* (Rocky Mountain juniper)/grasslands and *Artemisia tridentata* (big sagebrush) steppe may dominate upland hillsides and plateaus.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Forage production from dense thickets is low. Stands may be so dense as to preclude most livestock use. However, cattle will eat *Crataegus succulenta* (succulent hawthorn) foliage that is within reach, as well as the associated herbaceous layer. Heavy grazing and browsing pressures will cause an increase in *Rosa woodsii* (woods rose), *Symphoricarpos occidentalis* (western snowberry), and *Poa pratensis* (Kentucky bluegrass). Excessive disturbance may result in large amounts of exposed soil (Hansen and others 1995).

Wildlife

Stands of the *Crataegus succulenta* (succulent hawthorn) community type have a high structural diversity, providing both thermal and hiding cover for deer and moose. Numerous trails can be observed in most stands. This community type also supports a rich bird population even during the winter. Berries of *Crataegus succulenta* (succulent hawthorn) dry on the twigs and supply food for birds and small mammals. The characteristic branching of *Crataegus succulenta* (succulent hawthorn) is especially attractive for cover and as nesting sites for birds such as magpies and thrushes. Upland game birds such as grouse and pheasants frequently use this community type (Hansen and others 1995).

Fire

Crataegus succulenta (succulent hawthorn) is fire tolerant. The species has a shallow and much branched rhizomatous root system that will sprout and sucker following removal of the above ground stems (Hansen and others 1995).

Soil Management and Rehabilitation Opportunities

The sprouting capability of *Crataegus succulenta* (succulent hawthorn), along with the strongly rhizomatous nature of many of the associated species makes the *Crataegus succulenta* (succulent hawthorn) community type an excellent soil stabilizer (Hansen and others 1995). However, fine textured soils may be subject to compaction when saturated during the spring run-off and should be avoided where possible.

Recreational Uses and Considerations

In terms of recreation, nature trails should be routed around dense stands of this community type. However, *Crataegus succulenta* (succulent hawthorn) may be valuable for planting in recreation areas as a biological barrier to protect physical structures, fragile natural areas, and to direct foot traffic (Hansen and others 1995).

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

OTHER STUDIES

This type has been documented in the Classification and Management of Montana's Riparian and Wetland Sites (Hansen and others 1995).

Potentilla fruticosa/Deschampsia cespitosa Habitat Type
(Shrubby Cinquefoil/Tufted Hairgrass Habitat Type)

POTFRU/DESCES (POFR4/DECA5)

Number Of Stands Sampled In Montana = 76

CAUTION—Not all sites currently dominated by *Potentilla fruticosa* (shrubby cinquefoil) are considered riparian or wetland sites. In some instances, they are considered upland sites. The topographic position of the site must match the description as presented in the Location and Associated Landform section.

NOTE: The *Potentilla fruticosa/Deschampsia cespitosa* (shrubby cinquefoil/tufted hairgrass) habitat type has been documented in Idaho according to field surveys conducted in 1994. However, due to time constraints during the

1995 field season, homogeneous stand data could not be collected for this type. In the subsequent discussion, any references to physical site location or vegetation characteristics for this type in Idaho were interpreted from 1994 field surveys. The remainder of this description was taken from the Classification and Management of Montana's Riparian and Wetland Sites (Hansen and others 1995).

LOCATION AND ASSOCIATED LANDFORMS

The *Potentilla fruticosa/Deschampsia cespitosa* (shrubby cinquefoil/tufted hairgrass) habitat type may be an incidental type at mid to moderately high elevations in the mountainous regions throughout central and southeastern Idaho. This habitat type may be found in U-shaped canyons and on upper floodplains along streams and rivers at elevations ranging from 1,818 to 2,901 m (6,000 to 6,900 ft.). In Montana, this habitat type occupies sites adjacent to glacial depressions, terraces along meandering streams, slopes near springs and seeps, and broad mountain meadows.

VEGETATION

Potentilla fruticosa (shrubby cinquefoil) dominates the habitat type in Montana. *Artemisia cana* (silver sagebrush) may be present but is usually subordinate to *Potentilla fruticosa* (shrubby cinquefoil). Herbaceous species include *Deschampsia cespitosa* (tufted hairgrass), *Potentilla gracilis* (slender cinquefoil), and *Stipa occidentalis* (western needlegrass) (Table 8).Vegetation characteristics could not be adequately addressed for stands of this type in Idaho. Table 8 reflects vegetation surveyed on sites in Montana and may not accurately represent species composition and canopy cover for sites identified in Idaho but has been included as a reference for comparison of sites observed during future inventories.

Table 8. Average canopy cover, range of canopy cover, and constancy for species recorded in Montana for late seral to climax stands of the *Potentilla fruticosa/Deschampsia cespitosa* (shrubby cinquefoil/tufted hairgrass) habitat type (number = 76 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Trees			
Pinus contorta (lodgepole pine)	1	0-1	13
Populus tremuloides (quaking aspen)	2	0-3	25
Shrubs			
Artemisia cana (silver sagebrush)	80	0-80	13
Potentilla fruticosa (shrubby cinquefoil)	29	10-60	100
Rosa woodsii (woods rose)	1	0-1	13
Graminoids			
Agropyron caninum (bearded wheatgrass)	2	0-3	38
Alopecurus alpinus (alpine foxtail)	12	0-20	25
Calamagrostis canadensis (bluejoint reedgrass)	1	0-1	13
Calamagrostis stricta (narrow-spiked reedgrass)	20	0-20	13

Carex aquatilis (water sedge)	1	0-1	13
Carex buxbaumii (Buxbaum's sedge)	40	0-40	13
Carex microptera (small-winged sedge)	30	0-30	13
Carex pachystachya (thick-headed sedge)	40	0-40	13
Carex praegracilis (clustered field sedge)	3	0-3	13
Carex praticola (meadow sedge)	20	0-20	13
Carex rostrata (beaked sedge)	2	0-3	25
Carex simulata (short-beaked sedge)	1	0-1	13
Carex spp. (sedge)	1	0-1	13
Danthonia intermedia (timber oatgrass)	3	0-3	13
Deschampsia cespitosa (tufted hairgrass)	40	20-80	100
Hordeum brachyantherum (meadow barley)	3	0-3	13
Juncus balticus (Baltic rush)	7	0-20	50
Melica subulata (Alaska oniongrass)	1	0-1	13
Muhlenbergia filiformis (slender muhly)	20	0-20	13
Poa pratensis (Kentucky bluegrass)	9	0-20	38
Stipa occidentalis (western needlegrass)	17	0-40	50
Forbs			
Achillea millefolium (common yarrow)	1	0-1	38
Antennaria corymbosa (meadow pussy-toes)	10	0-10	13
Antennaria microphylla (rosy pussy-toes)	8	0-20	38
Aster chilensis (long-leaved aster)	2	0-3	38
Aster foliaceus (leafy aster)	3	0-3	13
Aster occidentalis (western aster)	1	0-1	13
Aster spp. (aster)	3	0-3	13
Barbarea orthoceras (American wintercress)	3	0-3	13
Cirsium scariosum (elk thistle)	2	0-3	50
Erysimum cheiranthoides (wormseed wallflower)	1	0-1	13
Fragaria virginiana (Virginia strawberry)	1	0-3	38
Galium boreale (northern bedstraw)	1	0-1	50
Gentiana spp. (gentian)	3	0-3	13
Geum macrophyllum (large-leaved avens)	1	0-3	38
Geum triflorum (old man's whiskers)	1	0-1	13
Hieracium gracile (alpine hawkweed)	1	0-1	13
Linum perenne (blue flax)	2	0-3	50
Penstemon rydbergii (Rydberg's penstemon)	10	0-10	13
Polygonum bistortoides (American bistort)	3	0-3	13
Polygonum douglasii (Douglas' knotweed)	1	0-1	13
Potentilla gracilis (slender cinquefoil)	6	0-30	75
Smilacina stellata (starry Solomon-plume)	1	0-1	13
Solidago canadensis (Canada goldenrod)	1	0-1	13

Taraxacum officinale (common dandelion)	1	0-1	13
Thalictrum spp. (meadowrue)	1	0-1	13
Valeriana edulis (edible valerian)	2	0-3	38
Ferns and Allies			
Equisetum laevigatum (smooth scouring-rush)	1	0-1	25

SUCCESSIONAL INFORMATION

With increasing disturbance, *Deschampsia cespitosa* (tufted hairgrass) will decrease and species such as *Juncus balticus* (Baltic rush), *Poa pratensis* (Kentucky bluegrass) and disturbance related forbs such as *Taraxacum officinale* (common dandelion) and *Fragaria virginiana* (Virginia strawberry) will increase. Moderate levels of grazing will also cause an increase in the cover of *Potentilla fruticosa* (shrubby cinquefoil). However, heavy levels of grazing will eventually cause a decrease in the canopy cover of *Potentilla fruticosa* (shrubby cinquefoil).

SOILS

Soils are commonly Mollisols (Typic or Argic Cryoborolls) (Brichta 1987). By definition Mollisols require considerable soil development, which implies long term stability for these sites. Soil texture varies little between clay loam and sandy loam. Water tables fluctuate widely, yet water levels usually drop below 1 m (39 in) of the soil surface by late summer. Redoximorphic features (mottling or gleyed soil) are common near 1 m (39 in) depth. Soil reaction is slightly acid to neutral (pH 6.0 to 7.0).

ADJACENT COMMUNITIES

Adjacent wetter sites are dominated by the *Carex rostrata* (beaked sedge) habitat type and various *Salix* spp. (willow) types. The *Artemisia cana* (silver sagebrush) dominated types may be common on slightly drier sites. *Pinus contorta* (lodgepole pine), *Artemisia tridentata* (big sagebrush), and *Festuca idahoensis* (Idaho fescue) communities dominate nearby uplands.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Potentilla fruticosa (shrubby cinquefoil) has a low palatability for livestock. However, the vegetation associated with the *Potentilla fruticosa/Deschampsia cespitosa* (shrubby cinquefoil/tufted hairgrass) habitat type is highly productive. Easy access may result in excessive grazing use. Heavy grazing use is typical, causing a marked decrease in the highly palatable *Deschampsia cespitosa* (tufted hairgrass) and an increase in the less palatable *Juncus balticus* (Baltic rush). *Juncus balticus* (Baltic rush) is considered palatable early in the growing season when plants are young and tender. As stems mature and toughen, palatability declines (Hermann 1975).

Potentilla fruticosa (shrubby cinquefoil) is tolerant of moderate defoliation by grazing, browsing, or shearing. However, it is injured by intense, repeated defoliation, especially when coupled with drought conditions.

Wildlife

Potentilla fruticosa (shrubby cinquefoil) has a low palatability for big game. However, this type, because of its wide-spread distribution, is an important source of forage for ungulates and as nesting and hiding cover for numerous songbird species. Value of *Potentilla fruticosa* (shrubby cinquefoil) is generally low (USDA Forest Service 1937). Winter use of *Potentilla fruticosa* (shrubby cinquefoil) by deer and elk is typically light (Gaffney 1941).

Beaver perform a vital role in the health and maintenance of riparian ecosystems. Beaver dams assist in controlling the downcutting of channels, bank erosion, and the movement of sediment downstream (Gordon and others 1992). When beaver construct a dam, they raise the water table in the area, which provides water for hydrophytic plants such as willows and sedges. The beaver dam also slows down the water in the channel, which allows suspended sediment to be deposited behind the dam. The combination of sediment deposition and plant reproduction raises the channel bed, creating a wetland environment which is excellent waterfowl and fish habitat. It has often been the policy of land managers to trap and kill beaver because they can be a nuisance. However, because beaver produce such desirable habitat and provide many beneficial stream functions, their removal from a riparian system needs to be closely evaluated.

Fire

Potentilla fruticosa (shrubby cinquefoil) and *Artemisia cana* (silver sagebrush) readily resprout following fire; burning to reduce shrub densities is normally not effective.

Deschampsia cespitosa (tufted hairgrass) is resistant to damage from fire (DeBenedetti and Parsons 1984). Root crowns are rarely damaged, even by hot, intense fires. However, repeated burning tends to favor rhizomatous species such as *Poa pratensis* (Kentucky bluegrass) and *Agropyron caninum* (bearded wheatgrass). Burning should be postponed if livestock are present to avoid attracting animals to young, palatable regrowth of *Deschampsia cespitosa* (tufted hairgrass).

Soil Management and Rehabilitation Opportunities

Heavy livestock use is common in this habitat type and results in compacted soils and reduced forage production. *Potentilla fruticosa* (shrubby cinquefoil) is well adapted for revegetating disturbed streambanks and moist meadow sites. Readily established from nursery grown stock, it grows fairly quickly and provides excellent soil stability.

Deschampsia cespitosa (tufted hairgrass) has a weak, fibrous root system that is of little value for stabilizing streambanks (Youngblood and others 1985b). However, *Juncus balticus* (Baltic rush) produces a deep and fibrous root system, with a mass of coarse and creeping rhizomes, and once established, rapidly spreads. These soil holding characteristics may make it valuable for stabilizing streambanks.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded.

OTHER STUDIES

Similar communities have been described by Mutz and Queiroz (1983), Youngblood and others (1985b), Padgett and others (1989), and Chadde and others (1988). A drier, upland, *Potentilla fruticosa/Festuca idahoensis* (shrubby cinquefoil/Idaho fescue) habitat type was identified for western Montana by Mueggler and Stewart (1980).

Prunus virginiana Community Type
(Common Chokecherry Community Type)

PRUVIR (PRVI)
Number Of Stands Sampled = 3

LOCATION AND ASSOCIATED LANDFORMS

The *Prunus virginiana* (common chokecherry) community type is an incidental type throughout eastern Idaho, ranging in elevation from 1,091 to 1,950 m (3,600 to 6,435 ft). Stands may be located on side slopes of hillsides immediately below springs and seeps, on the upper terraces of V-shaped canyon drainages and on wide floodplains of riverine systems. *Prunus virginiana* (common chokecherry) generally occupies riparian zones with a variety of other communities, creating a patchwork matrix of individual species dominating microsites.

VEGETATION

Prunus virginiana (common choke-cherry) forms dense, monotypic stands upwards of 3.5 m (12 ft) in height. Standing, interior deadwood is common on longer-lived stands. The full canopy tends to limit the presence of other shrub species and often results in a sparse herbaceous layer. *Smilacina stellata* (starry Solomon-plume) seems to be one of the few understory species that thrives under these conditions. Stands may become more open with livestock utilization, resulting in a greater diversity of shrubs. The herbaceous layer generally reflects the level and type of disturbance on a site, and may include a diversity of disturbance-induced species such as *Poa pratensis* (Kentucky bluegrass), *Bromus tectorum* (cheatgrass), *Rumex crispus* (curly dock), and *Verbascum thapsus* (Common mullein).

Table 9. Average canopy cover, range of canopy cover, and constancy for species of the sampled stands of the grazing disclimax *Prunus virginiana* (common chokecherry) community type (number = 3 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Trees			
Juniperus scopulorum (Rocky Mountain Juniper)	<1	0-1	33

Populus angustifolia (Narrowleaf Cottonwood)	<1	0-1	33
Shrubs			
Amelanchier alnifolia (Western Serviceberry)	<1	0-1	33
Berberis repens (Creeping Oregongrape)	1	0-3	33
Clematis ligusticifolia (Western Virgins-bower)	1	0-3	33
Cornus stolonifera (Red-osier Dogwood)	<1	0-1	33
Pachistima myrsinites (Mountain-boxwood)	3	0-10	33
Prunus virginiana (Common Chokecherry)	98	98-98	100
Ribes lacustre (Swamp Currant)	<1	0-1	33
Rosa woodsii (Woods Rose)	1	0-3	67
Salix exigua (Sandbar Willow)	<1	0-1	33
Sambucus cerulea (Blue Elderberry)	1	0-3	33
Graminoids			
Agropyron caninum (Bearded Wheatgrass)	<1	0-1	33
Elymus cinereus (Basin Wildrye)	<1	0-1	33
Elymus glaucus (Blue Wildrye)	<1	0-1	33
Forbs			
Cirsium arvense (Canada Thistle)	<1	0-1	33
Cynoglossum officinale (Common Hound's-tongue)	2	0-3	67
Galium triflorum (Sweetscented Bedstraw)	<1	0-1	33
Heracleum lanatum (Cow-parsnip)	<1	0-1	33
Osmorhiza chilensis (Mountain Sweet-cicely)	1	0-3	33
Smilacina racemosa (False Spikenard)	1	0-3	67
Smilacina stellata (Starry Solomon-plume)	14	3-20	100

SUCCESSIONAL INFORMATION

The *Prunus virginiana* (common chokecherry) community type often occurs in riparian zones as irregular dense thickets or bands with a complex of other vegetation communities. Successional trends may be difficult to predict as a result of this pattern. Types in the *Salix lutea* (yellow willow) series or types in the *Populus tremuloides* (quaking aspen) series may represent the successional climax in these cases. *Prunus virginiana* (common chokecherry) may be a seral stage within the *Acer negundo/Prunus virginiana* (box-elder/common chokecherry) habitat type as well but could actually represent a grazing disclimax under certain circumstances (Hansen and others 1995). On slightly drier sites, the *Juniperus scopulorum /Cornus stolonifera* (Rocky Mountain juniper/Red-osier Dogwood) habitat type or the *Pseudotsuga menziesii/Cornus stolonifera* (Douglas fir/Red-osier Dogwood) habitat type may develop as the final successional stage. The vegetative potential of a site is dependent on physical site features and the presence of later successional/climax species; both factors should be considered when determining the succession direction of a site.

SOILS

Hansen and others (1995) indicate that this type may prefer well drained, older, more developed soils that afford

good rooting depth and higher fertility, generally classified as Entisols (Torrifluvents) and Mollisols (Haploborolls and Argiborolls). Surface horizons are characterized by a rich, organic component that is fed by an overlying litter/duff layer. Soil textures are generally silty loams or silt clay loams and may be 60 cm (24 in) or more deep. Underlying substrates are generally rock and sand, although fines may be present to a depth of 1 m (39 in) or more in some locales. Water tables are generally at least 1 m (39 in) below the surface. The *Prunus virginiana* (common chokecherry) community type appears unable to tolerate prolonged or frequent flooding.

ADJACENT COMMUNITIES

Betula occidentalis (water birch), *Cornus stolonifera* (red-osier dogwood), and *Salix* spp. (willow) communities often occur in conjunction with the *Prunus virginiana* (common chokecherry) community type in riparian zones. *Carex* spp. (sedge) are typically present along adjacent streambanks in saturated zones. Cottonwoods may occupy neighboring, broader floodplains. Conifers, such as *Pseudotsuga menziesii* (Douglas fir) or *Juniperus scopulorum* (Rocky Mountain juniper), may manifest in the riparian zone or on drier hillsides. *Artemisia tridentata* (big sagebrush)/grasslands occur on adjacent uplands.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

In dense, monotypic stands, forage production from the *Prunus virginiana* (common chokecherry) community type is low. The palatability of *Prunus virginiana* (common chokecherry) ranges from poor to fair for both cattle and sheep, although livestock losses due to poisoning sometimes occur. Livestock normally do not eat fatal quantities except when other forage is scarce (Wasser 1982, Johnson and Nichols 1982).

Over the years there has been some debate whether *Prunus virginiana* (common chokecherry) leaves are poisonous to livestock. The leaves and seeds do have sugars that contain cyanide. These cyanide sugars are not poisonous themselves, but when plant material is crushed, eaten or decomposed, enzymes cause hydrogen cyanide to be released. In high concentrations hydrogen cyanide is a metabolic poison to most animals, including humans. It has recently been shown that livestock can acquire the ability to detoxify hydrogen cyanide if they consume limited amounts of it over an extended period of time. Therefore, *Prunus virginiana* (common chokecherry) will poison livestock only if it is consumed in large amounts without prior exposure (Hansen and others 1995).

Wildlife

The moderate structural diversity of the *Prunus virginiana* (common chokecherry) community type provides thermal and hiding cover for livestock, big game, and upland bird species. *Prunus virginiana* (common chokecherry) rates fair to good as palatable browse for big game. In some instances, dwarfed and thinned communities can occur as the result of concentrations of game in winter. As stands open and herbaceous species establish due to increasing disturbance, the forage value for both livestock and wildlife increases accordingly. *Prunus virginiana* (common chokecherry) is moderately tolerant of browsing (Hansen and others 1995).

Prunus virginiana (common chokecherry) is among one of our most important wildlife food plants. The fruits are

relished by both birds and mammals. The leaves and twigs of *Prunus virginiana* (common chokecherry) are also nutritious for browsing animals, and this shrub is rated as one of the best sources of winter browse for deer and elk. This is due to the increase of protein content in the stems during the fall and winter. The leaves and stems are also higher in carbohydrates, calcium, and phosphorus than other native shrubs (Hansen and others 1995).

Fisheries

Prunus virginiana (common chokecherry) is an excellent shrub for providing thermal cover for fish and for controlling erosion along streams (Hansen and others 1995).

Fire

Prunus virginiana (common chokecherry) will survive all but a hot, intense fire. *Prunus virginiana* (common chokecherry) has an aggressive root system and vigorously sprouts from surviving root crowns after fire (or occasionally from rhizomes) (Hansen and others 1995).

Soil Management and Rehabilitation Opportunities

Disturbed areas can be revegetated with *Prunus virginiana* (common chokecherry) with nursery grown stock or rooted cuttings. Adapted to a wide variety of sites, transplant success rates are typically high (Hansen and others 1995).

Recreational Uses and Considerations

The fruit of *Prunus virginiana* (common chokecherry) is highly regarded for making wine and tasty jelly, but one must harvest ahead of the birds (Johnson and Nichols 1982). Indians ate the fruit fresh or preserved it by drying. In addition they combined it with venison and buffalo meat to make mincemeat. They also used the berries for medicinal purposes.

Because of the density of branches, twigs, and heavy foliage, communities dominated by *Prunus virginiana* (common chokecherry) provide excellent screens in recreation areas. Because of their fruits, they also provide excellent opportunities for viewing a variety of wildlife (Hansen and others 1995).

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

OTHER STUDIES

This type has been documented in the Classification and Management of Montana's Riparian and Wetland Sites (Hansen and others 1995).

Rhus aromatica Community Type
(Fragrant sumac Community Type)

RHUARO (RHAR)
Number Of Observations In 1994 = 15

CAUTION—Not all sites currently dominated by *Rhus aromatica* (Fragrant sumac) are considered riparian or wetland sites. In some instances, they are considered upland sites. The topographic position of the site must match the description as presented in the Location and Associated Landform section.

LOCATION AND ASSOCIATED LANDFORMS

The *Rhus aromatica* (Fragrant sumac) community type is an incidental type at low to mid elevations of southern Idaho, primarily in the Burley District. It occurs on drier alluvial terraces along stream and river bottoms, often occupying marginally riparian sites. Stands are located in V-shaped ravines, swale-like depressions or on hillsides immediately adjacent to springs or seeps. Sites range in elevation from 939 to 1,636 m (3,100 to 5,400 ft).

VEGETATION

The *Rhus aromatica* (Fragrant sumac) community type often forms dense, monotypic stands. In some instances, the stands contain *Rosa* species (rose) and *Ribes odoratum* (buffalo currant). *Artemisia tridentata* (big sagebrush) may also be scattered throughout the stand and usually occupies drier upland sites adjacent to this community type. The lower herbaceous layer may be dominated by *Bromus tectorum* (cheatgrass), *Agropyron smithii* (western wheatgrass), *Elymus cinereus* (basin wildrye), and/or *Poa pratensis* (Kentucky bluegrass).

Table 10. Species recorded for stands of the *Rhus aromatica* (Fragrant sumac) community type observed in polygons during the 1994 field season (number = 15 polygons). Individual canopy coverages for species specific to this type were not available due to the methods of data collection.

Species	% Canopy Cover
Shrubs	
Artemisia cana (silver sagebrush))	-
Artemisia tridentata (big sagebrush)	-
Clematis spp. (clematis)	-
Cornus stolonifera (red-osier dogwood)	-
Prunus virginiana (common chokecherry)	-
Rhus aromatica (Fragrant sumac)	-
Rosa woodsii (woods rose)	-
Ribes odoratum (buffalo currant)	-

Solanum dulcamara (climbing nightshade)	-
Graminoids	
Agropyron cristatum (crested wheatgrass)	-
Agropyron smithii (western wheatgrass)	-
Bromus tectorum (cheatgrass)	-
Elymus cinereus (basin wildrye)	-
Poa pratensis (Kentucky bluegrass)	-
Forbs	
Achillea millefolium (common yarrow)	-
Cirsium arvense (Canada thistle)	-
Melilotus officinalis (yellow sweet-clover)	-
Ferns and Allies	
Equisetum arvense (field horsetail)	-

SUCCESSIONAL INFORMATION

The *Rhus aromatica* (fragrant sumac) community type may occupy a similar position on the landscape as does the *Rosa woodsii* (woods rose) community type, dominating drier riparian zones. In steep drainages where floodplains are narrow and the transition from wetland to upland zones is abrupt, types in the *Salix lutea* (yellow willow) series may represent the climax vegetation. *Rhus aromatica* (fragrant sumac) may also represent a seral stage for the *Juniperus scopulorum /Cornus stolonifera* (Rocky Mountain juniper/Red-osier Dogwood) habitat type on drier sites. Due to the limited number of observations in Idaho, the successional status of this community type has yet to be fully explored. However, Padgett and others (1989) suggest that a *Populus angustifolia/Rhus aromatica* (narrowleaf cottonwood /fragrant sumac) community type in Utah may be successional to upland types.

SOILS

Soils of this type may possess a xeric moisture regime and are probably classified as Entisols and Inceptisols, although Mollisols may be present on some locations (Padgett and others 1989). Sandy loams and silt loams are common at the surface, but may only form a shallow skin or irregular pockets over rocks and between boulders. Cobbles, gravels and sands are often present in underlying layers where rocks and boulders are more scarce. *Rhus aromatica* (fragrant sumac) is likely intolerant of high water tables and prolonged flooding.

ADJACENT COMMUNITIES

Phragmites australis (common reed), *Carex* spp. (sedge) and *Salix exigua* (sandbar willow) may be present immediately adjacent to active channels. *Salix lutea* (yellow willow) dominated habitat types or the *Cornus stolonifera* (red-osier dogwood) community type may occupy nearby moist sites in riparian zones. *Ribes* spp. (currant) and *Rosa* spp. (rose) communities are common on similar, slightly drier zones. Adjacent upland communities are typically dominated by *Artemisia tridentata* (big sagebrush) steppe and *Juniperus scopulorum* (Rocky Mountain juniper) /grasslands.

MANAGEMENT INFORMATION

Livestock

The forage value of the *Rhus aromatica* (fragrant sumac) community type rates poorly for all forms of livestock. In some cases, stands may become so dense as to exclude most livestock. However, in arid regions where palatable species are scarce, this species may represent some of the only forage available and may be browsed heavily (Sampson and Jespersen 1963).

Wildlife

The *Rhus aromatica* (fragrant sumac) community type offers only fair to poor browse for wild ungulates (Sampson and Jespersen 1963). In some regions, it may constitute the only forage available and may be utilized heavily. Manning and Padgett (1992) indicate that forage value may be moderate for sheep, mule deer and elk in the fall and winter.

Fire

Sampson and Jespersen (1963) indicate that *Rhus aromatica* (fragrant sumac) is a sprouting species with a shallow and much branched rhizomatous root system. This not only makes it a good soil stabilizer and allows it to colonize large areas, but permits it to actually increase overall coverage after a fire.

Soil Management and Rehabilitation Opportunities

Dry, mineral soils occupied by the *Rhus aromatica* (fragrant sumac) community type are generally not susceptible to compaction. *Rhus aromatica* (fragrant sumac) has moderate erosion control potential (Manning and Padgett 1992) and may be used for streambank restabilization.

Recreational Uses and Considerations

Primitive campsites were associated with this type on some locations. Due to the dense growth form, nature trails should be routed around this community type. However, *Rhus aromatica* (fragrant sumac) may be useful for planting in recreation areas as a biological barrier to protect physical structures, young and delicate plants, and to direct traffic.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

OTHER STUDIES

Padgett and others (1989) describe a *Populus angustifolia/Rhus aromatica* (narrowleaf cottonwood /fragrant sumac) community type in Utah with cottonwoods dominating the overstory. Manning and others (1992) describe a similar *Populus /Rhus aromatica* (cottonwood/fragrant sumac) community type in Nevada and eastern California.

However, no communities dominated solely by this shrub have been described elsewhere.

Ribes odoratum Community Type
(Buffalo Currant Community Type)

RIBODO (RIOD)
Number Of Observations In 1994 = 7

CAUTION—Not all sites currently dominated by *Ribes odoratum* (buffalo currant) are considered riparian or wetland sites. In some instances, they are considered upland sites. The topographic position of the site must match the description as presented in the Location and Associated Landform section.

LOCATION AND ASSOCIATED LANDFORMS

The *Ribes odoratum* (buffalo currant) community type is an incidental type occurring primarily in the Burley District in southern Idaho. Sites range in elevation from 1,485 to 1,636 m (4,900 to 5,400 ft). It occurs on drier, alluvial floodplain shelves along streams and rivers. Stands may also be located in U-shaped canyons and on hillsides immediately below springs or seeps.

VEGETATION

The *Ribes odoratum* (buffalo currant) community type is characterized by dense pockets of *Ribes odoratum* (buffalo currant) with scattered individuals occupying the interstitial spaces. *Rosa* species (rose) and *Artemisia tridentata* (big sagebrush) may also be present to a limited degree. The lowest layer is sparsely populated by *Agrostis stolonifera* (redtop), *Bromus tectorum* (cheatgrass), and *Senecio hydrophilus*. (alkali-marsh butterweed). Occasional *Salix exigua* (sandbar willow) individuals may also be present. This type often colonizes locations that are considered to be marginally riparian.

Table 11. Species recorded for stands of the *Ribes odoratum* (buffalo currant) community type observed in polygons during the 1994 field season (number = 7 polygons). Individual canopy coverages for species specific to this type were not available due to the methods of data collection.

Species	% Canopy Cover
Shrubs	
Artemisia ludoviciana (prairie sagewort)	-
Artemisia tridentata (big sagebrush)	-
Ribes odoratum (buffalo currant)	-
Rosa woodsii (woods rose)	-
Salix exigua (sandbar willow)	-

Salix lutea (yellow willow)	-
Graminoid	
Agropyron cristatum (crested wheatgrass)	-
Agropyron smithii (western wheatgrass)	-
Agrostis stolonifera (redtop)	-
Bromus tectorum (cheatgrass)	-
Carex lanuginosa (woolly sedge)	-
Eleocharis palustris (common spikesedge)	-
Elymus cinereus (basin wildrye)	-
Hordeum jubatum (foxtail barley)	-
Juncus balticus (Baltic rush)	-
Poa pratensis (Kentucky bluegrass)	-
Forb	
Achillea millefolium (common yarrow)	-
Cicuta douglasii (Douglas water-hemlock)	-
Cirsium arvense (Canada thistle)	-
Glycyrrhiza lepidota (American licorice)	-
Melilotus officinalis (yellow sweet-clover)	-
Potentilla anserina (common silverweed)	-
Rumex crispus (curly dock)	-
Senecio hydrophilus. (alkali-marsh butterweed)	-
Smilacina stellata (starry Solomon-plume)	-
Trifolium spp. (clover)	-
Urtica dioica (stinging nettle)	-
Verbascum thapsus (Common mullein)	-
Ferns and Allies	
Equisetum arvense (field horsetail)	-

SUCCESSIONAL INFORMATION

The *Ribes odoratum* (buffalo currant) community type dominates drier riparian zones and may occupy positions on the landscape similar to those inhabited by the *Rosa woodsii* (woods rose) community type or the *Rhus aromatica* (fragrant sumac) community type. Species with greater moisture requirements, such as *Salix* spp. (willow), in all likelihood do not succeed the *Ribes odoratum* (buffalo currant) community type unless site conditions alter, in response to beaver activity or channel migration, to favor a more saturated environment. The *Juniperus scopulorum /Cornus stolonifera* (Rocky Mountain juniper/Red-osier Dogwood) habitat type probably represents the climax vegetation on sites occupied by *Ribes odoratum* (buffalo currant). Due to the limited number of observations and methods of data collection in Idaho in 1994, the successional status of this community type has yet to be fully explored. However, it may be transitional to upland types if drying trends persist.

SOILS

Entisols and Inceptisols are suspected to be the dominant soil orders present on sites occupied by the *Ribes odoratum* (buffalo currant) community type. Surface soils may be characterized by a xeric moisture regime with textures ranging from silt loams to sandy loams. Cobbles, gravels or rock may predominate as underlying substrate materials. Boulders may be common in canyons and on sites adjacent to scree slopes. *Ribes odoratum* (buffalo currant) appears to be intolerant of high water tables and prolonged flooding, and soils tend to be well drained .

ADJACENT COMMUNITIES

Adjacent drier communities are typically dominated by *Artemisia tridentata* (big sagebrush) steppe and *Juniperus scopulorum* (Rocky Mountain juniper)/grasslands. Streamside habitats may be colonized by *Carex* spp. (sedge), *Eleocharis* spp. (spikesedge) or *Salix exigua* (sandbar willow). *Salix lutea* (yellow willow), *Salix geyeriana* (Geyer willow) and/or *Salix boothii*(Booth willow) may form matrices along riparian corridors where sufficient moisture is present. *Rhus* spp. (sumac) and *Rosa* spp(rose) communities are common on corresponding drier areas.

MANAGEMENT INFORMATION

Livestock

Forage production for the *Ribes odoratum* (buffalo currant) community type is moderate to low where dense thickets prevent accessibility to livestock (Wasser 1982). In arid regions where palatable species are scarce, this species may represent some of the only forage available and may be subject to intense utilization.

Wildlife

The *Ribes odoratum* (buffalo currant) community type exhibits good tolerance to browsing and offers high forage potential for wild ungulates in the spring and summer (Wasser 1982). With continued use, dense stands may become more open and offer greater browsing opportunities. The berries are a source of food for birds and small mammals and dense stands may provide nest and den sites.

Fire

Wasser (1982) indicates that *Ribes odoratum* (buffalo currant) is fairly fire tolerant in a dormant state. The species has a shallow, branched root system that allows it to resprout and even increase overall coverage after a fire.

Soil Management and Rehabilitation Opportunities

Ribes odoratum (buffalo currant) is valuable for revegetating disturbed sites along streambanks and seeps. It is easily established from nursery grown stock, root cuttings, or transplanted materials (Hansen and others 1988).

Recreational Uses and Considerations

Berries produced by *Ribes odoratum* (buffalo currant) may be harvested and used to make products such as jams and jellies.

Wildlife viewing opportunities are excellent. However, nature trails should be routed around dense stands of the *Ribes odoratum* (buffalo currant) community type. Thickets may be useful as biological barriers to protect physical structures, young and delicate plants, or to direct traffic, and *Ribes odoratum* (buffalo currant) will grow rapidly

when planted.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

OTHER STUDIES

This type has been documented in the Riparian Dominance Types of Montana (Hansen and others 1988).

Rosa woodsii Community Type
(Woods Rose Community Type)

ROSWOO (ROWO)

Number Of Stands Sampled = 1

CAUTION—Not all sites currently dominated by *Rosa woodsii* (woods rose) are considered riparian or wetland sites. In some instances, they are considered upland sites. The topographic position of the site must match the description as presented in the Location and Associated Landform section.

NOTE: The *Rosa woodsii* (woods rose) community type includes all combinations of *Rosa woodsii* (woods rose) and *Rosa acicularis* (prickly rose) due to similarities in environmental conditions and management concerns.

LOCATION AND ASSOCIATED LANDFORMS

The *Rosa woodsii* (woods rose) community type is a major type across hillsides and valleys of eastern Idaho. It occurs as dense thickets on alluvial floodplain terraces adjacent to streams and rivers of V-shaped canyons . Stands may also be located on the side slopes of hillsides immediately below springs and seeps or on upper floodplains of open drainages. Sites range in elevation from 1,091 to 1,818 m (3,600 to 6,000 ft).

VEGETATION

The *Rosa woodsii* (woods rose) community type represents a grazing disclimax in Idaho. Stands are often dense and may be nearly impenetrable due to the thorny armament of stems and branches. This type may be comprised of an assortment of other minor shrub species scattered throughout the stand in addition to the predominant *Rosa woodsii* (woods rose). These species may include: *Ribes odoratum* (buffalo currant), *Ribes setosum* (Missouri gooseberry), and *Artemisia tridentata* (big sagebrush). Herbaceous species are quite diverse and are generally represent-

ed by disturbance types such as *Poa pratensis* (Kentucky bluegrass), *Cirsium arvense* (Canada thistle), and *Urtica dioica* (stinging nettle).

Table 12. Canopy cover for species recorded in sampled stands of the grazing disclimax *Rosa woodsii* (woods rose) community type (number = 1 stand)

Species	% Canopy Cover
Shrubs	
Artemisia tridentata (Big Sagebrush)	3
Ribes setosum (Missouri Gooseberry)	10
Rosa woodsii (Woods Rose)	70
Graminoids	
Agropyron caninum (Bearded Wheatgrass)	10
Carex arcta (Northern-clustered Sedge)	3
Hordeum brachyantherum (Meadow Barley)	3
Juncus balticus (Baltic Rush)	3
Muhlenbergia cuspidata (Plains Muhly)	3
Poa pratensis (Kentucky Bluegrass)	10
Forbs	
Achillea millefolium (Common Yarrow)	3
Aster spp. (Aster)	1
Cirsium arvense (Canada Thistle)	10
Cirsium magnificum (Showy Thistle)	1
Silene menziesii (Menzies' Silene)	1
Urtica dioica (Stinging Nettle)	1

SUCCESSIONAL INFORMATION

The *Rosa woodsii* (woods rose) community type plays the role of the generalist, growing on a range of disturbed sites and representing a mid-seral grazing disclimax for a variety of *Salix* spp. (willow) types. However, with the absence of utilization, it may in turn act as a successional sere for these same *Salix* spp. (willow) communities. The *Juniperus scopulorum /Cornus stolonifera* (Rocky Mountain juniper/Red-osier Dogwood) habitat type probably represents the climax vegetation on drier riparian sites. *Rosa woodsii* (woods rose) may be one of the first species to invade an upland site that has acquired greater soil moisture as a result of beaver activity or channel migration. Hansen and others (1995) indicate that careful observation of site characteristics and remnant plant species will assist in the determination of the site potential.

SOILS

Manning and Padgett (1992) indicate that this community type occupies soils classified as Inceptisols, Entisols, or on sites with greater soil development, Mollisols. Surface horizons may be 60 cm (24 in) or more deep with tex-

tures ranging from silty clays to sandy loams. Gravels, cobbles and rocks are common in deeper horizons.Wasser (1982) notes that the *Rosa woodsii* (woods rose) community type is intolerant of poor drainage, high water tables, and prolonged flooding, although Manning and Padgett (1992) observed mottles on some sites in Nevada, indicative of seasonally shallow water tables. This disturbance community type may be capable of establishing over a range of sites with variable substrates and moisture regimes.

ADJACENT COMMUNITIES

Carex spp. (sedge) and *Juncus balticus* (Baltic Rush) inhabit saturated sites along streambanks and active channels. *Salix* spp. (willow), *Betula occidentalis* (water birch) and *Cornus stolonifera* (red-osier dogwood) may occupy adjacent sites in riparian corridors where grazing is less severe. Neighboring upland communities are predominantly *Artemisia tridentata* (big sagebrush) shrubland, and grasslands with *Juniperus scopulorum* (Rocky Mountain juniper) sporadically interspersed.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Forage production from dense thickets of the *Rosa woodsii* (woods rose) community type is low. Stands may be so dense that they exclude most livestock use. However, the leaves of *Rosa woodsii* (woods rose) are considered fair to fairly good livestock forage, particularly for sheep (Johnson and Nichols 1982).

Wildlife

Stands of the *Rosa woodsii* (woods rose) community type provide good structural diversity for both thermal and hiding cover. Deer and elk may browse heavily on *Rosa woodsii* (woods rose), while the persistent fruit (rose hips) provides fall and winter food for birds, small mammals, and bears, which disperse the seeds. *Rosa woodsii* (woods rose) is strongly grazing tolerant but can be dwarfed and thinned by intense browsing or defoliation by season long use (Hansen and others 1995).

Fire

Rosa woodsii (woods rose) is strongly fire tolerant, except for smoldering fires with heavy volumes of surface fuel. The species has a shallow and much branched rhizomatous root system that will readily sprout and sucker. This sprouting capability of *Rosa woodsii* (woods rose) make it a good soil stabilizer. This is especially important given the severe disturbance common to areas colonized by this community type (Hansen and others 1995).

Soil Management and Rehabilitation Opportunities

Rosa woodsii (woods rose) is valuable for revegetating disturbed sites along streambanks and seeps. It is easily established from nursery grown stock, root cuttings, or transplanted materials (Hansen and others 1995).

Recreational Uses and Considerations

Native Americans made extensive use of *Rosa woodsii* (woods rose) roots, stems, leaves, flowers, and rose hips for food and therapeutic materials (US Forest Service 1975). The persistent rose hips are edible, and are one of the

best natural sources of vitamin C. They can be dried for use in flavoring teas, jellies, fruitcakes, and puddings.

Nature trails should be routed around dense stands of *Rosa woodsii* (woods rose) community type. However, *Rosa woodsii* (woods rose) is useful for planting in recreation areas as a biological barrier to protect physical structures, young and delicate plants, and to direct traffic (Hansen and others 1995).

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

OTHER STUDIES

This type has been documented in the Classification and Management of Montana's Riparian and Wetland Sites (Hansen and others 1995). Manning and Padgett (1992) have also described this type for Nevada and eastern California.

Symphoricarpos occidentalis Community Type
(Western Snowberry Community Type)

SYMOCC (SYOC)
Number Of Stands Sampled In Montana= 53

CAUTION—Not all sites currently dominated by *Symphoricarpos occidentalis* (western snowberry) are considered riparian or wetland sites. In some instances, they are considered upland sites. The topographic position of the site must match the description as presented in the Location and Associated Landform section.

NOTE: The *Symphoricarpos occidentalis* (western snowberry) community type has been documented in Idaho according to field surveys conducted in 1994. However, due to time constraints during the 1995 field season, homogeneous stand data could not be collected for this type. In the subsequent discussion, any references to physical site location or vegetation characteristics for this type in Idaho were interpreted from 1994 field surveys. The remainder of this description was taken from the Classification and Management of Montana's Riparian and Wetland Sites (Hansen and others 1995).

LOCATION AND ASSOCIATED LANDFORMS

The *Symphoricarpos occidentalis* (western snowberry) community type is an incidental type at mid elevations in central and southeastern Idaho. It occurs on alluvial terraces along streams and rivers. Stands are located in V-

shaped ravines and swale-like depressions where overland flows provide additional moisture. However, in some instances stands may be located on the side slopes of hillsides immediately below springs or seeps. Sites range in elevation from 1,637 to 2,030 m (5,400 to 6,700 ft).

VEGETATION

Typically, the roots of *Symphoricarpos occidentalis* (western snowberry) are densely branched and found mostly near the soil surface. They are intermixed with stout, spreading rhizomes, thereby forming dense, thickets. In Montana, large, dense patches often exclude other forms of vegetation. *Symphoricarpos occidentalis* (western snowberry) thrives in nearly full sunlight. The undergrowth (if there is any at all) is comprised of depauperate looking *Poa pratensis* (Kentucky bluegrass).

In Idaho, although *Symphoricarpos occidentalis* (western snowberry) dominates the community type for which it was named, a variety of other shrub species are often associated with it. Shrubs which may be present on these sites include *Rosa woodsii* (woods rose), *Prunus virginiana* (common chokecherry), *Amelanchier alnifolia* (western serviceberry), and *Artemisia tridentata* (big sagebrush). Understory graminoids and forbs may include *Poa palustris* (fowl bluegrass), *Bromus inermis* (smooth brome), *Bromus tectorum* (cheatgrass), and *Phleum pratense* (common timothy. Table 13 reflects vegetation surveyed on sites exclusive to Montana and may not provide an accurate representation of species composition and canopy cover for sites identified in Idaho; however, it has been provided as a reference for comparison of sites observed during future inventories.

Table 13. Average canopy cover, range of canopy cover, and constancy for indicator species and those species recorded in 40 percent or more of the sampled stands of the *Symphoricarpos occidentalis* (western snowberry) community type (number = 53 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Shrubs			
Rosa woodsii (woods rose)	15	0-60	51
Symphoricarpos albus (common snowberry)	21	0-80	8
Symphoricarpos occidentalis (western snowberry)	67	0-98	91
Graminoids			
Poa pratensis (Kentucky bluegrass)	27	0-80	60

SUCCESSIONAL INFORMATION

The successional status of the *Symphoricarpos occidentalis* (western snowberry) community type in Idaho is confusing. At many sites in central and eastern Montana, the *Symphoricarpos occidentalis* (western snowberry) community type generally represents a mid-seral, grazing induced, successional stage of the *Fraxinus pennsylvanica/Prunus virginiana* (green ash/common chokecherry) habitat type or the *Acer negundo/Prunus virginiana* (box-elder/common chokecherry) habitat type. At other locations, the *Symphoricarpos occidentalis* (western snowberry)

community type seems to represent a long-lived, mid-seral stage that was not influenced by heavy grazing pressures. Future work may bring insight into the ecological status of this community type.

Disturbance Stages

Heavy grazing or browsing pressures will open up stands allowing disturbance species such as *Poa pratensis* (Kentucky bluegrass) to increase. Weedy species such as *Bromus japonicus* (Japanese brome), *B. tectorum* (cheatgrass), or *Achillea millefolium* (common yarrow) may invade.

SOILS

Soils are quite variable and include Entisols (Torrifluvents), and Mollisols (Haploborolls, and Argiborolls). The *Symphoricarpos occidentalis* (western snowberry) community type occurs on virtually all soil textures except sand. This community type is also tolerant of imperfectly drained soils and short duration floods, but is intolerant of prolonged floods and permanent high water tables. Soil reaction ranges between slightly acid to mildly alkaline (pH 6.0 to 8.0) (Wasser 1982).

ADJACENT COMMUNITIES

Adjacent wetter communities may include cottonwood, *Salix exigua* (sandbar willow), or *Salix amygdaloides* (peach-leaf willow) community types, or the *Fraxinus pennsylvanica/Prunus virginiana* (green ash/common chokecherry) or *Acer negundo/Prunus virginiana* (box-elder/common chokecherry) habitat types. Some wetter communities may include the *Salix lutea* (yellow willow) dominated habitat types. Adjacent drier communities are typically dominated by upland communities.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Forage production for dense, monotypic stands is low. As stands open, forage production increases accordingly due to the presence of *Agropyron smithii* (western wheatgrass) and *Poa pratensis* (Kentucky bluegrass). The palatability of *Symphoricarpos occidentalis* (western snowberry) ranges from low to fair for cattle and sheep (Wasser 1982, Johnson and Nichols 1982).

Wildlife

The moderate structural diversity of the *Symphoricarpos occidentalis* (western snowberry) community type provides thermal and hiding cover for big game and upland bird species. The palatability of *Symphoricarpos occidentalis* (western snowberry) is rated as good for deer and elk (Wasser 1982, Johnson and Nichols 1982).

Fisheries

This community type offers excellent streambank stabilization due to the rhizomatous nature of *Symphoricarpos occidentalis* (western snowberry).

Fire

Symphoricarpos occidentalis (western snowberry) is tolerant of fire. It can be injured by fire but usually sprouts, with stands becoming denser afterward. It is such a strong competitor, particularly in dense colonies, that it is not very compatible with most herbaceous vegetation.

Soil Management and Rehabilitation Opportunities

Symphoricarpos occidentalis (western snowberry) is well adapted for revegetating sites. Commonly growing in dense colony stands makes it suitable for disturbed land stabilization. It does best on moist, well drained soils which have not been excessively disturbed. Once established, it grows at a moderate rate and spreads rapidly by root sprouts. Nursery grown seedlings, rooted cuttings, or wildlings are the preferred planting materials. Critical, erosive sites may need complete exclusion from grazing during establishment, and animal populations and stocking rates should be balanced with forage supply on noncritical sites after establishment (Wasser 1982).

Recreational Uses and Considerations

Recreational opportunities are good to excellent for both big game and upland bird hunting. Because the fruits persist into the winter, *Symphoricarpos occidentalis* (western snowberry) is an important food source for upland birds.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

OTHER STUDIES

Similar communities have been described for Minnesota (Pelton 1953) and the northern Great Plains (Hansen and others 1984, Hansen and Hoffman 1988).

Carex aquatilis Habitat Type
(Water Sedge Habitat Type)

CARAQU (CAAQ)

Number Of Stands Sampled In Montana= 68

NOTE: The *Carex aquatilis* (water sedge) habitat type includes all combinations of *Carex aquatilis* (water sedge) and *Carex lenticularis* (lentil-fruit sedge) due to similarities in environmental conditions and management concerns.

NOTE: The *Carex aquatilis* (water sedge) habitat type has been documented in Idaho according to field surveys conducted in 1994. However, due to time constraints during the 1995 field season, homogeneous stand data could not be collected for this type. In the subsequent discussion, any references to physical site location or vegetation characteristics for this type in Idaho were interpreted from 1994 field surveys. The remainder of this description was taken from the Classification and Management of Montana's Riparian and Wetland Sites (Hansen and others 1995).

LOCATION AND ASSOCIATED LANDFORMS

The *Carex aquatilis* (water sedge) habitat type is a minor type throughout southeastern Idaho. Sites range in elevation from 1,515 to 1,697 m (5,000 to 5,600 ft). It occurs on broad, flat benches or valley bottoms immediately adjacent to open water. In Montana, it may grade into the *Carex rostrata* (beaked sedge) habitat type on sites characterized by slightly deeper water where *Carex aquatilis* (water sedge) is less competitive. Similar to the *Carex rostrata* (beaked sedge) habitat type, sites dominated by the *Carex aquatilis* (water sedge) habitat type include silted in beaver ponds, old oxbow lakes, depressions left by migrating stream channels, or narrow bands adjacent to small streams.

VEGETATION

Two phases have been identified for the *Carex aquatilis* (water sedge) habitat type in Montana. The *Carex aquatilis* (water sedge) phase occurs on slightly wetter sites than the *Deschampsia cespitosa* (tufted hairgrass) phase. The *Carex aquatilis* (water sedge) phase includes *Carex aquatilis* (water sedge) and *Calamagrostis stricta* (narrow-spiked reedgrass) (Table 1). Within the *Deschampsia cespitosa* (tufted hairgrass) phase, *Deschampsia cespitosa* (tufted hairgrass) is the major graminoid (Table 2). Tables 1 & 2 reflect vegetation surveyed on sites exclusive to Montana and may not provide an accurate representation of species composition and canopy cover for sites identified in Idaho; however, they have been provided here as references for comparison to sites observed during future inventories.

Due to the limited number of observations of the *Carex aquatilis* (water sedge) habitat type in Idaho during the 1994 field season, divisions to the phase level have not been verified nor are warranted at this stage in the classification. The signature species, *Deschampsia cespitosa* (tufted hairgrass), was not present in any stands of the *Carex aquatilis* (water sedge) habitat type in Idaho and the composition of the associated herbaceous graminoid and forb species also differs. Additional sites need to be surveyed to determine whether this type in Idaho matches the type described by Hansen and others (1995) in Montana, or whether it needs modification. The level and types of disturbances on these sites may account for the discrepancies in species composition.

Table 1. Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax stands of the *Carex aquatilis* (water sedge) habitat type, *Carex aquatilis* (water sedge) phase (number = 24 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Shrubs			
Betula glandulosa (bog birch)	1	0-1	4

Potentilla fruticosa (shrubby cinquefoil)	1	0-1	4
Rosa spp. (rose)	1	0-1	4
Salix bebbiana (Bebb willow)	3	0-3	4
Salix boothii (Booth willow)	2	0-3	8
Salix candida (hoary willow)	3	0-3	4
Salix drummondiana (Drummond willow)	1	0-1	4
Salix geyeriana (Geyer willow)	2	0-3	13
Salix planifolia (planeleaf willow)	1	0-3	13
Graminoids			
Agrostis humilis (alpine bentgrass)	1	0-1	4
Calamagrostis stricta (narrow-spiked reedgrass)	2	0-3	8
Carex aperta (Columbia sedge)	94	0-98	8
Carex aquatilis (water sedge)	69	0-98	88
Carex canescens (gray sedge)	3	0-3	4
Carex diandra (lesser-panicled sedge)	3	0-3	4
Carex illota (sheep sedge)	1	0-1	4
Carex lenticularis (lentil-fruited sedge)	80	0-80	4
Carex rostrata (beaked sedge)	12	0-20	29
Carex saxatilis (russet sedge)	30	0-30	4
Carex simulata (short-beaked sedge)	37	0-60	13
Carex vesicaria (inflated sedge)	14	0-20	13
Deschampsia cespitosa (tufted hairgrass)	2	0-3	25
Eleocharis palustris (common spikesedge)	1	0-1	4
Glyceria striata (fowl mannagrass)	1	0-1	4
Juncus balticus (Baltic rush)	2	0-3	10
Juncus regelii (Regel's rush)	10	0-10	4
Phleum alpinum (alpine timothy)	1	0-1	4
Poa palustris (fowl bluegrass)	1	0-1	4
Forbs			
Aster occidentalis (western aster)	1	0-1	4
Caltha leptosepala (elkslip marshmarigold)	3	0-3	4
Dodecatheon pulchellum (few-flowered shooting star)	1	0-1	4
Epilobium ciliatum (common willow-herb)	1	0-1	13
Epilobium palustre (swamp willow-herb)	2	0-3	8
Galium trifidum (small bedstraw)	1	0-1	4
Geum macrophyllum (large-leaved avens)	2	0-3	8
Mentha arvensis (field mint)	3	0-3	4
Mentha spp. (mint)	3	0-3	4
Pedicularis groenlandica (elephant's head)	3	0-3	4
Polemonium occidentale (western polemonium)	1	0-1	4
Polygonum amphibium (water smartweed)	3	0-3	4

Potentilla gracilis (slender cinquefoil)	10	0-10	4
Potentilla spp. (cinquefoil)	3	0-3	4
Ranunculus natans (floating water-buttercup)	3	0-3	4
Rumex crispus (curly dock)	2	0-3	8
Senecio hydrophilus (alkali-marsh butterweed)	1	0-1	4
Stellaria longipes (longstalk starwort)	1	0-1	4
Triglochin maritimum (seaside arrow-grass)	1	0-1	4
Typha latifolia (common cattail)	1	0-1	4
Viola spp. (violet)	1	0-1	8
Ferns and Allies			
Equisetum fluviatile (water horsetail)	20	0-20	4

Table 2. Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax stands of the *Carex aquatilis* (water sedge) habitat type, *Deschampsia cespitosa* (tufted hairgrass) phase (number = 6 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Shrubs			
Potentilla fruticosa (shrubby cinquefoil)	1	0-1	17
Salix bebbiana (Bebb willow)	3	0-3	17
Salix boothii (Booth willow)	1	0-1	17
Salix geyeriana (Geyer willow)	1	0-1	17
Salix lasiandra (Pacific willow)	3	0-3	17
Salix planifolia (planeleaf willow)	1	0-1	17
Graminoids			
Alopecurus alpinus (alpine foxtail)	1	0-1	17
Beckmannia syzigachne (American sloughgrass)	1	0-1	17
Calamagrostis stricta (narrow-spiked reedgrass)	1	0-1	33
Carex aquatilis (water sedge)	60	30-90	100
Carex canescens (gray sedge)	1	0-1	17
Carex lenticularis (lentil-fruit sedge)	47	0-90	10
Carex simulata (short-beaked sedge)	30	0-30	17
Carex spp. (sedge species)	1	0-1	17
Deschampsia cespitosa (tufted hairgrass)	28	10-60	100
Eleocharis palustris (common spikesedge)	3	0-3	17
Hordeum brachyantherum (meadow barley)	1	0-1	17
Juncus balticus (Baltic rush)	1	0-1	17
Phleum alpinum (alpine timothy)	1	0-1	17

Poa cusickii (Cusick's bluegrass)	1	0-1	17
Poa palustris (fowl bluegrass)	20	0-20	17
Forbs			
Achillea millefolium (common yarrow)	1	0-1	17
Aster occidentalis (western aster)	1	0-1	50
Epilobium spp. (willow-herb)	1	0-1	17
Erigeron peregrinus (subalpine daisy)	1	0-1	17
Galium trifidum (small bedstraw)	1	0-1	17
Geum macrophyllum (large-leaved avens)	1	0-1	33
Mentha arvensis (field mint)	3	0-3	33
Pedicularis groenlandica (elephant's head)	3	0-3	17
Polemonium occidentale (western polemonium)	1	0-1	17
Polygonum amphibium (water smartweed)	1	0-1	17
Potentilla gracilis (slender cinquefoil)	1	0-1	50
Senecio cymbalarioides (few-leaved groundsel)	1	0-1	17
Senecio hydrophilus (alkali-marsh butterweed)	1	0-1	17
Senecio integerrimus (western groundsel)	1	0-1	17
Sium suave (hemlock water-parsnip)	1	0-1	17
Stellaria longipes (longstalk starwort)	1	0-1	33
Swertia perennis (swertia)	10	0-10	17
Taraxacum officinale (common dandelion)	1	0-1	17
Viola spp. (violet)	1	0-1	17

SUCCESSIONAL INFORMATION

Carex aquatilis (water sedge) functions as a pioneer colonizer of exposed mineral substrates, such as when a beaver dam breaks, and a climax species. High water tables and a vigorous network of *Carex aquatilis* (water sedge) rhizomes limit the successful establishment of most other species. In general, the high water table throughout the growing season tends to limit access by livestock. However, due to the palatable nature of *Carex aquatilis* (water sedge), severe grazing pressures can greatly decrease the cover of *Carex aquatilis* (water sedge) while increasing the cover of disturbance-caused herbaceous species such as *Carex nebrascensis* (Nebraska sedge), *Juncus balticus* (Baltic rush), *Taraxacum officinale* (common dandelion), *Geum macrophyllum* (large-leaved avens), *Poa pratensis* (Kentucky bluegrass), and others.

SOILS

Soils of the *Carex aquatilis* (water sedge) phase are typically Histosols (Borofibrists, Borohemists, and Borosaprists). Mollisols are less frequently associated with this phase. Soil texture varies from clay to sandy loam. Water tables are at or near the soil surface throughout the year. The *Deschampsia cespitosa* (tufted hairgrass) phase are only rarely associated with Histosols. Soils tend to be more coarse textured with only thin organic matter accumulations. Water tables are often lower, and can fall below 1 m (39 in) by mid-summer. Both phases appear less anaerobic than the *Carex rostrata* (beaked sedge) habitat type. Soil reaction for both phases varies little between slightly acid and neutral (pH 6.0 to 7.0).

ADJACENT COMMUNITIES

Wetter sites support the *Carex rostrata* (beaked sedge) habitat type. Communities on adjacent drier sites include the *Salix wolfii/Carex aquatilis* (Wolf's willow/water sedge), *Potentilla fruticosa/Deschampsia cespitosa* (shrubby cinquefoil/tufted hairgrass), *Juncus balticus* (Baltic rush), *Phleum pratense* (common timothy), and *Poa pratensis* (Kentucky bluegrass) types. Upland communities support a variety of types including those dominated by conifers or by *Artemisia tridentata* (big sagebrush).

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Livestock forage value of *Carex aquatilis* (water sedge) is variable, depending upon season, previous grazing use, and the extent of the site. On narrow riparian or wetland sites within extensive rangelands, sedge species are heavily utilized, particularly when upland plants are cured, or where livestock distribution and stocking rate problems occur. On expansive *Carex aquatilis* (water sedge) sites, livestock can sometimes select more palatable species.

In general, sedges should respond satisfactorily to the more traditional grazing systems designed for upland species. However, on those sites adjacent to a stream, residual cover should be left to filter out sediments during the fall rains or spring runoff. Removing cattle to allow at least 30 days for the sedge regrowth should provide sufficient residual cover (Myers 1989).

Wet soils may deter animal use until soils have dried, allowing *Deschampsia cespitosa* (tufted hairgrass) to replenish its carbohydrate reserves and persist within these communities. However, if heavy grazing does occur, there will be a marked decrease in the highly palatable *Deschampsia cespitosa* (tufted hairgrass) and an increase in the less palatable *Juncus balticus* (Baltic rush). *Juncus balticus* (Baltic rush) is considered palatable early in the growing season when plants are young and tender. As stems mature and toughen, palatability declines (Hermann 1975).

Frisina (1991) states that for a grazing program to be successful, it must meet the basic biological requirements of the plants such as photosynthesis, food storage, reproduction, and seedling establishment. In order to meet these requirements, long periods of rest are needed. It is during long growing season rest periods that the essential biological processes of food production and storage, reproduction, and seedling establishment take place. In some instances, additional periods of rest may be required to either improve or maintain a plant community.

Wildlife

Elk may graze stands of *Carex aquatilis* (water sedge), but this species is not usually a major food source. Waterfowl consume the seeds produced by associated plants in this type.

Beaver perform a vital role in the health and maintenance of riparian ecosystems. Beaver dams assist in controlling the downcutting of channels, bank erosion, and the movement of sediment downstream (Gordon and others

1992). When beaver construct a dam, they raise the water table in the area, which provides water for hydrophytic plants such as willows and sedges. The beaver dam also slows down the water in the channel, which allows suspended sediment to be deposited behind the dam. The combination of sediment deposition and plant reproduction raises the channel bed, creating a wetland environment which is excellent waterfowl and fish habitat. It has often been the policy of land managers to trap and kill beaver because they can be a nuisance. However, because beaver produce such desirable habitat and provide many beneficial stream functions, their removal from a riparian system needs to be closely evaluated.

Fisheries

This type is often located adjacent to waterways supporting trout fisheries. The rhizomatous growth habit of *Carex aquatilis* (water sedge) forms a dense sod, effectively stabilizing soils and streambanks. Overhanging sod provides valuable cover and shade for fish.

Fire

The *Carex aquatilis* (water sedge) type is suited to prescribed burning. Nonuse by livestock during the year prior to burning is essential. Residual cover burns well in spring, prior to the growing season. Fire will reduce litter accumulations and temporarily increase productivity. However, species composition will not drastically change away from dominance by *Carex aquatilis* (water sedge) (DeBenedetti and Parsons 1984).

Deschampsia cespitosa (tufted hairgrass) is resistant to damage from fire (DeBenedetti and Parsons 1984). Root crowns are rarely damaged, even by hot, intense fires. However, repeated burning will favor the rhizomatous sedge species. Burning should be postponed if livestock are present to avoid attracting animals to young, palatable regrowth of *Deschampsia cespitosa* (tufted hairgrass).

Care should be taken when burning stands along streambanks because of the excellent erosion protection this type provides.

Soil Management and Rehabilitation Opportunities

Mineral soils are highly susceptible to compaction when wet. Organic soils can be broken and churned by grazing animals. Productivity of sites may be lowered as soil are disturbed and become less favorable to *Carex aquatilis* (water sedge). Rutting can be severe with packstock or hiker use, often resulting in multiple parallel trails. Off road vehicles cause serious long term damage. Care should be taken to maintain existing roads to help discourage off road travel. New trails or roads should be located on adjacent uplands.

Generally, sedges offer better streambank stability than grasses, primarily due to their rhizomatous growth form. *Carex aquatilis* (water sedge) tends to form a dense, thick sod that is highly resistant to erosion. Along the stream, the sod may be undercut and sag into the water, providing additional protection to streambanks. However, if grazing or trailing impacts are severe, the heavy weight of the sod makes it susceptible to damage, and streambank sloughing can occur.

Deschampsia cespitosa (tufted hairgrass) has a weak, fibrous root system that is of little value for stabilizing stream-

banks (Youngblood and others 1985b). However, *Juncus balticus* (Baltic rush) produces a deep and fibrous root system, with a mass of coarse and creeping rhizomes. Once established, they spread rapidly. These soil holding characteristics may make it valuable for stabilizing streambanks.

The low stream gradient and well developed floodplain associated with this type results in high rates of recovery through the bank building process. This requires residual spring cover to filter sediments. Removing cattle to allow at least 30 days for the sedge regrowth should provide sufficient residual cover (Myers 1989).

Recreational Uses and Considerations

Recreational use is usually confined to the associated fishery. Heavy human use in the spring and summer can result in compacted soils, bank damage, and exposed soils along stream edges. Moderate amounts of late season use have little impact.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = seasonally flooded to saturated.

OTHER STUDIES

Mutz and Queiroz (1983), Mattson (1984), Youngblood and others (1985b), and Chadde and others (1988) described similar *Carex aquatilis* (water sedge) communities in eastern Idaho and western Wyoming. In Utah and southeastern Idaho, Padgett and others (1989) described a similar community. Manning and Padgett (1992) recognize this type in eastern California and Nevada as well.

Carex lasiocarpa Habitat Type
(Slender Sedge Habitat Type)

CARLAS (CALA16)

Number Of Stands Sampled In Montana= 32

NOTE: The *Carex lasiocarpa* (slender sedge) habitat type includes all combinations of *Carex lasiocarpa* (slender sedge), *Carex lanuginosa* (woolly sedge), and *Carex buxbaumii* (Buxbaum's sedge) due to similarities in environmental conditions and management concerns.

NOTE: The *Carex lasiocarpa* (slender sedge) habitat type has been documented in Idaho according to field surveys conducted in 1994. However, due to time constraints during the 1995 field season, homogeneous stand data could

not be collected for this type. In the subsequent discussion, any references to physical site location or vegetation characteristics for this type in Idaho were interpreted from 1994 field surveys. The remainder of this description was taken from the Classification and Management of Montana's Riparian and Wetland Sites (Hansen and others 1995).

LOCATION AND ASSOCIATED LANDFORMS

The *Carex lasiocarpa* (slender sedge) habitat type is an incidental type at mid elevations in valleys of southeastern Idaho. Sites range in elevation from 1,636 to 1,697 m (5,400 to 5,600 ft). Stands may be found around the periphery of beaver ponds or on broad, level floodplains. In Montana, this type is associated with drier meadows, basins, glacial depressions (kettles), and along lake margins that are anaerobically favorable to the buildup of deep organic soils.

VEGETATION

The diagnostic sedges of this type in Montana include *Carex lasiocarpa* (slender sedge), *Carex lanuginosa* (woolly sedge), and *Carex buxbaumii* (Buxbaum's sedge) (Table 5). Table 5 reflects vegetation surveyed on sites exclusive to Montana, and may not provide an accurate representation of species composition and canopy cover for sites identified in Idaho.

Carex lanuginosa (woolly sedge) is the dominant sedge for this habitat type in Idaho, with little if any *Carex lasiocarpa* (slender sedge) or *Carex buxbaumii* (Buxbaum's sedge) actually present. Other associated herbaceous species often include *Glyceria grandis* (American mannagrass), *Eleocharis palustris* (common spikesedge), and *Agrostis stolonifera* (redtop). Additional sites need to be surveyed to determine whether this type in Idaho matches the type described by Hansen and others (1995) in Montana, or whether it needs modification.

Table 5. Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax stands of the *Carex lasiocarpa* (slender sedge) habitat type (number = 14 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Shrubs			
Potentilla fruticosa (shrubby cinquefoil)	3	0-3	7
Rosa acicularis (prickly rose)	3	0-3	7
Salix bebbiana (Bebb willow)	1	0-1	7
Salix candida (hoary willow)	2	0-3	14
Salix planifolia (planeleaf willow)	1	0-1	7
Graminoids			
Agrostis stolonifera (redtop)	1	0-1	7
Calamagrostis stricta (narrow-spiked reedgrass)	18	0-50	21
Carex aquatilis (water sedge)	20	0-20	7
Carex atherodes (awned sedge)	10	0-10	7

Carex aurea (golden sedge)	1	0-1	7
Carex buxbaumii (Buxbaum's sedge)	40	0-40	7
Carex diandra (lesser-panicled sedge)	1	0-1	7
Carex flava (yellow sedge)	3	0-3	7
Carex interior (inland sedge)	3	0-3	7
Carex lanuginosa (woolly sedge)	46	0-98	36
Carex lasiocarpa (slender sedge)	55	0-98	79
Carex limosa (mud sedge)	20	0-20	7
Carex oederi (green sedge)	1	0-1	7
Carex paupercula (poor sedge)	60	0-60	7
Carex rostrata (beaked sedge)	8	0-10	43
Carex simulata (short-beaked sedge)	1	0-1	7
Carex vesicaria (inflated sedge)	3	0-3	7
Deschampsia cespitosa (tufted hairgrass)	7	0-10	14
Eriophorum polystachion (many-spiked cotton-grass)	10	0-10	7
Glyceria grandis (American mannagrass)	3	0-3	7
Hordeum jubatum (foxtail barley)	1	0-1	7
Muhlenbergia andina (foxtail muhly)	1	0-1	7
Phalaris arundinacea (reed canarygrass)	1	0-1	7
Poa palustris (fowl bluegrass)	1	0-1	7
Scirpus acutus (hardstem bulrush)	1	0-1	7
Scirpus pallidus (pale bulrush)	1	0-1	7
Scirpus pungens (sharp bulrush)	40	0-40	7
Forbs			
Allium schoenoprasum (chives)	1	0-1	7
Antennaria anaphaloides (tall pussy-toes)	1	0-1	7
Arnica chamissonis (meadow arnica)	3	0-3	7
Aster foliaceus (leafy aster)	1	0-1	7
Aster occidentalis (western aster)	30	0-30	7
Dodecatheon spp. (shooting star)	1	0-1	7
Epilobium ciliatum (common willow-herb)	1	0-1	7
Galium aparine (goose-grass)	1	0-1	7
Galium boreale (northern bedstraw)	1	0-1	7
Galium trifidum (small bedstraw)	1	0-1	7
Gentiana affinis (pleated gentian)	1	0-1	7
Gentianella detonsa (smaller fringed gentian)	1	0-1	7
Geum macrophyllum (large-leaved avens)	1	0-1	7
Mentha arvensis (field mint)	3	0-3	7
Menyanthes trifoliata (buckbean)	3	0-3	7
Polygonum amphibium (water smartweed)	1	0-1	7
Polygonum austinae (Austin's knotweed)	1	0-1	7

Potamogeton gramineus (grass-leaved pondweed)	1	0-1	7
Potentilla anserina (common silverweed)	40	0-40	7
Potentilla gracilis (slender cinquefoil)	10	0-10	7
Potentilla palustris (purple cinquefoil)	15	0-40	29
Ranunculus macounii (Macoun's buttercup)	1	0-1	7
Rumex crispus (curly dock)	1	0-1	7
Scutellaria galericulata (marsh skullcap)	3	0-3	7
Triglochin maritimum (seaside arrow-grass)	3	0-3	7
Viola spp. (violet)	1	0-1	7
Ferns and Allies			
Equisetum arvense (field horsetail)	40	0-40	7
Equisetum laevigatum (smooth scouring-rush)	1	0-1	7

SUCCESSIONAL INFORMATION

Moderate disturbance will increase *Juncus balticus* (Baltic rush) and associated forbs. Severe disturbance may lower the water table and cause the site to be dominated by *Poa pratensis* (Kentucky bluegrass), *Poa palustris* (fowl bluegrass), *Potentilla anserina* (common silverweed), or *Agrostis stolonifera* (redtop).

Moderately disturbed sites will improve rapidly with protection due to the rhizomatous nature of *Carex lasiocarpa* (slender sedge) and *Carex lanuginosa* (woolly sedge).

SOILS

Soils are usually Histosols (Borofibrists, Borohemists, and Borosaprists), with thick accumulations of partially decomposed sedges. Soil texture is predominantly loam. Soils are poorly to very poorly drained. Sites are often flooded into July and August with water tables remaining within the root zone throughout the growing season.

ADJACENT COMMUNITIES

Adjacent wetter communities may be dominated by either the *Carex rostrata* (beaked sedge) or the *Carex aquatilis* (water sedge) habitat type, or the *Carex nebrascensis* (Nebraska sedge) community type. Drier communities may be dominated by the *Deschampsia cespitosa* (tufted hairgrass) or *Artemisia cana/Festuca idahoensis* (silver sagebrush/Idaho fescue) habitat type, or the *Juncus balticus* (Baltic rush) community type. Adjacent uplands are typically dominated by *Artemisia tridentata* (big sagebrush) at lower elevations and by *Abies lasiocarpa* (subalpine fir) at higher elevations.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Estimated herbage production is moderate to high ranging from 1,000 to 3,000 lbs/acre dry weight (Kovalchik 1987). *Carex lasiocarpa* (slender sedge) receives limited use by livestock due to its low palatability. However, asso-

ciated species of this type, such as *Carex lanuginosa* (woolly sedge) or *Deschampsia cespitosa* (tufted hairgrass) are highly palatable to livestock and may attract earlier use than desired. Livestock tend to avoid the wet meadows or basins until they are surface dry, usually in late July or early August. *Carex lasiocarpa* (slender sedge) and *Carex lanuginosa* (woolly sedge) will rapidly reoccupy moderately disturbed sites with rest and late season grazing. Livestock should be removed before 40 percent of the summer/fall forage has been utilized to insure an upward trend in ecological status (Kovalchik 1987).

Frisina (1991) states that for a grazing program to be successful, it must meet the basic biological requirements of the plants such as photosynthesis, food storage, reproduction, and seedling establishment. In order to meet these requirements, long periods of rest are needed. It is during long growing season rest periods that the essential biological processes of food production and storage, reproduction, and seedling establishment take place. In some instances, additional periods of rest may be required to either improve or maintain a plant community.

Wildlife

The *Carex lasiocarpa* (slender sedge) habitat type is generally flooded long enough to provide nesting habitat for waterfowl. However, it has limited use by songbirds and small mammals because of the lack of diversity and flooded soils. It is an important habitat for raptors, deer, and elk. Deer use the type for fawning.

Beaver perform a vital role in the health and maintenance of riparian ecosystems. Beaver dams assist in controlling the downcutting of channels, bank erosion, and the movement of sediment downstream (Gordon and others 1992). When beaver construct a dam, they raise the water table in the area, which provides water for hydrophytic plants such as willows and sedges. The beaver dam also slows down the water in the channel, which allows suspended sediment to be deposited behind the dam. The combination of sediment deposition and plant reproduction raises the channel bed, creating a wetland environment which is excellent waterfowl and fish habitat. It has often been the policy of land managers to trap and kill beaver because they can be a nuisance. However, because beaver produce such desirable habitat and provide many beneficial stream functions, their removal from a riparian system needs to be closely evaluated.

Fire

High water tables make burning difficult. However, meadows and basins can be burned in the late summer. Fire can be used in late spring or early summer on sites adjacent to floodplains. Fire will help reduce litter accumulations and competitors. Dominant sedges of this habitat type are resistant to damage by fire except where hot fires penetrate the peat soil.

Soil Management and Rehabilitation Opportunities

Mechanical use should be avoided because of the fragile nature of wet, organic soils. Livestock should be kept off these sites until the surface soils are dry. Trails and roads should be located on the adjacent uplands.

Carex lasiocarpa (slender sedge) and *Carex lanuginosa* (woolly sedge) are useful for improving degraded sites. Their long, creeping rhizomes form a dense mat, effectively stabilizing streambank soils.

Recreational Uses and Considerations

The sites provide good opportunities for viewing deer, elk, and waterfowl. Floodplain sites adjacent to streams are often used as fishing access points.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = semipermanently flooded to seasonally flooded to saturated.

OTHER STUDIES

The *Carex lasiocarpa* (slender sedge) habitat type is similar to the *Carex lanuginosa* (woolly sedge) and the *Carex lasiocarpa* (slender sedge) associations described by Kovalchik (1987) for central Oregon, and Manning and Padgett (1992) for Nevada and eastern California, and the *Carex buxbaumii* (Buxbaum's sedge) series described by Mattson (1984) for central Yellowstone National Park. Padgett and others (1989) described a similar community for Utah and southeastern Idaho as well.

Carex microptera Community Type
(Small-winged Sedge Community Type)

CARMIC (CAMI)

Number Of Observations in 1994 = 1

LOCATION AND ASSOCIATED LANDFORMS

The *Carex microptera* (small-winged sedge) community type is an incidental type at mid elevations in the mountains of central and eastern Idaho. Sites range in elevation from 1,727 to 1,818 m (5,700 to 6,000 ft). This type may be located in and adjacent to stream channels at the bottom of V-shaped canyons, near seeps and springs, and in wet meadows and depressional areas.

VEGETATION

The *Carex microptera* (small-winged sedge) community type is characterized by a dense herbaceous layer dominated by *Carex microptera* (small-winged sedge). Associated subordinate *Carex* spp occupying wetter zones of this type may include *Carex rostrata* (beaked sedge) and *Carex aquatilis* (water sedge) on some locations (Youngblood and others 1985) or *Carex lanuginosa* (woolly sedge) and *Carex praegracilis* (clustered field sedge) on others (Padgett and others 1989). *Deschampsia cespitosa* (tufted hairgrass) and *Poa pratensis* (Kentucky bluegrass) seem to be affiliated with most stands, although often poorly represented, occupying the drier areas dominated by this type. An assortment of other graminoids and forbs may be dispersed throughout these stands. Due to the meth-

ods of data collection during the 1994 field season, species specific vegetation tables identifying composition and cover could not be constructed.

SUCCESSIONAL INFORMATION

This type tends to establish small, localized communities, often part of a matrix with other riparian types, and is seldom found as extensive, monotypic stands. *Carex rostrata* (beaked sedge), *Carex lanuginosa* (woolly sedge) or *Carex aquatilis* (water sedge) may represent the climax vegetation on sites occupied by the *Carex microptera* (small-winged sedge) community type; however, due to the limited number of observations in Idaho, the the successional status of this community type has yet to be fully explored. Padgett and others (1989) suspect that it may be tied to *Deschampsia cespitosa* (tufted hairgrass) habitat type. Manning and Padgett (1992) observed high concentrations of *Juncus balticus* (Baltic rush) on one site which may indicate one transitional shift of the *Carex microptera* (small-winged sedge) community type under intense grazing or other disturbances. *Poa pratensis* (Kentucky bluegrass) may represent a potential grazing disclimax where water tables have dropped as a result of severe livestock disturbance (Padgett and others 1989).

SOILS

Youngblood and others (1985) indicate that this type occupies soils classified as Mollisols and Entisols, although Inceptisols were also observed on some sites by both Manning and Padgett (1992) and Padgett and others (1989). Mineral surface horizons are consistently characterized by fine-loamy or clayey textures. Water tables range from 20 to 100 cm (8 to 39 in) below the surface, with the average approximately 49 cm (19 in) deep. Padgett and others (1989) noted that mottles may be common where high water tables promote oxidation and reduction reactions.

ADJACENT COMMUNITIES

Adjacent wetter communities may be dominated by either the *Carex rostrata* (beaked sedge) or the *Carex aquatilis* (water sedge) habitat types while drier communities may be dominated by the *Deschampsia cespitosa* (tufted hairgrass) (Padgett and others 1989). *Salix* spp. (willow) may also be present along some riparian corridors. (Manning and Padgett (1992). Adjacent uplands are typically dominated by *Artemisia tridentata* (big sagebrush) or *Pseudotsuga menziesii* (Douglas fir).

MANAGEMENT INFORMATION

Livestock

Carex microptera (small-winged sedge) is essentially a bunchgrass, with a cespitose growth form, that causes it to be more susceptible to livestock damage from trampling and grazing than rhizomatous, sod forming species (Padgett and others 1989). Manning and Padgett (1992) indicate that this type rates high as a resource value for horses and cattle for the spring, summer and fall seasons, and moderate for sheep, mule deer, and elk; however, Lewis (1958) reports that it is only moderately palatable for cattle and and low for sheep. Associated species, such as *Carex lanuginosa* (woolly sedge) or *Deschampsia cespitosa* (tufted hairgrass), are highly palatable to livestock and may attract use earlier in the growing season than desired (Kovalchik 1987).

Wildlife

This type appears to have limited use for most songbirds and small mammals due to the absence of shrubs for nest sites and overall cover, and the presence of highly saturated soils that preclude denning. It may provide a food source for wild ungulates, although use has not been documented.

Fire

The burning potential of the *Carex microptera* (small-winged sedge) community type is unknown at this time. If burning is desired, elevated water tables may preclude burning until the late summer when surface soils are drier. However, *Carex microptera* (small-winged sedge) has a cespitose growth form and overall coverages may be reduced under a regular fire regime while rhizomatous competitors may prosper.

Soil Management and Rehabilitation Opportunities

Under saturated conditions, fine-textured soils affiliated with this type are susceptible to compaction; therefore, mechanical equipment and livestock should be restricted from these sites unless surface horizons are dry. Trails and roads should be located on the adjacent uplands to reduce destructive trafficking.

Carex microptera (small-winged sedge) forms large, dense clumps (Lackschewitz 1991) and has moderate capacity for erosion control (Manning and Padgett 1992).

Recreational Uses and Considerations

Where this type occupies streamside zones, it may offer access for anglers. These sites may also provide opportunities for viewing wildlife such as deer, moose, and waterfowl.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = semipermanently flooded to seasonally flooded to saturated.

OTHER STUDIES

The *Carex microptera* (small-winged sedge) community type is described by Youngblood and others (1985) for eastern Idaho and western Wyoming, and Manning and Padgett (1992) for Nevada and eastern California. Padgett and others (1989) also described a similar community for Utah and southeastern Idaho while Hansen and others (1988) describe a *Carex microptera* (small-winged sedge) dominance type for the state of Montana.

Carex nebrascensis Community Type
(Nebraska Sedge Community Type)

CARNEB (CANE2)
Number Of Stands Sampled = 1

LOCATION AND ASSOCIATED LANDFORMS

The *Carex nebrascensis* (Nebraska sedge) community type occurs across east central and southern Idaho, ranging in elevations from 1,576 to 1,825 m (5,200 to 6,023 ft). This minor type colonizes level, gently sloping benches with high water tables, probably associated with seeps, establishing broad meadows or narrow belts. It may also border streams and rivers on floodplains in U-shaped canyons.

VEGETATION

Carex nebrascensis (Nebraska sedge) forms essentially a monoculture at some locations, but may contain *Juncus balticus* (Baltic rush), *Carex praegracilis* (Clustered Field Sedge) or *Carex rostrata* (beaked sedge) as lesser components on other sites. Depending on the level of disturbance, a variety of other graminoids and forbs, including *Agrostis stolonifera* (redtop), *Glyceria striata* (fowl mannagrass) and *Poa pratensis* (Kentucky bluegrass), may be present. The *Carex nebrascensis* (Nebraska sedge) community type represents a grazing disclimax in Idaho, and is generally found on heavily disturbed sites.

Table 7. Canopy cover for those species recorded in the sampled stands of the grazing disclimax *Carex nebrascensis* (Nebraska sedge) community type (number = 1 stands)

Species	% Canopy Cover
Graminoids	
Carex nebrascensis (Nebraska Sedge)	98
Carex praegracilis (Clustered Field Sedge)	3
Glyceria striata (fowl mannagrass)	1

SUCCESSIONAL INFORMATION

Hansen and others (1995) indicate that the *Carex nebrascensis* (Nebraska sedge) community type is a grazing disclimax typically representing an early/mid-seral secondary successional type. Numerous fence line contrasts illustrate that *Carex nebrascensis* (Nebraska sedge) acts as an increaser and/or invader. It is strongly rhizomatous with high underground biomass that, while being highly palatable to livestock, appears to withstand moderate to heavy grazing pressures. Under continued season long grazing, *Carex nebrascensis* (Nebraska sedge) acts as an increaser, replacing former climax dominants (Youngblood and others 1985b, Kovalchik 1986, Kovalchik 1987). However, due to its tolerance to grazing and soil holding root mat, replacement of *Carex nebrascensis* (Nebraska sedge) by former climax species may not occur, or will occur gradually, over a long period of time.

The *Carex nebrascensis* (Nebraska sedge) community type occupies positions intermediate to the *Carex rostrata* (beaked sedge) and *Deschampsia cespitosa* (tufted hairgrass) habitat types (Youngblood and others 1985b). In some cases it represents a grazing disclimax of the *Typha latifolia* (common cattail) habitat type.

SOILS

Mollisols seem to be the most common soil order occupied by this type, although Inceptisols and Histosols are occasionally present (Youngblood and others 1985, Padgett and others 1989). Surface soil textures may be silty clay loams or silt loams. Although Padgett and others (1989) indicate that this type seldom occurs on organic soils, in Idaho this type may prosper on organic, nutrient rich soils 45 cm (18 in) or more in depth, which is consistent with the findings of Youngblood and others (1985). Soils often remain saturated throughout summer months, but water tables occasionally drop below 1 m (39 in) of the soil surface towards the end of the growing season. Available water holding capacities are estimated to be moderate to high (Padgett and others 1989). Shallow water tables often present on sites may provide optimal conditions for oxidation and reduction reactions .

ADJACENT COMMUNITIES

Adjacent wetter sites may be inhabited by the *Scirpus acutus* (hardstem bulrush) and *Carex rostrata* (beaked sedge) habitat types or various *Salix* spp.(willow) types. Drier wetland communities include the *Agrostis stolonifera* (redtop), *Deschampsia cespitosa* (tufted hairgrass), *Juncus balticus* (Baltic rush), and *Poa pratensis* (Kentucky bluegrass) types. Upland communities are often dominated by *Artemisia* spp. (sagebrush) steppe.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Because forage production is high for this community type, livestock utilization may be intense. *Carex nebrascensis* (Nebraska sedge) is palatable to both cattle and horses, especially in the spring and early summer when stems and leaves are tender (Lewis 1958, Hermann 1970). *Carex nebrascensis* (Nebraska sedge) withstands heavy utilization without apparent damage, primarily due to its rhizomatous habit and favorable moisture conditions on site (USDA Forest Service 1937). However, repeated defoliation during the period of early shoot growth depletes root carbohydrate reserves and lessens plant vigor (Steele and others 1984).

Late season grazing of this type after surface soils have begun to dry will lessen trampling damage to plant rhizomes and will allow degraded streambanks to stabilize. However, on those stands adjacent to streams, residual cover should be left to filter out sediments during the fall rains or spring runoff. Removing cattle to allow at least 30 days for the sedge regrowth should provide sufficient residual cover (Myers 1989).

Wildlife

The resource value of *Carex nebrascensis* (Nebraska sedge) rates high to moderate for elk and medium for mule deer (Manning and Padgett 1992). It may also provide food and cover for waterfowl and small game (Youngblood and others 1995).

Beaver perform a vital role in the health and maintenance of riparian ecosystems. Beaver dams assist in controlling the downcutting of channels, bank erosion, and the movement of sediment downstream (Gordon and others 1992). When beaver construct a dam, they raise the water table in the area, which provides water for hydrophytic

plants such as willows and sedges. The beaver dam also slows down the water in the channel, which allows suspended sediment to be deposited behind the dam. The combination of sediment deposition and plant reproduction raises the channel bed, creating a wetland environment which is excellent waterfowl and fish habitat. It has often been the policy of land managers to trap and kill beaver because they can be a nuisance. However, because beaver produce such desirable habitat and provide many beneficial stream functions, their removal from a riparian system needs to be closely evaluated (Hansen and others 1995).

Fire

Hansen and others (1995) indicate that preliminary information suggests that the *Carex nebrascensis* (Nebraska sedge) community type is suited to prescribed burning. Nonuse by livestock during the year prior to burning is essential. Residual cover burns well in spring, prior to the growing season. Fire will reduce litter accumulations and temporarily increase productivity. However, species composition probably will not drastically change away from dominance by *Carex nebrascensis* (Nebraska sedge).

Care should be taken when burning stands along streambanks because of the excellent erosion protection this type provides. Removal of *Carex nebrascensis* (Nebraska sedge) may increase the susceptibility of soil erosion from overland flows during fall rains or spring runoff (Hansen and others 1995).

Soil Management and Rehabilitation Opportunities

The strongly rhizomatous nature of this type makes it valuable for streambank stabilization and provides protective overhanging sod on undercut banks. These fine textured soils are typically saturated to the surface in spring and early summer, making them highly susceptible to compaction by livestock and mechanical damage. Human trampling damage also occurs around popular fishing areas. Heavy machinery use should be avoided (Hansen and others 1995) .

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = seasonally flooded to saturated.

OTHER STUDIES

Similar *Carex nebrascensis* (Nebraska sedge) communities have been identified by Norton and others (1981), Ratliff (1982), Mutz and Queiroz (1983), Youngblood and others (1985b), Kovalchik (1987), Padgett and others (1989), Manning and Padgett (1992), and by Hansen and others (1995)..

Carex rostrata Habitat Type

CARROS (CARO6)

Number Of Stands Sampled = 2

LOCATION AND ASSOCIATED LANDFORMS

The *Carex rostrata* (beaked sedge) habitat type, a major type throughout eastern and southern Idaho, ranges in elevation from 1,061 to 2,000 m (3,500 to 6,600 ft). This type, representing one of the wettest riparian and wetland communities, may occupy sites inundated with a few inches of standing/slowly flowing water or may establish on somewhat drier, saturated sites lacking surface water for part of the year. *Carex rostrata* (beaked sedge) stands typically colonize wet meadow/seeps with subsurface flow and are often associated with active or abandoned beaver complexes. They may also colonize banks adjacent to active channels, appearing in U-and V-shaped canyon drainages or on islands, oxbows, bars and floodplains of major riverine systems. Where overland flow is present, *Carex rostrata* (beaked sedge) may form hummocks or tussocks which develop over time as individual sod clusters that are able to resist the gradual erosion and downcutting of associated, numerous micro-channels.

VEGETATION

The signature species, *Carex rostrata* (beaked sedge), dominates this habitat type in Idaho, essentially forming a monoculture on most sites. The rhizomatous root network forms a dense mat, often precluding the establishment of competing graminoids and forbs. Other herbaceous species that may be present, generally characterized by low coverages and constancies, may include *Agrostis stolonifera* (redtop), *Myosotis scorpioides* (common forget-me-not), or assorted *Carex* spp. (sedge). Hansen and others (1995) include all combinations of *Carex atherodes* (awned sedge), *Carex vesicaria* (inflated sedge) and *Carex rostrata* (beaked sedge) as a part of this habitat type for Montana. Neither of these species was observed with *Carex rostrata* (beaked sedge) during the 1994 and 1995 field seasons in Idaho, although Youngblood and others (1985) noted that these three *Carex* spp. (sedge) communities may grade into one another in eastern Idaho and western Wyoming . The discrepancies in species composition may be attributed to differences in the levels and types of disturbances, particulars about physical site parameters, or the limited number of observations of this habitat type. Careful inspection of sites in the field may explain some of these disparities.

Table 8. Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax stands of the *Carex rostrata* (beaked sedge) habitat type (number = 6 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Shrubs			
Salix boothii (Booth Willow)	<1	0-1	17
Salix exigua (Sandbar Willow)	<1	0-1	17
Graminoids			
Agrostis stolonifera (Redtop)	3	0-20	33

Alopecurus alpinus (Alpine Foxtail)	<1	0-1	17
Carex nebrascensis (Nebraska Sedge)	<1	0-1	17
Carex raynoldsii (Raynolds' Sedge)	5	0-30	17
Carex rostrata (Beaked Sedge)	83	70-98	100
Eleocharis palustris (Common Spikesedge)	2	0-10	33
Glyceria grandis (American Mannagrass)	<1	0-1	17
Juncus balticus (Baltic Rush)	5	0-30	17
Phalaris arundinacea (Reed Canarygrass)	1	0-3	33
Phleum pratense (Common Timothy)	<1	0-1	17
Poa palustris (Fowl Bluegrass)	<1	0-1	17
Scirpus acutus (Hardstem Bulrush)	3	0-10	33
Forbs			
Cirsium arvense (Canada Thistle)	<1	0-1	17
Erigeron glabellus (Smooth Daisy)	<1	0-1	17
Forb (Forb)	<1	0-1	17
Hippuris vulgaris (Common Mare's-tail)	<1	0-1	17
Mentha arvensis (Field Mint)	2	0-10	17
Mimulus guttatus (Common Monkey-flower)	<1	0-1	17
Myosotis scorpioides (Common Forget-me-not)	12	0-70	17
Nuphar polysepalum (Spatter-dock)	<1	0-1	17
Ranunculus pensylvanicus (Pennsylvania Buttercup)	<1	0-1	17
Senecio hydrophilus (Alkali-marsh Butterweed)	<1	0-1	17
Typha latifolia (Common Cattail)	<1	0-1	33

SUCCESSIONAL INFORMATION

Carex rostrata (beaked sedge) may colonize newly deposited mineral soils on saturated sites associated with beaver ponds (Padgett and others 1989), functioning as a pioneer species, yet remain as the climax vegetation with the development of a thick, rhizomatous mat that, in combination with high water tables, precludes the invasion and establishment of other species. Shoot density was observed to be higher on seasonally flooded sites than on sites characterized by year round surface water (Sjoberb and Danell 1983), indicating that stands may recede over time with prolonged inundation. Hansen and others (1995) note that high water tables throughout the growing season tend to limit access by livestock and thereby reduce impacts from various forms of disturbance. Nevertheless, severe grazing pressures can greatly decrease the cover of *Carex rostrata* (beaked sedge) while increasing the cover of disturbance-caused herbaceous species such as *Carex nebrascensis* (Nebraska sedge), *Juncus nodosus* (tuberous rush), *Potentilla palustris* (purple cinquefoil), *Equisetum arvense* (field horsetail), and others. Where physical site alterations, such as the deterioration of beaver dams, cause drying trends, certain species, especially willow shrubs or other *Carex* spp. (sedge), may dominate sites.

SOILS

The *Carex rostrata* (beaked sedge) habitat type occupies a wide range of soil types, with surface textures ranging

from silt loams or silty clays to loamy sands. On long-lived stands where surface water is present, rich, black organic soils may form a fine muck, potentially to depths of 1 m (39 in) or more. Mollisols and Histosols are the most common soil orders present on older sites often associated with beaver ponds and meadow seeps (Padgett and others 1989), while more recently occupied sites with less developed soils are typically classified as Entisols (Youngblood and others 1985). High water tables facilitate oxidation/reduction reactions which produce mottled or gleyed soil characteristics according to the dominant water regimes. Water tables are generally at or near the surface, but may be as deep as 1 m (39 in) or as high as a few inches above the ground level (Youngblood and others 1985). Padgett and others (1989) speculate that soils of this type tend to be more anaerobic than those of the *Carex aquatilis* (water sedge) habitat type.

ADJACENT COMMUNITIES

Scirpus acutus (hardstem bulrush) and *Typha latifolia* (common cattail) may occupy adjacent streamside zones, and may colonize deeper waters where more anaerobic conditions preclude *Carex rostrata* (beaked sedge). Slightly drier sites support a variety of types, including *Juncus balticus* (Baltic rush), other *Carex* spp. (sedge), especially *Carex aquatilis* (water sedge), or shrub species, such as *Salix geyeriana* (Geyer willow) or *Betula occidentalis* (water birch). Uplands may be dominated by *Artemisia tridentata* (big sagebrush) shrubland, grasslands or by *Pinus contorta* (lodgepole pine) or *Pseudotsuga menziesii* (Douglas fir) forests.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Livestock forage value of *Carex rostrata* (beaked sedge) varies, depending upon season, previous grazing use, and the extent of the site. On narrow riparian or wetland sites within extensive rangelands, sedge species are heavily utilized, particularly when upland plants are cured, or where livestock distribution and stocking rate problems occur. On expansive *Carex rostrata* (beaked sedge) sites, livestock can sometimes select more palatable species (Hansen and others 1995).

In general, sedges should respond satisfactorily to the more traditional grazing systems designed for upland species. However, on those sites adjacent to a stream, residual cover should be left to filter out sediments during the fall rains or spring runoff. Removing cattle to allow at least 30 days for sedge regrowth should provide sufficient residual cover (Myers 1989).

Wet soils may deter animal use until soils have dried, allowing *Deschampsia cespitosa* (tufted hairgrass) to replenish its carbohydrate reserves and persist within these communities. However, if heavy grazing does occur, there will be a marked decrease in the highly palatable *Deschampsia cespitosa* (tufted hairgrass) and an increase in the less palatable *Juncus balticus* (Baltic rush). *Juncus balticus* (Baltic rush) is considered palatable early in the growing season when plants are young and tender. As stems mature and toughen, palatability declines (Hermann 1975).

Frisina (1991) states that for a grazing program to be successful, it must meet the basic biological requirements of the plants such as photosynthesis, food storage, reproduction, and seedling establishment. In order to meet these

requirements, long periods of rest are needed. It is during long growing season rest periods that the essential biological processes of food production and storage, reproduction, and seedling establishment take place. In some instances, additional periods of rest may be required to either improve or maintain a plant community.

Wildlife

Elk and moose may graze stands of this type although palatability may be poor due to the coarse, tough herbage of *Carex rostrata* (beaked sedge) (Youngblood and others 1985).

Beaver perform a vital role in the health and maintenance of riparian ecosystems. Beaver dams assist in controlling the downcutting of channels, bank erosion, and the movement of sediment downstream (Gordon and others 1992). When beaver construct a dam, they raise the water table in the area, which provides water for hydrophytic plants such as willows and sedges. The beaver dam also slows down the water in the channel, which allows suspended sediment to be deposited behind the dam. The combination of sediment deposition and plant reproduction raises the channel bed, creating a wetland environment which is excellent waterfowl and fish habitat. It has often been the policy of land managers to trap and kill beaver because they can be a nuisance. However, because beaver produce such desirable habitat and provide many beneficial stream functions, their removal from a riparian system needs to be closely evaluated (Hansen and others 1995).

Fisheries

The rhizomatous, sod forming root growth of *Carex rostrata* (beaked sedge) makes it an exceptional choice for streambank stabilization. Moreover, the dense shoot growth may act to slow flows and filter sediments where stands occur immediately adjacent to streambanks, and undercut sod mats that overhang channels may provide excellent cover for various fish species.

Fire

The *Carex rostrata* (beaked sedge) type is suited to prescribed burning. Nonuse by livestock during the year prior to burning is essential. Residual cover burns well in the spring, prior to the growing season. Fire will reduce litter accumulations and temporarily increase productivity. However, species composition will not drastically shift from dominance by *Carex rostrata* (beaked sedge) (DeBenedetti and Parsons 1984).

Care should be taken when burning stands along streambanks because of the excellent erosion protection this type provides.

Soil Management and Rehabilitation Opportunities

Organic soils are easily trampled and compacted by grazing animals. Mineral soils are also easily damaged if use occurs when soils are moist. Rutting can be severe with packstock or hiker use, often resulting in multiple parallel trails. Off road vehicles cause serious long term damage. Care should be taken to maintain existing roads to help discourage off road travel. New trails or roads should be located on adjacent uplands (Hansen and others 1995).

In general, sedges offer better streambank stability than grasses, primarily due to their rhizomatous growth form. *Carex rostrata* (beaked sedge) and *Carex aquatilis* (water sedge) tend to form a dense, thick sod that is highly resist-

ant to erosion. Along the stream, the sod may be undercut and sag into the water, providing additional protection to streambanks. However, if grazing or trailing impacts are severe, the heavy weight of the sod makes it susceptible to damage, and streambank sloughing can occur (Hansen and others 1995).

The low stream gradient and well developed floodplain associated with this type results in high rates of recovery through the bank building process. This requires residual spring cover to filter sediments. Removing cattle to allow at least 30 days for sedge regrowth should provide sufficient residual cover (Myers 1989).

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = semipermanently flooded to seasonally flooded to saturated.

OTHER STUDIES

Numerous other studies have identified similar communities, reflective of the widespread distribution of this type: Norton and others (1981), Ratliff (1982), Tuhy and Jensen (1982), Mutz and Queiroz (1983), Mattson (1984), Youngblood and others (1985b), Kovalchik (1987), Chadde and others (1988), Padgett and others (1989), Manning and Padgett (1995).

Agropyron smithii Habitat Type
(Western Wheatgrass Habitat Type)

AGRSMI (AGSM)
Number Of Stands Sampled in Montana= 32

CAUTION—Not all sites currently dominated by *Agropyron smithii* (western wheatgrass) are considered riparian or wetland sites. In some instances, they are considered upland sites. The topographic position of the site must match the description as presented in the Location and Associated Landform section.

NOTE: The *Agropyron smithii* (western wheatgrass) habitat type has been documented in Idaho according to field surveys conducted in 1994. However, due to time constraints during the 1995 field season, homogeneous stand data could not be collected for this type. In the subsequent discussion, any references to physical site location or vegetation characteristics for this type in Idaho were interpreted from 1994 field surveys. The remainder of this description was taken from the Classification and Management of Montana's Riparian and Wetland Sites (Hansen and others 1995).

LOCATION AND ASSOCIATED LANDFORMS

The *Agropyron smithii* (western wheatgrass) habitat type is an incidental type at lower elevations in central and eastern Idaho. Sites are swales and nearly level alluvial terraces where either overland flow or soil conditions (fine textures), or a combination of both, allow for a greater than normal moisture regime. In many situations, the fine textured soils have resulted in a perched water table. Sites were recorded at elevations in the neighborhood of 1,303 m (4,300 ft).

VEGETATION

The *Agropyron smithii* (western wheatgrass) habitat type in Montana is dominated by *Agropyron smithii* (western wheatgrass), which typically forms nearly pure stands. Although a diversity of other graminoids and forbs have been documented on various sites, they occur with limited constancy and coverage (Table 1). Due to the methods of data collection during the 1994 field season, vegetation characteristics could not be adequately addressed for stands of this type in Idaho. Table 1 reflects vegetation surveyed on sites exclusive to Montana, but may provide a fairly accurate interpretation of species composition and canopy cover for sites identified in Idaho. Additional sites need to be surveyed to determine whether this type in Idaho matches the type described by Hansen and others (1995) in Montana, or whether it needs modification.

Table 1. Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax stands of the *Agropyron smithii* (western wheatgrass) habitat type (number = 8 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Shrubs			
Artemisia frigida (fringed sage)	1	0-1	13
Ceratoides lanata (winterfat)	3	0-3	13
Graminoids			
Agropyron smithii (western wheatgrass)	82	80-98	100
Alopecurus carolinianus (Carolina foxtail)	20	0-20	25
Bouteloua curtipendula (sideoat grama)	1	0-1	13
Bromus inermis (smooth brome)	3	0-3	13
Bromus japonicus (Japanese brome)	1	0-1	13
Buchloe dactyloides (buffalo grass)	1	0-1	13
Poa pratensis (Kentucky bluegrass)	3	0-3	13
Stipa comata (needle-and-thread)	1	0-1	13
Stipa viridula (green needlegrass)	12	0-20	25
Forbs			
Achillea millefolium (common yarrow)	1	0-1	13
Lactuca oblongifolia (blue lettuce)	1	0-1	13
Linum perenne (blue flax)	1	0-1	13
Melilotus officinalis (yellow sweet-clover)	2	0-3	25
Plagiobothrys scouleri (Scouler's popcorn-flower)	40	0-40	13

Polygonum ramosissimum (bushy knotweed)	12	0-20	25
Polygonum spp. (smartweed)	3	0-3	13
Sphaeralcea coccinea (red globe-mallow)	3	0-3	13
Taraxacum spp. (dandelion)	3	0-3	13
Tragopogon dubius (goat's beard)	1	0-1	13
Vicia americana (American vetch)	1	0-1	13

SUCCESSIONAL INFORMATION

Overgrazing of these sites will reduce the vigor and cover of *Agropyron smithii* (western wheatgrass). Severe overgrazing will convert the site to one dominated by less desirable grass species such as *Poa pratensis* (Kentucky bluegrass), *Bromus tectorum* (cheatgrass) and *Agrostis stolonifera* (redtop). Where grazing pressure is removed, sites may be invaded by *Symphoricarpos occidentalis* (western snowberry), *Glycyrrhiza lepidota* (American licorice), and *Cirsium arvense* (Canada thistle) (Table 2).

Table 2. Average canopy cover, range of canopy cover, and constancy for species recorded in disturbed and/or early to mid-seral stands of the *Agropyron smithii* (western wheatgrass) habitat type (number = 24 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Trees			
Juniperus scopulorum (Rocky Mountain juniper)	1	0-3	13
Populus deltoides (Great Plains cottonwood)	10	0-10	4
Shrubs			
Artemisia cana (silver sagebrush)	3	0-10	46
Artemisia frigida (fringed sagewort)	1	0-3	17
Artemisia tridentata (big sagebrush)	4	0-10	17
Ceratoides lanata (winterfat)	3	0-3	4
Chrysothamnus viscidiflorus (green rabbitbrush)	1	0-1	4
Clematis spp. (clematis)	3	0-3	4
Crataegus columbiana (Columbia Hawthorn)	1	0-1	4
Gutierrezia sarothrae (broom snakeweed)	1	0-1	4
Rhus aromatica (fragrant sumac)	3	0-3	4
Rosa woodsii (woods rose)	2	0-3	21
Salix drummondiana (Drummond willow)	1	0-1	4
Salix exigua (sandbar willow)	1	0-1	4
Sarcobatus vermiculatus (black greasewood)	1	0-1	4
Symphoricarpos occidentalis (western snowberry)	4	0-30	42
Tamarix chinensis (salt cedar)	2	0-3	8
Graminoids			

Agropyron caninum (bearded wheatgrass)	1	0-1	4
Agropyron cristatum (crested wheatgrass)	5	0-10	8
Agropyron spp. (wheatgrass)	3	0-3	4
Agropyron repens (quackgrass)	11	0-20	17
Agropyron smithii (western wheatgrass)	52	10-100	100
Agropyron spicatum (bluebunch wheatgrass)	1	0-1	8
Agrostis stolonifera (redtop)	38	0-80	21
Bouteloua gracilis (blue grama)	7	0-10	8
Bromus inermis (smooth brome)	11	0-50	21
Bromus japonicus (Japanese brome)	1	0-1	8
Calamovilfa longifolia (prairie sandgrass)	1	0-1	4
Calamagrostis rubescens (pinegrass)	27	0-50	8
Carex brevior (short-beaked sedge)	1	0-1	4
Carex filifolia (thread-leaved sedge)	3	0-3	4
Carex rostrata (beaked sedge)	1	0-1	4
Carex rupestris (curly sedge)	3	0-3	4
Carex vesicaria (inflated sedge)	1	0-1	4
Dactylis glomerata(orchard-grass)	1	0-1	8
Deschampsia cespitosa (tufted hairgrass)	3	0-3	4
Dichanthelium acuminatum (western witchgrass)	3	0-3	4
Distichlis spicata (inland saltgrass)	10	0-10	4
Echinochloa crusgalli (large barnyard-grass)	1	0-1	4
Elymus canadensis (Canada wildrye)	7	0-20	13
Festuca idahoensis (Idaho fescue)	10	0-10	4
Festuca pratensis (meadow fescue)	3	0-3	8
Hordeum jubatum (foxtail barley)	1	0-1	13
Juncus articulatus (jointed rush)	1	0-1	4
Juncus balticus (Baltic rush)	5	0-10	21
Juncus tenuis (slender rush)	3	0-3	8
Panicum virgatum (switchgrass)	10	0-10	4
Phleum pratense (common timothy)	1	0-3	13
Poa bulbosa (bulbous bluegrass)	3	0-3	4
Poa glaucifolia (pale-leaf bluegrass)	10	10-10	4
Poa interior (inland bluegrass)	1	0-1	4
Poa palustris (fowl bluegrass)	1	0-1	8
Poa pratensis (Kentucky bluegrass)	17	0-40	21
Poa spp. (bluegrass)	20	0-20	4
Scirpus maritimus (alkali bulrush)	1	0-1	4
Scirpus pungens (sharp bulrush)	2	0-3	8
Setaria viridis (green bristlegrass)	1	0-1	4
Spartina pectinata (prairie cordgrass)	1	0-1	13

Stipa comata (needle-and-thread)	3	0-3	4
Stipa viridula (green needlegrass)	4	0-1	21
Forbs			
Achillea millefolium (common yarrow)	2	0-3	21
Alyssum alyssoides (pale alyssum)	10	0-10	4
Artemisia dracunculus (tarragon)	3	0-3	4
Artemisia ludoviciana (prairie sagewort)	7	0-20	17
Centaurea maculosa (spotted knapweed)	1	0-1	4
Chenopodium leptophyllum (slimleaf goosefoot)	20	0-20	4
Cirsium arvense (Canada thistle)	18	0-50	25
Cirsium vulgare (bull thistle)	10	0-10	13
Conyza canadensis (horseweed)	12	0-20	8
Coreopsis tinctoria (common bugseed)	3	0-3	4
Coryphantha vivipara (pincushion cactus)	1	0-1	4
Dalea spp. (dalea; prairie-clover)	1	0-1	4
Descurainia sophia (flixweed tansymustard)	1	0-1	4
Epilobium ciliatum (common willow-herb)	1	0-1	4
Epilobium paniculatum (autumn willow-herb)	1	0-1	4
Euphorbia esula (leafy spurge)	1	0-1	8
Fragaria vesca (woods strawberry)	1	0-1	4
Galium aparine (goose-grass)	1	0-1	4
Gaura coccinea (scarlet gaura)	1	0-1	4
Glycyrrhiza lepidota (American licorice)	16	0-50	42
Grindelia squarrosa (curlycup gumweed)	2	0-3	8
Helenium autumnale (sneezeweed)	1	0-1	4
Helianthus petiolaris (prairie sunflower)	1	0-1	4
Lactuca oblongifolia (blue lettuce)	2	0-3	8
Lactuca serriola (prickly lettuce)	20	0-20	8
Lupinus lepidus (prairie lupine)	1	0-1	4
Medicago lupulina (black medic)	3	0-3	8
Medicago sativa (alfalfa)	10	030	13
Melilotus alba (white sweet-clover)	8	0-10	13
Melilotus officinalis (yellow sweet-clover)	2	0-3	8
Monolepis nuttalliana (poverty weed)	1	0-1	4
Opuntia polyacantha (plains prickly-pear)	1	0-3	17
Osmorhiza chilensis (mountain sweet-cicely)	3	0-1	4
Parietaria pensylvanica (Pennsylvania pellitory)	20	0-20	4
Physostegia parviflora (purple dragonhead)	1	0-1	4
Plantago major (common plantain)	2	0-3	8
Plantago patagonica (Indian-wheat)	3	0-3	4
Polygonum hydropiper (marshpepper smartweed)	3	0-3	8

Potentilla anserina (common silverweed)	1	0-1	4
Prunella vulgaris (self-heal)	3	0-3	4
Psoralea argophylla (silver-leaved scurf-pea)	3	0-3	4
Ratibida columnifera (prairie coneflower)	1	0-1	4
Rumex crispus (curly dock)	1	0-1	13
Rumex spp. (dock; sorrel)	1	0-1	4
Solidago canadensis (Canada goldenrod)	1	0-1	4
Sphaeralcea coccinea (red globe-mallow)	1	0-1	8
Taraxacum officinale (common dandelion)	1	0-3	25
Thlaspi arvense (field pennycress)	9	0-20	21
Tragopogon dubius (goat's beard)	1	0-1	13
Trifolium spp. (clover)	12	0-30	13
Trifolium pratense (red clover)	3	0-3	4
Trifolium repens (white clover)	3	0-3	4
Vicia americana (American vetch)	9	0-40	21
Xanthium strumarium (common cocklebur)	7	0-20	25
Ferns and Allies			
Equisetum arvense (field horsetail)	3	0-3	4
Equisetum hyemale (common scouring-rush)	1	0-1	4

SOILS

Soil texture ranges from clay to silt loam. Soils are poorly drained to very poorly drained. Seasonal flooding is common in spring following snow melt. Soil reaction varies widely from neutral to moderately alkaline (pH 7.0 to 8.5). Saline soils are also common.

ADJACENT COMMUNITIES

Adjacent wetter sites include the *Spartina pectinata* (prairie cordgrass) habitat type, the *Phragmites australis* (common reed) habitat type, or the *Phalaris arundinacea* (reed canarygrass) community type. Adjacent drier sites are dominated by upland species.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Forage production of the *Agropyron smithii* (western wheatgrass) habitat type ranges from moderate to high. The *Agropyron smithii* (western wheatgrass) habitat type is highly desired by livestock. *Agropyron smithii* (western wheatgrass) is palatable and nutritious when green in the spring, and moderately so during other times of the year (Johnson and Nichols 1982). It is also commonly used as a hay crop. Vigorous rhizomes make *Agropyron smithii* (western wheatgrass) one of the more tolerant of the desirable and abundant grasses to grazing pressure and drought. However, overgrazing in May and June will decrease its abundance. When growing conditions im-

prove, as is the case following drought or overgrazing, it may rapidly colonize areas previously occupied.

Wildlife

Hiding and thermal cover is limited in this site type. However, it may be used by a variety of waterfowl as nesting sites. The *Agropyron smithii* (western wheatgrass) habitat type is highly desired by wildlife such as deer and antelope. *Agropyron smithii* (western wheatgrass) is palatable and nutritious when green in the spring, and moderately so during other times of the year (Johnson and Nichols 1982).

Fire

Agropyron smithii (western wheatgrass) has a good tolerance to fire in the dormant state. It usually survives fires during the growing season but recovery may be delayed (Wasser 1982).

Soil Management and Rehabilitation Opportunities

Agropyron smithii (western wheatgrass) is potentially valuable for revegetating some disturbed or degraded wetland sites in eastern and central Montana. Using transplants will speed the recovery process as seedlings are typically slow growing. However, once established, plants quickly spread by rhizomes.

Agropyron smithii (western wheatgrass) is tolerant of moderately severe droughts if not greatly prolonged, surviving by underground rhizomes (Wasser 1982).

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = saturated to temporarily flooded.

OTHER STUDIES

Similar sites in the northern Great Plains have been described by Hansen and others (1984) and Hansen and Hoffman (1988).

Agrostis stolonifera Community Type
(Redtop Community Type)

AGRSTO (AGST)

Number Of Stands Sampled = 1

LOCATION AND ASSOCIATED LANDFORMS

The *Agrostis stolonifera* (redtop) community type is an incidental type at mid elevations, ranging from 1,650 to

1,727 m (5,445 to 5,700 ft). Stands may colonize recently deposited alluvial bars and wet meadows associated with level floodplains of minor stream systems.

VEGETATION

This community type may develop as essentially homogeneous stands of *Agrostis stolonifera* (redtop), but more often appears as mixed stands of graminoids and forbs dominated by *Agrostis stolonifera* (redtop). Associated species may include *Carex* spp.(sedge), *Juncus* spp. (rush), *Scirpus* spp. (bulrush), *Trifolium* spp. (Clover) and *Poa pratensis* (Kentucky Bluegrass). Hansen and others (1995) note that where sites occur on recently deposited alluvial bars, the total canopy cover of all species may be relatively low.

Table 3. Canopy cover for those species recorded in the sampled stands of the *Agrostis stolonifera* (redtop) community type (number = 1 stands)

Species	% Canopy Cover
Graminoids	
Agrostis stolonifera (Redtop)	90
Juncus balticus (Baltic Rush)	3
Juncus regelii (Regel's Rush)	1
Juncus tenuis (Slender Rush)	1
Poa pratensis (Kentucky Bluegrass)	10
Forbs	
Achillea millefolium (Common Yarrow)	1
Artemisia ludoviciana (Prairie Sagewort)	1
Tragopogon dubius (Goat's Beard)	1
Trifolium repens (White Clover)	20
Ferns and Allies	
Equisetum laevigatum (Smooth Scouring-rush)	3

SUCCESSIONAL INFORMATION

Hansen and others (1995) contend that *Agrostis stolonifera* (redtop) is an early seral (pioneer) species, often colonizing recently exposed sediment deposits. This species may be considered an increaser and is indicative of past or present disturbance on locations where it is found. Overgrazing by herbivores can produce drastic changes on sites formerly dominated by native graminoids (Volland 1978). Once a suitable site is disturbed, the extensive rhizome system of *Agrostis stolonifera* (redtop) allows it to rapidly spread and establish on these areas. It also withstands high levels of utilization, making replacement by former dominants questionable. Close observation of associated species on similar locations may provide insight to the potential climax communities, such as various *Salix* spp.(willow).

SOILS

Hansen and others (1995) suggest that soils occupied by this type are typically Entisols (Fluvents) or Mollisols (Borolls). The *Agrostis stolonifera* (redtop) community type thrives best on moist to semi wet soils. It is tolerant of poorly drained wetlands and subirrigated sites, submergence, and frequent flooding. It will occur on most soil textures, provided moisture is not limiting. If moisture is limiting, it grows best on clay loam and loam soils. It is tolerant of medium acid (pH 5.5) and nutritionally poor soils low in calcium, phosphorus, and potassium (Wasser 1982). This type is also fairly tolerant of saline soils and is moderately tolerant of drought.

ADJACENT COMMUNITIES

Carex spp.(sedge), *Scirpus* spp. (bulrush), and occasionally *Juncus* spp. (rush) generally dominate zones along streambanks and channels. Adjacent drier riparian sites support a diversity of communities including those within the *Populus* spp. (cottonwood), *Salix* spp.(willow), and *Juniperus* spp. (juniper) types. Uplands may be dominated by *Juniperus scopulorum* (Rocky Mountain juniper), *Artemisia tridentata* (big sagebrush), and mixed grasslands.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

According to Hansen and others (1995), the *Agrostis stolonifera* (redtop) community type is moderately productive, and provides a significant amount of forage. Although *Agrostis stolonifera* (redtop) is not as palatable as other species, the community type provides forage throughout the summer due to high water tables. It is rated as having good palatability in the spring and early summer, with fair palatability after heads seed out. Palatability is rated as poor in the winter. *Agrostis stolonifera* (redtop) is rated as fairly good to good forage for livestock (USDA Forest Service 1937).

In pastures, close grazing, followed by rest in a rotation system, is recommended to keep plants producing palatable growth throughout the growing season (Vallentine 1967). *Agrostis stolonifera* (redtop) is tolerant of close use due to its somewhat prostrate growth form, rhizomatous growth habitat, and lower palatability than associated species. Plants should be cut during the early flowering stage to obtain highest quality hay (Hansen and others 1995).

Wildlife

Elk and deer make use of the grasses and forbs of this type. Waterfowl utilize *Agrostis stolonifera* (redtop) for food and cover (Hansen and others 1995).

Fisheries

The *Agrostis stolonifera* (redtop) community type is moderately effective in stabilizing streambanks due to its typically dense network of intertwining root and rhizomes. However, bank undercutting and sloughing may occur, especially when soils are wet or stands weakened by excessive grazing (Hansen and others 1995). Mixed stands with higher densities of non-rhizomatous species offer poor bank stabilization.

Fire

Agrostis stolonifera (redtop) is rated as only having a fair tolerance to fire (Wasser 1982).

Soil Management and Rehabilitation Opportunities

Potential for soil compaction is greatest in spring when soils are moist. The associated graminoids of this type provide limited streambank protection, making the potential for erosional problems quite high. Managers need to pay close attention to streambanks associated with the *Agrostis stolonifera* (redtop) community type in order to detect early signs of streambank collapse. If there is no change in management, once the stream bank starts to degrade, there is little that can be done to save it short of expensive riprap (Hansen and others 1995).

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = saturated to temporarily flooded.

OTHER STUDIES

A similar community type has been defined for the Upper Salmon/Middle Fork Salmon River drainages, Idaho, by Tuhy and Jensen (1982), for meadows of the Sierra Nevada, California, by Ratliff (1982), and by Hansen and others (1995) for the state of Montana.

Butomus umbellatus Habitat Type
(Flowering Rush Community Type)

BUTUMB (BUUM)

Number Of Stands Sampled = 1

LOCATION AND ASSOCIATED LANDFORMS

The *Butomus umbellatus* (flowering rush) community type is an incidental type in southeastern Idaho, occurring in the vicinity of 1,340 m (4,422 ft). Sites are located in low-lying, saturated environments along marshes, reservoirs or in wet meadows where pooled or slowly moving surface water is prevalent. Sites may be reminiscent of locations occupied by *Carex* spp. (sedge) and are probably classified as temporarily flooded or overflow sites.

VEGETATION

Butomus umbellatus (flowering rush), an introduced species from Eurasia now well established in parts of North America (Hitchcock and others 1969), may reach 1 m in height, creating often dense, monotypic stands. Vigorous rhizomes and high water tables may exclude other species from invading sites dominated by this community type (Table 4).

Table 4. Canopy cover for those species recorded in the sampled stands of the *Butomus umbellatus* (flowering rush) community type community type (number = 1 stands)

Species	% Canopy Cover
Graminoids	
Eleocharis palustris (Common Spikesedge)	20
Juncus balticus (Baltic Rush)	1
Forbs	
Aster spp. (Aster)	1
Butomus umbellatus (Flowering-rush)	98
Plantago major (Common Plantain)	1
Rumex crispus (curly dock)	3

SUCCESSIONAL INFORMATION

Butomus umbellatus (flowering rush) appears to occupy some of the wetter lentic and lotic positions on the landscape, prospering on muddy sites along streambanks and lakeshores in as much as 30 cm (1 ft) or more of water. The successional status of this type is unknown, but it may be a sere for the *Carex rostrata* (beaked sedge) or *Carex aquatilis* (water sedge) habitat types due to comparable site requirements. An introduced species, *Butomus umbellatus* (flowering rush) may be gradually colonizing areas in Idaho and could represent climax vegetation on some sites where high water tables and dense sod formation allow it to displace other species. *Salix* spp. (willow), such as *Salix exigua* (sandbar willow), may establish on drier sites.

SOILS

Soil textures are predominantly clays. High water tables that may be at or above the soil surface throughout most of the the year foster oxidation/reduction reactions and the development of mottled and gleyed soil features. Soils should classify to Histosols or Mollisols.

ADJACENT COMMUNITIES

Phalaris arundinacea (reed canarygrass), *Eleocharis palustris* (common spikesedge) and *Polygonum* spp. (smartweed) stands may colonize wet zones adjacent to the *Butomus umbellatus* (flowering rush) community type, while *Salix exigua* (sandbar willow) occupies slightly drier sites. *Elaeagnus angustifolia* (Russian olive) and *Populus trichocarpa* (Black cottonwood) may form scattered forests on upper floodplains. Adjacent uplands may be dominated by *Agropyron* spp. (wheatgrass) grasslands or a variety of other upland communities.

MANAGEMENT INFORMATION

Livestock

Herbage production and palatability for cattle is unknown for the *Butomus umbellatus* (flowering rush) community type. Palatability is probably greatest in the spring when young plants are actively growing and still tender; however, sites are generally quite wet at this time, thereby limiting access to livestock. As the plants mature, the

palatability probably decreases and may limit livestock use during most of the growing season. Unless water levels drop and upland forage browns out, livestock use is thought to be low. Utilization was not observed on sites in Idaho.

Wildlife

Palatability of the *Butomus umbellatus* (flowering rush) community type is unknown for wild ungulates. Except in the spring when shoots are tender or when other forage dies back, utilization is probably low.

Waterfowl may nest and feed in stands of *Butomus umbellatus* (flowering rush), and dams in the general area suggest moderate use of this type by beaver.

Soil Management and Rehabilitation Opportunities

The rhizomatous nature and dense growth form of *Butomus umbellatus* (flowering rush) makes it an excellent species for stabilizing streamside zones; however, as an introduced species, it may out compete native vegetation.

Recreational Uses and Considerations

Butomus umbellatus (flowering rush) inhabits lakeshores, streamsides and other areas often heavily infested by mosquitoes. Camping is not recommended, although stands may provide access to open water for anglers.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = seasonally flooded to saturated.

OTHER STUDIES

Similar communities have not been described elsewhere.

Deschampsia cespitosa Habitat Type
(Tufted Hairgrass Habitat Type)

DESCES (DECA5)

Number Of Stands Sampled In Montana= 9

NOTE: The *Deschampsia cespitosa* (tufted hairgrass) habitat type has been documented in Idaho according to field surveys conducted in 1994. However, due to time constraints during the 1995 field season, homogeneous stand data could not be collected for this type. In the subsequent discussion, any references to physical site location or vegetation characteristics for this type in Idaho were interpreted from 1994 field surveys. The remainder of this

description was taken from the Classification and Management of Montana's Riparian and Wetland Sites (Hansen and others 1995).

LOCATION AND ASSOCIATED LANDFORMS

The *Deschampsia cespitosa* (tufted hairgrass) habitat type is a incidental type at low elevations in open valleys of eastern Idaho. Sites range in elevation from 1,394 to 1,454 m (4,600 to 4,800 ft). This type occurs on a variety of landforms including basins, wet meadow swales, seep areas and nearly level stream terraces in u-shaped canyon bottoms.

VEGETATION

In Montana, *Deschampsia cespitosa* (tufted hairgrass) usually forms a dense stand of individual tussocks. Associated herbaceous species generally include *Carex vesicaria* (inflated sedge), *Aster occidentalis* (western aster), and *Pedicularis groenlandica* (elephant's head) (Table 5). Table 5 reflects vegetation surveyed on sites exclusive to Montana, but may provide a fairly accurate interpretation of species composition and canopy cover for sites identified in Idaho. Due to the methods of data collection during the 1994 field season, vegetation characteristics could not be adequately addressed for stands of this type in Idaho.

Table 5. Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax stands of the *Deschampsia cespitosa* (tufted hairgrass) habitat type (number = 9 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Shrubs			
Potentilla fruticosa (shrubby cinquefoil)	1	0-1	11
Salix boothii (Booth willow)	1	0-1	11
Salix exigua (sandbar willow)	1	0-1	11
Salix planifolia (planeleaf willow)	1	0-1	11
Salix wolfii (Wolf's willow)	1	0-1	11
Graminoids			
Agrostis humilis (alpine bentgrass)	10	0-10	11
Agrostis scabra (tickle-grass)	30	0-30	11
Alopecurus alpinus (alpine foxtail)	1	0-1	11
Calamagrostis canadensis (bluejoint reedgrass)	1	0-1	11
Carex aquatilis (water sedge)	5	0-10	22
Carex atherodes (awned sedge)	10	0-10	11
Carex aurea (golden sedge)	10	0-10	11
Carex concinnoides (northwestern sedge)	3	0-3	11
Carex limosa (mud sedge)	10	0-10	11
Carex luzulina (woodrush sedge)	10	0-10	11
Carex microptera (small-winged sedge)	3	0-3	11

Carex praticola (meadow sedge)	3	0-3	11
Carex rostrata (beaked sedge)	5	0-10	33
Carex vesicaria (inflated sedge)	11	0-20	44
Danthonia intermedia (oatgrass)	40	0-40	11
Deschampsia cespitosa (tufted hairgrass)	42	30-80	100
Eleocharis pauciflora (few-flowered spike-rush)	3	0-3	11
Festuca spp. (fescue)	20	0-20	11
Hordeum jubatum (foxtail barley)	3	0-3	22
Juncus balticus (Baltic rush)	1	0-1	11
Luzula campestris (field woodrush)	1	0-1	11
Phleum alpinum (alpine timothy)	11	0-20	33
Poa leptocoma (bog bluegrass)	1	0-1	11
Trisetum wolfii (Wolf's trisetum)	1	0-1	11
Forbs			
Allium schoenoprasum (chives)	10	0-10	11
Antennaria corymbosa (meadow pussy-toes)	1	0-1	11
Antennaria umbrinella (umber pussy-toes)	10	0-10	11
Arnica chamissonis (meadow arnica)	20	0-30	22
Arnica rydbergii (Rydberg's arnica)	1	0-1	22
Aster chilensis (long-leaved aster)	40	0-40	11
Aster foliaceus (leafy aster)	30	0-30	11
Aster occidentalis (western aster)	8	0-20	44
Caltha leptosepala (elkslip marshmarigold)	50	0-50	11
Epilobium ciliatum (common willow-herb)	1	0-1	11
Gentiana calycosa(explorer's gentian)	10	0-10	11
Geum macrophyllum (large-leaved avens)	10	0-20	22
Ligusticum tenuifolium (slender-leafed licorice-root)	14	0-20	33
Microseris nigrescens (black-hairy microseris)	10	0-10	11
Pedicularis groenlandica (elephant's head)	3	0-10	44
Petasites sagittatus (arrowleaf coltsfoot)	1	0-1	11
Polygonum bistortoides (American bistort)	1	0-1	22
Potentilla diversifolia (diverse-leaved cinquefoil)	5	0-10	22
Potentilla gracilis (slender cinquefoil)	1	0-1	11
Senecio cymbalarioides (few-leaved groundsel)	10	0-10	11
Senecio integerrimus (western groundsel)	10	0-30	33
Stellaria longipes (longstalk starwort)	1	0-1	22
Trifolium longipes (long-stalked clover)	1	0-1	11
Veronica cusickii (Cusick's speedwell)	1	0-1	11

SUCCESSIONAL INFORMATION

Deschampsia cespitosa (tufted hairgrass) may have once occupied much larger acreages, but through long term heavy grazing, it has been eliminated from many of its former locations. On relatively undisturbed sites, *Deschampsia cespitosa* (tufted hairgrass) is dominant over other graminoids and forbs. Litter is thick on drier sites but may be absent on moist sites. Moderate grazing reduces the reproductive potential and vigor of *Deschampsia cespitosa* (tufted hairgrass) through reduced seedhead production and depletion of carbohydrate reserves. Under heavy grazing, *Deschampsia cespitosa* (tufted hairgrass) vigor is further reduced and other graminoids and forbs dominate the site. Severely disturbed dry sites are dominated by graminoids such as *Poa pratensis* (Kentucky bluegrass), *Poa palustris* (fowl bluegrass), *Agrostis stolonifera* (redtop), and *Juncus balticus* (Baltic rush), and have an abundance of forbs such as *Achillea millefolium* (common yarrow) and *Aster occidentalis* (western aster). Severely disturbed moist sites are generally dominated by *Juncus balticus* (Baltic rush), *Carex nebrascensis* (Nebraska sedge), and other sedges, and by an assortment of forbs. These disturbed stands begin to take on the appearance of the *Poa pratensis* (Kentucky bluegrass), *Poa palustris* (fowl bluegrass), *Juncus balticus* (Baltic rush), or *Carex nebrascensis* (Nebraska sedge) community types.

SOILS

Soils are generally Mollisols (Aquolls or Borolls) and Entisols. Soil texture is commonly silt loam. Water tables at or slightly above the soil surface are common in the spring, often dropping below 1 m (39 in) of the surface in summer on the drier stands. Wetter stands, having year long water tables above 1 m (39 in) in depth, commonly have some accumulation of organic material at the soil surface. Redox concentrations (mottles) near the soil surface are common as evidence of a seasonally high water table.

ADJACENT COMMUNITIES

Adjacent wetter communities at mid elevation include the *Carex rostrata* (beaked sedge) and *Carex aquatilis* (water sedge) habitat types. High elevations may include the *Carex scopulorum* (Holm's Rocky Mountain sedge) habitat type. Adjacent drier communities include a variety of shrub and herbaceous types such as the *Artemisia cana/Festuca idahoensis* (silver sagebrush/Idaho fescue) and *Potentilla fruticosa/Deschampsia cespitosa* (shrubby cinquefoil/tufted hairgrass) habitat types, or the *Poa pratensis* (Kentucky bluegrass) and *Juncus balticus* (Baltic rush) community types. Adjacent drier sites may include conifer dominated communities.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Herbage production is high, ranging from 500 to 3,000 lbs/acre dry weight at lower elevations, and ranging from 500 to 1,500 lbs/acre at higher elevations (Kovalchik 1987). Sites of the *Deschampsia cespitosa* (tufted hairgrass) habitat type are among the best summer range for cattle in western Montana (Mueggler and Steward 1980). However, in general, sites receive heavy livestock pressure because they typically dry out in the upper soil and are relatively palatable, especially to cattle. Suitability for sheep is not as great because of the predominantly graminoid vegetation. Under season long grazing, *Deschampsia cespitosa* (tufted hairgrass) may be replaced by *Juncus balticus* (Baltic rush) and *Poa pratensis* (Kentucky bluegrass). To maintain vigor and prevent damage to soils and vegetation, grazing should be deferred until soils dry. Proper levels of grazing should range from light to moderate.

In order to develop an upward trend in ecological status on moderately disturbed sites, time the season of use by livestock to both the drying of the soil surface and to the maturation of the seedheads (Kovalchik 1987). Livestock should be removed when 40 percent or less utilization of herbaceous forage is obtained.

In severely disturbed sites, more intensive rehabilitation strategies will be required due to the abundance of *Poa pratensis* (Kentucky bluegrass), *Poa palustris* (fowl bluegrass), and *Juncus balticus* (Baltic rush).

Frisina (1991) states that for a grazing program to be successful, it must meet the basic biological requirements of the plants such as photosynthesis, food storage, reproduction, and seedling establishment. In order to meet these requirements, long periods of rest are needed. It is during long growing season rest periods that the essential biological processes of food production and storage, reproduction, and seedling establishment take place. In some instances, additional periods of rest may be required to either improve or maintain a plant community.

Wildlife

Landforms supporting the *Deschampsia cespitosa* (tufted hairgrass) habitat type provide important summer habitat for deer and elk. This type also provides food and cover for waterfowl (Dittberner and Olson 1983). Care should be taken to avoid use conflicts between livestock and wildlife.

Fisheries

This type is usually separated from open water by a zone dominated by *Salix* species (willow) or *Carex* species (sedge). However, where it is adjacent to streams, the weak, fibrous root system of *Deschampsia cespitosa* (tufted hairgrass) has little value for stabilizing streambanks (Youngblood and others 1985b). If downcutting is severe, water tables will drop, resulting in a change in the community.

Fire

Deschampsia cespitosa (tufted hairgrass) is resistant to damage from fire (DeBenedetti and Parsons 1984). Root crowns are rarely damaged, even by hot, intense fires. However, repeated burning of this habitat type favors rhizomatous species such as *Poa pratensis* (Kentucky bluegrass) and *Agropyron caninum* (bearded wheatgrass). Burning should be postponed if livestock are present to avoid attracting animals to young, palatable regrowth of *Deschampsia cespitosa* (tufted hairgrass).

Soil Management and Rehabilitation Opportunities

Moist soils are readily compacted by livestock and vehicular traffic. Seasonally high water tables common to this type can make soils particularly susceptible to compaction problems. In most cases, roads and trails should be located on the uplands adjacent to this type.

Although widely recommended for use in alpine and subalpine mine reclamation and revegetation efforts, *Deschampsia cespitosa* (tufted hairgrass) shows little potential for use in streambank rehabilitation projects due to its thin fibrous root structure (Youngblood and others 1985b). However, *Juncus balticus* (Baltic rush) produces a deep and fibrous root system, with a mass of coarse and creeping rhizomes. Once established, they spread rapidly.

These soil holding characteristics may make it valuable for stabilizing streambanks.

Recreational Uses and Considerations

The sites provide opportunities for viewing big game during the summer and fall. Those sites adjacent to streams provide access points for fishing.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = saturated to temporarily flooded.

OTHER STUDIES

Similar communities have been described by Mueggler and Steward (1980) for western Montana (*Deschampsia cespitosa/Carex* species [tufted hairgrass/sedge habitat type]), Youngblood and others (1985b) for eastern Idaho and western Wyoming, Kovalchik (1987) for central Oregon, Tuhy and Jensen (1982) for Idaho, Padgett and others (1989) for Utah and southeastern Idaho, Ratliff (1982) for the Sierra Nevada's in California, and Franklin and Dyrness (1973) for Oregon and Washington.

Eleocharis palustris Habitat Type
(Common Spikesedge Habitat Type)

ELEPAL (ELPA3)

Number Of Stands Sampled = 5

LOCATION AND ASSOCIATED LANDFORMS

The *Eleocharis palustris* (common spikesedge) habitat type is a major type throughout southeastern and central Idaho, ranging in elevation from 1,424 to 2,000 m (4,700 to 6,600 ft). This type typically occurs on sites prone to yearly flooding or persistent surface water. It appears in and adjacent to low gradient stream and river corridors in open valleys or U-shaped drainages, and along the periphery of beaver impoundments, sloughs, lakes margins, and reservoirs.

VEGETATION

Eleocharis palustris (common spikesedge) clearly dominates sites occupied by this type, often forming a monoculture. A diversity of associated graminoids and forbs which may be present, generally characterized by low coverage and constancy, include: *Phalaris arundinacea* (Reed Canarygrass), *Juncus balticus* (Baltic rush), *Carex* spp.(sedge), *Scirpus* spp (bulrush), and *Sium suave* (Hemlock Water-parsnip). Types and levels of disturbances

may account for significant discrepancies in species diversity and cover. Hansen and others (1995) observed *Eleocharis acicularis* (needle spike-rush) typically accompanying this habitat type in Montana, although this species was absent for stands in Idaho. Additional sites may need to be surveyed to further understand the intricacies of this habitat type.

Table 6. Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax stands of the *Eleocharis palustris* (common spikesedge) habitat type (number = 5 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Graminoids			
Carex retrorsa (Retrorse Sedge)	1	0-3	20
Carex rostrata (Beaked Sedge)	1	0-3	20
Carex vesicaria (Inflated Sedge)	<1	0-1	20
Eleocharis palustris (Common Spikesedge)	79	60-98	100
Phalaris arundinacea (Reed Canarygrass)	4	0-20	40
Scirpus acutus (Hardstem Bulrush)	1	0-3	20
Forbs			
Alisma triviale (American Waterplantain)	1	0-3	20
Hippuris vulgaris (Common Mare's-tail)	<1	0-1	20
Myosotis scorpioides (Common Forget-me-not)	1	0-3	20
Polygonum amphibium (Water Smartweed)	<1	0-1	20
Polygonum hydropiperoides (Waterpepper)	<1	0-1	20
Rorippa curvipes (Blunt-leaved Yellowcress)	<1	0-1	20
Rumex crispus (Curly Dock)	<1	0-1	20
Sium suave (Hemlock Water-parsnip)	4	0-20	20

SUCCESSIONAL INFORMATION

Padgett and others (1989) suggest that *Eleocharis palustris* (common spikesedge) represents an early seral species on ponds and streambanks where water is at or above the ground surface. As siltation occurs over time, other types such as the *Carex rostrata* (beaked sedge) habitat type may replace it. However, due to the continually saturated conditions and the dense growth form of *Eleocharis palustris* (common spikesedge), once formed, stands appear to be difficult to displace and may persist as the climax vegetation. If water levels rise, *Scirpus* spp (bulrush) and *Typha* spp. (cattail) may be able to supplant *Eleocharis palustris* (common spikesedge).

Hansen and others observed that disturbance can drastically shift the the vegetative composition of this type toward increaser or invader species such as *Hordeum jubatum* (foxtail barley).

SOILS

Sites are generally saturated or inundated with surface water for much of the growing season. Litter accumulations at the surface may blend into rich, black organic muck soils on some sites. Upper horizons, typically categorized as fine silts or clays which may be 1 m (39 in) or more in depth, often arise from alluvial deposition. Sands, gravels and cobbles usually constitute the main body of deeper subsurface materials. Soils orders may be classified as Histosols, Mollisols, and occasionally Entisols (Padgett and others 1989).

ADJACENT COMMUNITIES

Scirpus spp (bulrush), and *Typha* spp. (cattail) may reside in deeper water adjacent to the *Eleocharis palustris* (common spikesedge) habitat type, while *Phalaris arundinacea* (Reed Canarygrass), *Juncus balticus* (Baltic rush), and *Carex* spp.(sedge) may occupy similar or slightly drier zones. *Glyceria* spp. (mannagrass) and *Wyethia* spp. (mule's-ears) may establish mixed meadows where moisture is available along the edges of marshes or sloughs. *Salix* spp. (willow), *Populus tremuloides* (quaking aspen), and *Populus trichocarpa* (Black cottonwood) form clusters and stringer communities along active and older floodplains. *Artemisia tridentata* (big sagebrush) scrub/grasslands or *Pseudotsuga menziesii* (Douglas fir) groves may appear on neighboring hillsides and draws.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Seasonally wet conditions and low palatability of *Eleocharis palustris* (common spikesedge) limit the grazing value of this type for livestock, even during drought years when upland forage dries early and dies back (Kovalchik 1987), although use is probably slightly higher at these times.

Wildlife

Broad zones of this type along streams, rivers, lakes, and reservoirs provide valuable feeding and nesting areas for waterfowl. *Eleocharis palustris* (common spikesedge) and associated plants are a valuable source of food and cover for waterfowl (Hansen and others 1995). Wild ungulates seldom browse this habitat type due to its low palatability (Kovalchik 1987).

Soil Management and Rehabilitation Opportunities

Sites occupied by this type are typically inundated or at least saturated for much of the year as to preclude most development. Trampling damage and soil churning occurs readily with livestock use and may result in a shift toward more disturbance tolerant species such as *Hordeum jubatum* (foxtail barley), *Carex nebrascensis* (Nebraska sedge) or *Juncus balticus* (Baltic rush).

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = semipermanent-

ly flooded to seasonally flooded.

OTHER STUDIES

Similar communities have been described by Kovalchik (1987), Ratliff (1982), Chadde and others (1988), Padgett and others (1989), and by Hansen and others (1995).

Hordeum jubatum Community Type
(Foxtail Barley Community Type)

HORJUB (HOJU)
Number Of Stands Sampled = 2

LOCATION AND ASSOCIATED LANDFORMS

The *Hordeum jubatum* (foxtail barley) community type is a minor type at low to mid elevations in eastern Idaho, ranging from 1,272 to 1,600 m (4,200 to 5,200 ft). This community type occurs most frequently in the drawdown zone of ponds or temporary ponds with moderately saline or alkali water. This drawdown zone is flooded during the early part of the growing season but the water table falls to below the soil surface by late spring or early summer. The drawdown zone takes on the appearance of narrow bands encircling the open water. The soil surface may be covered with white salt crusts (Hansen and others 1995). *Hordeum jubatum* (foxtail barley) may also colonize wet meadows where surface water may be present for much of the growing season.

VEGETATION

The *Hordeum jubatum* (foxtail barley) community type is often characterized as a monotypic stand dominated by *Hordeum jubatum* (foxtail barley). On some sites, it may form a dense root network, essentially creating a thick mat at the surface that excludes other species. However, depending on the types and levels of disturbance, a diversity of other graminoids and forbs may be associated with this type, although generally with low cover and constancy.

Table 7. Average canopy cover, range of canopy cover, and constancy for species recorded in sampled stands of the *Hordeum jubatum* (foxtail barley) community type (number = 2 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Graminoids			
Agrostis stolonifera (Redtop)	2	0-3	50
Alopecurus aequalis (Short-awn Foxtail)	<1	0-1	50
Carex nebrascensis (Nebraska Sedge)	2	0-3	50
Eleocharis palustris (Common Spikesedge)	15	0-30	50
Hordeum jubatum (Foxtail Barley)	89	80-98	100

Juncus balticus (Baltic Rush)	3	3-3	100
Polypogon monspeliensis (Rabbitfoot Polypogon)	10	0-20	50
Scirpus acutus (Hardstem Bulrush)	2	0-3	20
Forbs			
Aster campestris (Meadow Aster)	<1	0-1	50
Chenopodium album (Lambsquarter)	<1	0-1	50
Cirsium arvense (Canada Thistle)	<1	0-1	50
Mentha arvensis (Field Mint)	<1	0-1	50
Rumex obtusifolius (Bitterdock)	2	0-3	50

SUCCESSIONAL INFORMATION

Hordeum jubatum (foxtail barley) is an early successional, pioneer species establishing bands along the perimeter of ponds and reservoirs or wider swathes in wet meadow environments. *Eleocharis* spp.(spikesedge), *Scirpus acutus* (Hardstem Bulrush), and *Carex* spp. (sedge) may represent climax types on wetter sites. Hansen and others (1995) suggest that the *Hordeum jubatum* (foxtail barley) community type may represent an early/mid-seral grazing disclimax of the *Agropyron smithii* (western wheatgrass) habitat type in Montana. Due to the limited number of observations in Idaho, the successional status of this community type is not fully documented. Careful observation of surrounding communities may provide insights to the potential climax vegetation.

SOILS

Soils probably classify to Mollisols, or possibly Entisols, on most sites. Soil textures are predominantly fines, commonly clays, silty clays, or silty clay loams. These poorly drained soils, in combination with seasonally high water tables, generally exhibit mottled or gleyed soil characteristics as a result of oxidation/reduction reactions common to these saturated environments. *Hordeum jubatum* (foxtail barley) appears tolerant of seasonal flooding and possibly long term inundation.

ADJACENT COMMUNITIES

Eleocharis spp.(spikesedge), *Scirpus acutus* (Hardstem Bulrush), *Typha* spp. (cattail) and *Carex* spp. (sedge) may occupy adjacent wetter zones. In many cases, the *Hordeum jubatum* (foxtail barley) community type inhabits sites abutting open water. *Betula occidentalis* (water birch) or *Salix* spp. (willow) may occur on the periphery of wet meadows associated with streams corridors. Adjacent drier communities may be dominated by grasslands or *Artemisia tridentata* (big sagebrush) steppe.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Herbage production from the *Hordeum jubatum* (foxtail barley) community type is low. Palatability of *Hordeum jubatum* (foxtail barley) when young is fair for livestock, but little use occurs after seed heads develop (USDA Forest Service 1937, Johnson and Nichols 1982). Consuming the awned seed heads can cause severe mouth sores and oc-

casionally death. Injuries to wildlife such as elk, deer, and pronghorn antelope have also been documented (USDA Forest Service 1937).

Hordeum jubatum (foxtail barley) acts as an increaser under excessive grazing pressure and also quickly invades suitable sites (USDA Forest Service 1937). Moderate grazing may allow desired forage plants to regain dominance.

Wildlife

Low herbage production and palatability makes this community type of limited value for wildlife. Consuming the mature awned seed heads can cause severe mouth sores and occasionally death. Injuries to wildlife such as elk, deer, and pronghorn have also been documented (USDA Forest Service 1937).

Soil Management and Rehabilitation Opportunities

Most management concerns associated with this type are centered around the increasing saline seep problems. The presence or expansion of seep areas may indicate that upland vegetation, small grains, fallow fields, or excess irrigation are not allowing the water table to drop to levels these sites have routinely experienced in the past. Excess water then flows through the soil, gathering soluble salts before evaporating in depressions. The salts remain, increasing in concentration with time, thereby restricting the types of plants able to tolerate this environment. The state of Montana is working with landowners to solve or reduce saline related problems. However, it is important to note that saline areas occur naturally due to the arid climate, parent material, and local topography (Hansen and others 1995).

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = saturated to temporarily flooded.

OTHER STUDIES

A similar community was described by Lesica and Shelly (1988) for the Blackfeet Indian Reservation and Hansen and others (1995) for the state of Montana.

Juncus balticus Community Type
(Baltic Rush Community Type)

JUNBAL (JUBA)

Number Of Stands Sampled In Montana= 9

NOTE: The *Juncus balticus* (Baltic rush) community type has been documented in Idaho according to field surveys conducted in 1994. However, due to time constraints during the 1995 field season, homogeneous stand data could not be collected for this type. In the subsequent discussion, any references to physical site location or vegetation characteristics for this type in Idaho were interpreted from 1994 field surveys. The remainder of this description was taken from the Classification and Management of Montana's Riparian and Wetland Sites (Hansen and others 1995).

LOCATION AND ASSOCIATED LANDFORMS

The *Juncus balticus* (Baltic rush) community type is a major type of low to mid elevation riparian or wetland environments throughout southern and eastern Idaho. Sites range from 1,545 to 1,727 m (5,100 to 5,700 ft). This type occurs near seeps and springs, in wet meadow prairies, and along the periphery of beaver ponds. It may also be found on alluvial terraces adjacent to stream and river channels in broad valleys where surface topography is usually level or sometimes undulating.

VEGETATION

The *Juncus balticus* (Baltic rush) community type represents a grazing disclimax. *Juncus balticus* (Baltic rush) dominates the aspect of this type. Common associates of this disturbance-caused type may include *Hordeum jubatum* (foxtail barley) (Table 8).

An assortment of species, many disturbance-induced, are associated with the *Juncus balticus* (Baltic rush) community type in Idaho. These species differ from those recorded for stands in Montana and may include *Poa pratensis* (Kentucky bluegrass), *Agrostis stolonifera* (redtop), *Carex rostrata* (beaked sedge), and *Juncus articulatus* (jointed rush) as the most prevalent.

Table 8. Average canopy cover, range of canopy cover, and constancy for indicator species of the sampled stands in Montana of the grazing disclimax *Juncus balticus* (Baltic rush) community type (number = 9 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Graminoids			
Hordeum jubatum (foxtail barley)	22	0-60	44
Juncus balticus (Baltic rush)	70	30-98	100

SUCCESSIONAL INFORMATION

The *Juncus balticus* (Baltic rush) community type represents a grazing disclimax. Numerous fence line contrasts throughout Montana illustrate that it acts as an increaser and/or invader. This community type occurs over a wide range of environmental conditions. It usually increases on sites formally held by the *Deschampsia cespitosa* (tufted hairgrass) and the *Calamagrostis canadensis* (bluejoint reedgrass) habitat types. It is considered an increaser due to its high tolerance to grazing. Utilization of *Juncus balticus* (Baltic rush) may be partially responsible for the

numerous invader species often associated with it. In other situations, *Juncus balticus* (Baltic rush) appears to have increased with disturbance, replacing other riparian or wetland graminoids.

The presence of nearly pure stands of *Juncus balticus* (Baltic rush) usually indicates wetter phases of this type and sites which have been heavily grazed in the past. *Deschampsia cespitosa* (tufted hairgrass) occurs on intermediate sites, while *Poa pratensis* (Kentucky bluegrass) indicates drier conditions and previous site disturbance.

SOILS

Soils are typically Mollisols (Aquolls and Borolls), or rarely Entisols, Inceptisols or Histosols (Padgett and otters 1989). Soil texture ranges from silt to sandy loam. Water tables are often at or near the soil surface in early summer, but may drop below 50 cm (20 in) by late August. Soil reaction ranges from neutral to mildly alkaline (pH 7.0 to 8.0).

ADJACENT COMMUNITIES

A variety of types occupy adjacent wetter sites, including the *Salix geyeriana* (Geyer willow), *Typha latifolia* (common cattail), *Scirpus acutus* (hardstem bulrush), *Carex aquatilis* (water sedge), and *Carex rostrata* (beaked sedge) habitat types. The *Potentilla fruticosa/Deschampsia cespitosa* (shrubby cinquefoil/tufted hairgrass) habitat type is common on adjacent sites with similar or slightly drier moisture regimes.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Stands of this community type are productive but forage value is relatively low. Hermann (1975) reported grazing use when plants were young and tender. As it matures, it is commonly avoided. Heavy grazing generally results in an increase of unpalatable forbs.

Poa pratensis (Kentucky bluegrass) is a palatable and moderately productive grass, especially when soil moisture levels are high, and tolerates a high degree of defoliation. Herbage production is moderate. *Poa pratensis* (Kentucky bluegrass) is well adapted to grazing and is considered an increaser (Wasser 1982). This species can produce new shoots from both existing tillers or rhizomes. Grazing practices influence the type of growth form present (Volland 1978). A high density of weak, low vigor tillers results under season long grazing. Stem densities are emphasized over aboveground biomass. Grazing practices incorporating early season rest increase the vigor of individual plants. Fewer shoots may be produced, but total aboveground biomass tends to be greater.

Agrostis stolonifera (redtop) is tolerant of close use due to its somewhat prostrate growth form, rhizomatous growth habit, and lower palatability than associated species.

Numerous fence line contrasts throughout Montana illustrate that *Juncus balticus* (Baltic rush) acts as an increaser and/or invader.

Wildlife

This type provides early season forage for wildlife, especially in stands with a large grass component.

Fisheries

Juncus balticus (Baltic rush) produces a deep and fibrous root system, with a mass of coarse and creeping rhizomes, and once established, rapidly spreads. These soil holding characteristics may make it valuable for stabilizing streambanks (Youngblood and others 1985)).

Fire

Limited information on the effects of fire on *Juncus balticus* (Baltic rush) suggests that is not harmed by cool fires. Associated species such as *Poa pratensis* (Kentucky bluegrass) is damaged only by a hot, intense fire. Cool burns will have little effect on *Poa pratensis* (Kentucky bluegrass) (Volland and Dell 1981), but spring burns may lower tiller densities (Dix and Smeins 1967). Intense burns during active growing periods can severely damage stands of *Poa pratensis* (Kentucky bluegrass) (Wasser 1982).

Soil Management and Rehabilitation Opportunities

The fine textured soils associated with this community type are subject to soil compaction and damage when moist, resulting in lower productivity and compositional changes that favor *Juncus balticus* (Baltic rush).

The strong rhizomes of *Juncus balticus* (Baltic rush) effectively stabilize streambanks, especially where soils are coarse and otherwise unstable. Except for *Juncus balticus* (Baltic rush), the associated graminoids of this type provide limited streambank protection.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = saturated to temporarily flooded.

OTHER STUDIES

Other studies of the region have identified similar *Juncus balticus* (Baltic rush) communities, including Norton (1981), Mattson (1984), Youngblood and others (1985b), Chadde and others (1988), and Padgett and others (1989).

Phalaris arundinacea Habitat Type
(Reed Canarygrass Habitat Type)

PHAARU (PHAR3)

Number Of Stands Sampled = 8

LOCATION AND ASSOCIATED LANDFORMS

The *Phalaris arundinacea* (reed canarygrass) habitat type is a minor type in eastern Idaho. It occurs at low to mid elevations, ranging from 1,030 to 1,697 m (3,400 to 5,600 ft). This type is located along streams, rivers, oxbows, lake and pond margins, ditches, irrigation channels, and in wet meadows. Although a native species, *Phalaris arundinacea* (reed canarygrass) has been widely distributed for the purposes of forage, and readily escapes from pastures into riparian or wetland areas, displacing more desirable species (Hansen and others 1995).

VEGETATION

Phalaris arundinacea (reed canarygrass) may reach heights of 2 m (6.5 ft) or more and often forms dense, rhizomatous root mats in the upper few inches of the soil solum. Coupled with the seasonal die-back of leaves and stalks which form a thick carpet of litter over the ground surface, *Phalaris arundinacea* (reed canarygrass) is able to form dense, monotypic stands, virtually excluding other riparian species. The occasional graminoids and forbs that are found on sites are poorly represented and exhibit low vigor.

Table 9. Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax stands of the *Phalaris arundinacea* (reed canarygrass) habitat type (number = 8 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Shrubs			
Salix exigua (Sandbar Willow)	<1	0-3	25
Graminoids			
Agrostis stolonifera (Redtop)	1	0-10	38
Phalaris arundinacea (Reed Canarygrass)	97	90-98	100
Poa pratensis (Kentucky Bluegrass)	<1	0-3	12
Scirpus acutus (Hardstem Bulrush)	<1	0-1	12
Forbs			
Bidens cernua (Nodding Beggar-ticks)	<1	0-1	12
Forb (Forb)	<1	0-1	12
Lemna minor (Water Lentil)	<1	0-1	12
Myosotis scorpioides (Common Forget-me-not)	<1	0-1	12
Polygonum amphibium (Water Smartweed)	1	0-10	12
Polygonum lapathifolium (Willow Weed)	<1	0-1	12
Rumex salicifolius (Willow Dock)	<1	0-1	12
Sagittaria cuneata (Arumleaf Arrowhead)	<1	0-1	12
Taraxacum officinale (common dandelion)	<1	0-1	12

SUCCESSIONAL INFORMATION

Hansen and others (1995) note that *Phalaris arundinacea* (reed canarygrass) has a strong tolerance to grazing except in the early growth stages. However, if stands are severely impacted, species such as *Bromus inermis* (smooth brome), *Mentha arvensis* (field mint), and *Poa palustris* (fowl bluegrass) may invade and dominate sites. Increasing water levels due to beaver activity or other impoundments may shift sites from the *Phalaris arundinacea* (reed canarygrass) habitat type to deep water types dominated by *Typha latifolia* (common cattail) or *Scirpus acutus* (hardstem bulrush).

SOILS

Surface soils are fine textured, typically clays, silty clay loams, and loams, with pH measurements ranging from 6.5 (slightly acid) to 8.0 (moderately alkaline) (USDA Soil Conservation Service 1968). Upper horizons, which may be 1 m (39 in) or more in depth and may contain a significant organic component, often appear as thick, black muck soils where standing water is present. Underlying substrates are dominated by sands, gravels, cobbles and even rock. Soils are probably classified as Entisols (Fluvents) or Mollisols. Water tables may be at or above the ground surface throughout the early part of the growing season, although may drop below 30 cm (12 in) towards the later summer months. Mottled and gleyed soil features are common in the upper horizons. *Phalaris arundinacea* (reed canary grass) tolerates prolonged periods of flooding and may be one of the most flood tolerant of the cultivated grasses, yet is capable of withstanding short summer droughts (Apfelbaum and Sams 1987).

ADJACENT COMMUNITIES

Carex rostrata (beaked sedge), *Typha latifolia* (common cattail), *Scirpus acutus* (hardstem bulrush), and *Eleocharis palustris* (common spikesedge) habitat types may form a patchwork mosaic with *Phalaris arundinacea* (reed canarygrass) communities along the margins of lakes and ponds or paralleling stream channels or oxbows. Scattered *Populus trichocarpa* (Black cottonwood) stands may appear throughout the upper floodplains and on islands. A variety of shrubs, such as *Cornus stolonifera* (red-osier dogwood), *Crataegus douglasii* (Black Hawthorn) , and *Salix spp.* (willow) may develop as stringer communities adjacent to riparian corridors. Drier hillsides and secondary floodplains may consist of mixed grasslands and *Artemisia tridentata* (big sagebrush) shrubs.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Hansen and others (1995) indicate that although herbage production from this habitat type is high, the palatability of the coarse-leaved *Phalaris arundinacea* (reed canarygrass) is only low to moderate. It is most palatable when actively growing, and becomes less palatable in fall and winter. *Phalaris arundinacea* (reed canarygrass) has a strong tolerance to grazing except in the early growth stages. Alkaloidal content and increasing fiber content with advancing maturity cause a gradual decline in palatability during the growing season. Grazing should begin when this species is about 30 cm (12 in) tall and soils have dried enough to minimize trampling damage (USDA Soil Conservation Service 1968). It is suggested that livestock operators graze it using an intense stocking and short rotation plan that leaves at least a 2-3 cm (5-8 in) stubble. Management may include mowing stands once a year and fencing to force cattle to consume *Phalaris arundinacea* (reed canarygrass). To maintain dense stands, plants should not be grazed to less than 10 cm (4 in) in height (Alberta Agriculture 1981).

This type is also suitable for hay production. However, harvest must usually be delayed until late in the season when soils are dry and plants mature. Nutritive quality at this time is low, especially where *Phalaris arundinacea* (reed canarygrass) completely dominates the stand (Hansen and others 1995).

Wildlife

In many locations, the *Phalaris arundinacea* (reed canarygrass) habitat type is inundated long enough to provide limited nesting habitat for waterfowl and cover for muskrats. Stands of this habitat type are also used by big game, especially moose, for forage and cover (Hansen and others 1995).

Fisheries

This habitat type may provide valuable spawning areas and hiding cover for many species of fish (Hansen and others 1995).

Fire

High water tables during the growing season make burning difficult. However, burning during the nongrowing season may be feasible. Fire management strategies based on two to three year burn rotations has shown limited success in controlling the spread of *Phalaris arundinacea* (reed canarygrass) (Hansen and others 1995).

Soil Management and Rehabilitation Opportunities

These sites are generally so wet as to preclude most development activities. Even sites that dry out near the end of the growing season are highly susceptible to compaction problems due to fine textured soils (Hansen and others 1995). Mosquito populations are generally high in these areas as well where standing or stagnant water provide prime breeding grounds.

Once established, *Phalaris arundinacea* (reed canarygrass) spreads rapidly and is extremely difficult to eliminate (Apfelbaum and Sams 1987). The resilient nature of this rhizomatous grass makes it an effective stabilizer of streambanks and ditches. ***However, its future use in revegetating degraded sites should be severely restricted.*** *Phalaris arundinacea* (reed canarygrass) is becoming a threat to wetland areas dominated by other native species. The effectiveness of control measures, such as burning and herbicide spraying, has not been determined. Chemical methods usually provide poor long term control and are not always acceptable. The proximity of water tables creates a high potential for water contamination. Even when chemical and mechanical control treatments are used, new seedlings can rapidly reestablish themselves from seeds in the soil (Hansen and others 1995).

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = seasonally flooded to saturated.

OTHER STUDIES

This type has been documented in the Classification and Management of Montana's Riparian and Wetland Sites (Hansen and others 1995).

Phragmites australis Habitat Type
(Common Reed Habitat Type)

PHRAUS (PHAU7)
Number Of Stands Sampled = 1

LOCATION AND ASSOCIATED LANDFORMS

The *Phragmites australis* (common reed) habitat type is an incidental type at mid to lower elevations throughout eastern Idaho, ranging from 970 to 1,600 m (3,200 to 5,280 ft). It occurs in swales, marshes, pond and lake margins, oxbow lakes, backwater areas, and on the banks of rivers and streams. Sites are classified as seasonally flooded (Hansen and others 1995).

VEGETATION

Phragmites australis (common reed) is a strongly rhizomatous perennial that generally forms dense, monotypic stands up to 3 m (10 ft) in height. Some stands my be quite extensive in marshes and swales while other stands may appear as narrow swaths paralleling stream and river corridors. Understory graminoids and forbs may be more prevalent where disturbance occurs or at the edge of ecotones.

Table 10. Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax stands of the *Phragmites australis* (common reed) habitat type (number = 1 stands)

Species	% Canopy Cover
Shrubs	
Solanum dulcamara (Climbing Nightshade)	3
Graminoids	
Agrostis stolonifera (Redtop)	30
Carex rostrata (Beaked Sedge)	3
Phalaris arundinacea (Reed Canarygrass)	3
Phragmites australis (Common Reed)	80
Polypogon monspeliensis (Rabbitfoot Polypogon)	1
Scirpus acutus (Hardstem Bulrush)	30
Forbs	
Aster eatonii (Eaton's Aster)	3
Cicuta maculata (Spotted Water-hemlock)	1

Cirsium arvense (Canada Thistle)	1
Epilobium ciliatum (Common Willow-herb)	1
Mentha arvensis (Field Mint)	10
Polygonum amphibium (Water Smartweed)	1
Rumex crispus (Curly Dock)	1
Solidago occidentalis (Western Goldenrod)	10
Taraxacum officinale (Common Dandelion)	3
Typha spp. (Cattail)	3
Veronica anagallis-aquatica (Water Speedwell)	1

SUCCESSIONAL INFORMATION

Phragmites australis (common reed) is a strongly rhizomatous perennial that tends to out compete all but the most aggressive disturbance-induced herbaceous species. However, with increased disturbance, weedy species such as *Cirsium arvense* (Canada thistle) may invade the understory (Hansen and others 1995). *Typha latifolia* (common cattail) and *Scirpus acutus* (hardstem bulrush) generally occupy adjoining sites and appear to compete with *Phragmites australis* (common reed), although the specific physical site requirements that allow one community to dominate over another in a certain location is unknown.

SOILS

Soils are generally classified as Entisols (Aquents) and Mollisols (Aquolls) (Hansen and others 1995). Soil textures range from clay to sandy loam, and often exhibit mottled or gleyed characteristics due to prolonged flooding common on most sites. Sands, or potentially gravels and cobbles, comprise the subsurface horizons. Hansen and others (1995) observed that water tables fluctuate tremendously, particularly in drawdown areas, ranging from 50 cm (20 in) above to 1 m (39 in) below the soil surface at the end of the growing season.

ADJACENT COMMUNITIES

Typha latifolia (common cattail), *Carex* spp. (sedge), and *Scirpus acutus* (hardstem bulrush) habitat types often occupy adjacent wet zones. In some cases, *Phragmites australis* (common reed) communities may border open water. Slightly drier zones may be dominated by stands of *Salix* spp. (willow), *Betula occidentalis* (water birch) or even *Populus* spp. (cottonwood). *Agrostis stolonifera* (redtop), *Agropyron* spp. (wheatgrass) and *Poa pratensis* (Kentucky bluegrass) mixed grasslands with sporadic *Juniperus scopulorum* (Rocky Mountain juniper) scattered throughout may inhabit adjacent hillsides and valleys.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Hitchcock and others (1969) indicate that *Phragmites australis* (common reed) is too coarse to be a valuable forage species. However, Hansen and others (1995) contend that herbage production in the *Phragmites australis* (common reed) habitat type is high to very high, and that *Phragmites australis* (common reed) is highly palatable to both livestock and wildlife, especially when the plants are young and growing vigorously. They suggest that *Phrag-*

mites australis (common reed) is moderately tolerant of grazing, although heavy grazing pressure may reduce the size and extent of stands. *Phragmites australis* (common reed) may also produce good quality hay or silage.

Wildlife

Hansen and others (1995) propose that *Phragmites australis* (common reed) is highly palatable to both livestock and wildlife, especially when the plants are young and growing vigorously. The high structural diversity of *Phragmites australis* (common reed) provides excellent thermal and hiding cover for big game species and waterfowl may use this habitat type for nesting and hiding cover. Other birds such as red-winged blackbirds and yellow-headed blackbirds are also common inhabitants.

Fisheries

The rhizomatous root network of *Phragmites australis* (common reed) provides exceptional streambank stabilization while the dense shoot growth slows high flows and helps trap and filter sediments from water columns.

Soil Management and Rehabilitation Opportunities

Phragmites australis (common reed) can provide excellent streambank protection. Rhizomes hold and stabilize the bank while the above ground vegetation helps trap and filter sediments. Once established, these characteristics help to stabilize sites (Hansen and others 1995).

Recreational Uses and Considerations

The *Phragmites australis* (common reed) habitat type provides excellent opportunities for viewing wildlife. Hitchcock and others (1969) note that this type may be used for thatching and matting as well.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = seasonally flooded to saturated.

OTHER STUDIES

Similar communities were described by Ward (1942), Walker and Waygood (1968), Shay and Shay (1986), and Hansen and others (1995).

Poa pratensis Community Type
(Kentucky Bluegrass Community Type)

POAPRA (POPR)

Number Of Stands Sampled = 4

LOCATION AND ASSOCIATED LANDFORMS

The *Poa pratensis* (Kentucky bluegrass) community type is a major, widespread type across broad, level valleys and foothills of eastern Idaho. Sites range in elevation from 1,455 to 1,909 m (4,800 to 6,300 ft). Stands occur on generally drier, marginally riparian zones of upper riverine floodplains that have been influenced by severe, often long term disturbance, such as historic grazing.

VEGETATION

A native of Eurasia, *Poa pratensis* (Kentucky bluegrass) is widely used for lawns and hay meadows and has become naturalized across most of North America (Kovalchik 1987). The *Poa pratensis* (Kentucky bluegrass) community type represents a grazing disclimax and is often associated with a variety of other "weed" species. *Poa pratensis* (Kentucky bluegrass) will typically represent the dominant species on these stands, although, depending on the site and general region, the composition of "weed" species and other species will differ (Table 11). This community type occupies marginally riparian zones and is considered one of the drier riparian types in Idaho.

Table 11. Average canopy cover, range of canopy cover, and constancy for species recorded in sampled stands of the grazing disclimax *Poa pratensis* (Kentucky bluegrass) community type (number = 4 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Trees			
Populus angustifolia (Narrowleaf Cottonwood)	<1	0-1	25
Shrubs			
Alnus incana (Mountain Alder)	<1	0-1	25
Clematis ligusticifolia (Western Virgins-bower)	3	0-10	25
Crataegus douglasii (Black Hawthorn)	<1	0-1	25
Elaeagnus commutata (Silverberry)	<1	0-1	25
Rosa woodsii (Woods Rose)	<1	0-1	25
Salix lasiandra (Pacific Willow)	<1	0-1	25
Symphoricarpos occidentalis (Western Snowberry)	<1	0-1	25
Graminoids			
Agropyron repens (Quackgrass)	<1	0-1	25
Agropyron smithii (Western Wheatgrass)	16	3-20	100
Agrostis stolonifera (Redtop)	6	0-20	75
Carex atherodes (Awned Sedge)	<1	0-1	25
Carex nebrascensis (Nebraska Sedge)	<1	0-1	25
Juncus spp. (Rush)	<1	0-1	25
Phalaris arundinacea (Reed Canarygrass)	<1	0-1	50
Phleum pratense (Common Timothy)	<1	0-1	25
Poa pratensis (Kentucky Bluegrass)	70	40-90	100

Stipa occidentalis (Western Needlegrass)	3	0-10	50
Forbs			
Achillea millefolium (Common Yarrow)	2	0-3	75
Artemisia ludoviciana (Prairie Sagewort)	<1	0-1	25
Aster campestris (Meadow Aster)	<1	0-1	50
Cirsium arvense (Canada Thistle)	<1	0-1	75
Erigeron glabellus (Smooth Daisy)	<1	0-1	25
Glycyrrhiza lepidota (American Licorice)	3	0-10	50
Linaria vulgaris (Butter-and-eggs)	1	0-3	50
Perideridia gairdneri (Gairdner's Yampah)	3	0-10	25
Potentilla spp. (Cinquefoil)	<1	0-1	25
Potentilla gracilis (Slender Cinquefoil)	<1	0-1	25
Rumex crispus (Curly Dock)	1	0-3	25
Tragopogon dubius (Goat's Beard)	<1	0-1	50
Trifolium dubium (Least Hop Clover)	5	0-20	25
Equisetum laevigatum (Smooth Scouring-rush)	1	0-3	25

SUCCESSIONAL INFORMATION

The *Poa pratensis* (Kentucky bluegrass) community type represents a grazing disclimax of an early/mid-seral secondary successional stage. Overgrazing by herbivores has produced drastic changes on sites formerly dominated by native graminoids (Volland 1978). Once a suitable site is disturbed, the extensive rhizome system of *Poa pratensis* (Kentucky bluegrass) allows it to rapidly spread and establish on these areas. It also withstands high levels of utilization, making replacement by former dominants such as *Deschampsia cespitosa* (tufted hairgrass) or *Agropyron smithii* (western wheatgrass) unlikely. The *Poa pratensis* (Kentucky bluegrass) community type represents a seral stage of many types including the *Deschampsia cespitosa* (tufted hairgrass) and the *Agropyron smithii* (western wheatgrass) habitat types. Close observation of similar sites may give insight to the climax community for the site (Hansen and others 1995).

SOILS

Youngblood and others (1985) indicate that this type typically establishes on Mollisols (Borolls) or Entisols (Fluvents). *Poa pratensis* (Kentucky bluegrass) survives on sands, dense clays, and thin, rocky soils when adequate moisture is available, but stands exhibit the greatest vigor on moist, fertile sandy to clay alluvial soils with a high organic component. *Poa pratensis* (Kentucky bluegrass) is generally intolerant of prolonged flooding, seasonally high water tables, or poor drainage. It is tolerant of mildly alkaline (pH 8.0), and saline soils (Hansen and others 1995).

ADJACENT COMMUNITIES

Populus spp. (cottonwood) stands often appear in scattered clusters or extensive forests on upper floodplains adjacent to this type. Disturbance tolerant shrubs such as *Crataegus douglasii* (Black Hawthorn), *Rosa* spp. (rose), and *Symphoricarpos occidentalis* (western snowberry) may also be present. *Salix* spp. (willow), *Carex rostrata* (beaked

sedge), and *Juncus balticus* (Baltic rush) types typically colonize streambanks on saturated sites. Upland communities may be dominated by grasslands, often with a significant *Artemisia tridentata* (big sagebrush) or *Juniperus scopulorum* (Rocky Mountain juniper) element.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Hansen and others (1995) note that the *Poa pratensis* (Kentucky bluegrass) community type is moderately productive, and provides a significant amount of early season forage. It is highly palatable in the rapid growth phase with palatability becoming greatly reduced during semidormancy of late summer and winter. Fall regrowth can occur provided moisture is sufficient and temperatures remain above freezing. *Poa pratensis* (Kentucky bluegrass) is well adapted to grazing and is considered an increaser or an invader, especially if grazing intensities and durations are severe (Wasser 1982). This species can produce new shoots from both existing tillers or rhizomes. Grazing practices influence the type of growth form present (Volland 1978). A high density of weak, low vigor tillers results under season long grazing. Grazing practices incorporating early season rest increase the vigor of individual plants. Fewer shoots may be produced, but total aboveground biomass tends to be greater. Streambanks associated with *Poa pratensis* (Kentucky bluegrass) stands are susceptible to sloughing (Hansen and others 1995).

Wildlife

Elk and deer make use of the grasses and forbs of this type, especially in early spring when other forages have not yet greened. Waterfowl utilize *Poa pratensis* (Kentucky bluegrass) for food and cover. Upland game birds, small mammals and small nongame birds also use this type for cover (Dittberner and Olson 1983).

Fisheries

The *Poa pratensis* (Kentucky bluegrass) community type is not very effective in stabilizing streambanks due to the shallow rhizomatous root system (Youngblood and others 1985b). Bank undercutting and sloughing may occur, especially when soils are wet or stands weakened by excessive grazing.

Fire

Hansen and others (1995) indicate that *Poa pratensis* (Kentucky bluegrass) is well adapted to fire, and is able to quickly resprout following burning because of its extensive network of rhizomes. However, it is intolerant of burning during the active growth stages and can be successfully controlled by late spring burning. Fire is an effective tool to remove excessive litter accumulations common on rested or lightly grazed stands. Cool burns will have little effect on *Poa pratensis* (Kentucky bluegrass) (Volland and Dell 1981), but spring burns may lower tiller densities (Dix and Smeins 1967).

Soil Management and Rehabilitation Opportunities

The potential for soil compaction is greatest in the spring when soils are moist. *Poa pratensis* (Kentucky bluegrass) has an extensive rhizome system, but its shallow rooting characteristics make it only marginally effective in stabilizing streambanks. The potential for erosional problems associated with this community type can be quite high.

Managers need to pay close attention to streambanks associated with *Poa pratensis* (Kentucky bluegrass) community type in order to detect early signs of streambank collapse. Once the streambank starts to degrade, with no change in management, there is little that can be done to save it short of expensive riprap (Hansen and others 1995).

Unless water tables are restored, these sites will remain with a ground cover dominated by introduced grass species. On those sites adjacent to a first or second order stream, the use of rock checkdams to aid in the rehabilitation of degraded (de-watered) sites is an excellent cost effective approach. The rock dam will help raise the water table thereby allowing the willows and sedges to reclaim a degraded site.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = temporarily flooded.

OTHER STUDIES

A number of other researchers have identified similar *Poa pratensis* (Kentucky bluegrass) communities, including Norton (1981; Greys River, Wyoming), Ratliff (1982; Sierra Nevada, California), Youngblood and others (1985b; eastern Idaho and western Wyoming), Padgett and others (1989; Utah and southeastern Idaho), and Hansen and others (1995; Montana).

Polygonum amphibium Community Type
(Water Smartweed Community Type)

POLAMP (POAM8)
Number Of Stands Sampled = 1

LOCATION AND ASSOCIATED LANDFORMS

The *Polygonum amphibium* (water smartweed) community type is an incidental type at low to mid elevations in eastern Idaho, documented in the vicinity of 1,500 m (4,950 ft). This type occupies shallow water along the edges of reservoirs, lakes, ponds, marshes, and other wet areas. Sites are classified as seasonally flooded.

VEGETATION

The *Polygonum amphibium* (water smartweed) community type is an aggressive invader of shallow water and exposed mud flats where there is minimal wave action (Hansen and others 1995). A partially decumbent growth

form and numerous stolons often result in the formation of dense, monotypic stands.

Table 12. Canopy cover for species recorded in stands of the *Polygonum amphibium* (water smartweed) community type that are relatively undisturbed by livestock or wildlife (number = 1 stands)

Species	% Canopy Cover
Forbs	
Alisma gramineum (Narrowleaf Waterplantain)	1
Polygonum amphibium (Water Smartweed)	98

SUCCESSIONAL INFORMATION

The *Polygonum amphibium* (water smartweed) community type may represent an early seral stage for a host of climax communities. *Typha latifolia* (common cattail) or *Scirpus acutus* (hardstem bulrush) may prevail in deep water sites, while *Eleocharis palustris* (common spikesedge) or *Carex* spp. (sedge) may succeed *Polygonum amphibium* (water smartweed) on shallower, saturated sites. Physical site parameters and neighboring communities should aid in the identification of the potential climax community for most sites.

SOILS

Water tables occur at or above the ground surface throughout most of the year on sites occupied by the *Polygonum amphibium* (water smartweed) community type. Surface soils are typically nutrient rich, black mucky clays with a high organic component, although Hansen and others (1995) indicate that this type may establish on a variety of soils with textures ranging from fine clays to sandy loams. It is considered to be intolerant of saline or alkaline conditions. Soils types should classify to Mollisols, or possibly Histosols or Entisols

ADJACENT COMMUNITIES

Typha latifolia (common cattail) or *Scirpus acutus* (hardstem bulrush) habitat types often colonize zones in slightly deeper water, although stands of *Polygonum amphibium* (water smartweed) ordinarily appear immediately adjacent to open water. *Eleocharis palustris* (common spikesedge) is typically associated with this community type in shallow water while *Salix* spp. (willow) may form small clustered stands above the high water mark. Adjacent uplands may be dominated by *Artemisia tridentata* (big sagebrush)/grasslands.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Herbage production of the *Polygonum amphibium* (water smartweed) community type rates low to moderate. *Polygonum amphibium* (water smartweed) is of low palatability to livestock and wildlife (Hansen and others 1995).

Wildlife

Polygonum amphibium (water smartweed) is of low palatability to wildlife (Hansen and others 1995), although waterfowl appear to use these areas for nesting, shelter and forage.

Soil Management and Rehabilitation Opportunities

Shore vegetation around reservoirs is a mosaic of short lived plant communities that may survive from one to many years before being eliminated by a combination of high water or grazing. These shore communities are composed primarily of early successional species that become established either during the fall or spring when water levels are low. Repeated annual drawdowns perpetuate this disturbance and associated vegetation. Shore vegetation is important in providing habitat for terrestrial wildlife, certain fish species, and livestock. These communities also protect shores from accelerated erosion, and enhance the aesthetic quality of the shore environment (Hansen and others 1995).

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = seasonally flooded.

OTHER STUDIES

A number of authors have described similar communities for the prairie pothole region of North America (Van der Valk 1989).

Scirpus acutus Habitat Type
(Hardstem Bulrush Habitat Type)

SCIACU (SCAC)

Number Of Stands Sampled = 6

NOTE: The *Scirpus acutus* (hardstem bulrush) habitat type includes all combinations of *Scirpus acutus* (hardstem bulrush) and *Scirpus validus* (softstem bulrush) due to similarities in environmental conditions and management concerns.

LOCATION AND ASSOCIATED LANDFORMS

The *Scirpus acutus* (hardstem bulrush) habitat type, ranging in elevation from 909 to 1,576 m (3,000 to 5,200 ft), is a major type occurring throughout southern and central Idaho. Stands may appear as fringes along the margins of ponds, lakes and reservoirs, stringers paralleling stream and river channels, or broad swaths in backwater marsh-

es and sloughs. This type often inhabits relatively deep water and represents one of the wettest riparian types in Idaho.

VEGETATION

The *Scirpus acutus* (hardstem bulrush) habitat type usually appears as an impenetrable monotypic stand often reaching heights of 2 m (6.5 ft) or more. *Scirpus* spp. (bulrush) require high levels of moisture throughout the year, and while stands may colonize saturated soils along streambanks or on the periphery of ponds and reservoirs, they typically extend out into the water column up to 1 m (39 in) or more in depth in some locations. Due to the dense growth form and flooded water regime, other species are largely absent, or if present, in limited amounts. Although Hansen and others (1995) observed high coverages of *Scirpus validus* (softstem bulrush) on some sites in Montana, it was present on only one site in Idaho. Additional sites may need to be surveyed to determine whether this type in Idaho matches the type described by Hansen and others (1995) in Montana, or whether it needs modification.

Table 14. Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax stands of the *Scirpus acutus* (hardstem bulrush) habitat type (number = 6 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Graminoids			
Eleocharis palustris (Common Spikesedge)	4	0-20	50
Grass (Grass)	<1	0-1	17
Juncus balticus (Baltic Rush)	<1	0-1	17
Scirpus acutus (Hardstem Bulrush)	94	90-98	100
Scirpus validus (Softstem Bulrush)	2	0-10	17
Forbs			
Chenopodium album (Lambsquarter)	1	0-3	17
Lepidium virginicum (Tall Pepperweed)	<1	0-1	17
Polygonum amphibium (Water Smartweed)	1	0-3	50
Rorippa curvipes (Blunt-leaved Yellowcress)	<1	0-1	17
Rumex crispus (Curly Dock)	<1	0-1	17

SUCCESSIONAL INFORMATION

Scirpus acutus (hardstem bulrush) occupies some of the wettest sites on the landscape and tolerates prolonged flooding better than most riparian communities. These highly saturated conditions, coupled with an extremely dense growth form, allow this aggressive species to colonize sites at an early successional stage and maintain dominance on undisturbed sites as the climax vegetation. However, *Scirpus acutus* (hardstem bulrush) is regularly accompanied by other water-loving species, such as *Sparganium emersum* (simplestem bur-reed), *Typha latifolia*

(common cattail), and *Carex* spp. (sedge). The reasons for the distribution of these species is difficult to discern, but minor changes in water chemistry or nutrient availability may favor the expansion of one species at the expense of another. Seasonal climatic changes may play a vital role in determining which species may dominate a site at a particular point in time.

SOILS

The *Scirpus acutus* (hardstem bulrush) habitat type generally inhabits soils classified as Mollisols (Aquolls), Entisols (Aquents), or occasionally Histosols (Brichta 1987). Textures of surface horizons on long-lived stands are predominantly fines, which appear as black or gleyed, mucky clay or silty loam soils with high concentrations of decomposed and partially decomposed plant material that accumulate over time from annual dieback. Alluvial sands, gravels and cobbles may form an unconsolidated matrix in the subsurface horizons. Water tables are generally at or above the soil surface throughout the growing season. Soil reactions on sites occupied by this type vary from almost neutral to moderately alkaline (pH 7.4 to 8.2) (Brichta 1987).

ADJACENT COMMUNITIES

Carex spp. (sedge), *Typha latifolia* (common cattail), *Sparganium emersum* (Simplestem Bur-reed), *Eleocharis palustris* (common spikesedge), *Phalaris arundinacea* (reed canarygrass) and *Scirpus acutus* (hardstem bulrush) types may form a patchwork mosaic along the margins of lakes and ponds or parallel stream channels or oxbows. These communities generally occupy microsites according to moisture regimes, substrate composition, nutrient availability and a variety of other physical site parameters. *Salix* spp. (willow) occupy slightly drier sites at the waterline while *Elaeagnus angustifolia* (Russian olive) and *Populus trichocarpa* (Black cottonwood) appear in scattered communities on upper floodplains. Hayfields and pastureland may represent the dominate upland communities, although *Artemisia tridentata* (big sagebrush)/grasslands are also common.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Wet conditions and the lack of palatable forage limit livestock use of this type. However, if upland forage becomes sparse and soil conditions dry, livestock may make use of *Scirpus acutus* (hardstem bulrush) (Hansen and others 1995).

Wildlife

Scirpus acutus (hardstem bulrush) provides valuable nesting and roosting cover for a variety of songbirds and waterfowl, notably redwinged, yellow-headed blackbirds and wrens. *Scirpus acutus* (hardstem bulrush) is a staple food for muskrats and is used in construction of their huts. Seeds of *Scirpus acutus* (hardstem bulrush) are eaten by a variety of birds. Waterfowl managers often attempt to increase the proportion of *Scirpus acutus* (hardstem bulrush) relative to *Typha* species (cattails) as a means of improving habitat. *Triglochin maritimum* (seaside arrowgrass), if present, may be heavily grazed by elk (Hansen and others 1995).

Fire

The *Scirpus acutus* (hardstem bulrush) habitat type will burn in either late fall or early spring if the water levels have dropped sufficiently (Hansen and others 1995).

Soil Management and Rehabilitation Opportunities

Soils are commonly wet throughout the growing season and easily damaged from trampling by livestock and wildlife. Vegetation can also be damaged by trampling.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = permanently flooded to semipermanently flooded.

OTHER STUDIES

Similar communities dominated by *Scirpus acutus* (hardstem bulrush) have been identified by Pierce and Johnson (1986) for west central Montana and by Chadde and others (1988) for northern Yellowstone National Park.

Scirpus pungens Habitat Type
(Sharp Bulrush Habitat Type)

SCIPUN (SCPU3)

Number Of Stands Sampled = 1

NOTE: The *Scirpus pungens* (sharp bulrush) habitat type includes all combinations of *Scirpus pungens* (sharp bulrush) and *Scirpus americanus* (American bulrush) due to similarities in environmental conditions and management concerns.

LOCATION AND ASSOCIATED LANDFORMS

The *Scirpus pungens* (sharp bulrush) habitat type is an incidental type inhabiting broad, riverine valleys across eastern Idaho. Sites are located in wet areas along the margins of marshes and ponds or in backwater areas of floodplains proximal to streams and rivers. Sites range in elevation from 1,121 to 1,697 m (3,700 to 5,600 ft). This type often inhabits relatively deep water and represents one of the wettest riparian types in Idaho.

VEGETATION

The *Scirpus pungens* (sharp bulrush) habitat type usually forms dense stands, up to 1 m (39 in) tall (Hitchcock and others 1969), that may be dominated by *Scirpus pungens* (sharp bulrush) or *Scirpus americanus* (American bulrush). Although both species may be present, they do not appear to codominate sites; there is generally only one domi-

nant species. The rhizomatous root growth and saturated site conditions often preclude the invasion of other species, resulting in monotypic stands essentially devoid of other graminoids and forbs on undisturbed sites.

Table 14. Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax stands of the *Scirpus pungens* (sharp bulrush) habitat type (number = 1 stands)

Species	% Canopy Cover
Graminoids	
Hordeum jubatum (Foxtail Barley)	1
Juncus balticus (Baltic Rush)	30
Scirpus americanus (American Bulrush)	70
Triglochin maritimum (Seaside Arrow-grass)	10

SUCCESSIONAL INFORMATION

Scirpus pungens (sharp bulrush) occupies some of the wettest sites on the landscape and tolerates prolonged flooding better than most riparian species. These highly saturated conditions, coupled with an extremely dense rhizomatous root growth, allow this aggressive species to colonize sites at an early successional stage and maintain dominance on undisturbed sites as the climax vegetation. *Typha latifolia* (common cattail) and *Scirpus acutus* (hardstem bulrush) may border this habitat type, acting as competitors; however, the complex interactions between these species and their individual site requirements are not well understood and, as yet, are unable to fully explain vegetation patterns observed on the landscape.

Disturbance can dramatically increase the amount of increaser and invader species such as *Hordeum jubatum* (foxtail barley) and *Juncus balticus* (Baltic rush) (Hansen and others 1995).

SOILS

Hansen and others (1995) indicate that soils are typically classified as Entisols (Fluvaquents) or Mollisols (Haplaquolls). Soil textures range from clay loam to sandy loam. Water tables are high, remaining within 1 m (39 in) of the soil surface throughout the year. Soils are rated as somewhat poorly drained to poorly drained. Soil reaction is typically alkali (pH 8.5). Saline soils are also common . Lesica and Shelly (1988) measured soil water conductivities of this type that range from 2,920 to 41,000 uhmos/cm (a median of 81,000 uhmos/cm) on the Blackfeet Indian Reservation.

ADJACENT COMMUNITIES

Typha latifolia (common cattail) and *Scirpus acutus* (hardstem bulrush) habitat types occupy adjacent deep water sites, while *Eleocharis palustris* (common spike sedge) and *Juncus balticus* (Baltic Rush) may inhabit moderately shallow or merely saturated zones. Adjacent drier sites above the waterline may be dominated by *Elaeagnus angustifolia* (Russian olive) or *Populus trichocarpa* (Black cottonwood). Mixed grasslands and *Artemisia tridentata* (big sagebrush) scrubland populate hillsides and drier uplands.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Herbage production is high to very high. However, palatability is low to moderate. *Scirpus pungens* (sharp bulrush) is seldom grazed by livestock or wildlife, provided additional forage is available or the site is in fairly deep water. However, if water levels drop or upland forage is limited, livestock may heavily utilize these communities (Hansen and others 1995).

Wildlife

The *Scirpus pungens* (sharp bulrush) habitat type is an important source of shade, hiding cover, and food for wildlife. *Scirpus pungens* (sharp bulrush) is used by muskrats for construction of huts. Waterfowl use this site type for nesting and hiding cover. Other birds such as red-winged blackbirds and yellow-headed blackbirds are common inhabitants. Deer also use this site type for hiding cover (Hansen and others 1995).

Fisheries

The *Scirpus pungens* (sharp bulrush) habitat type buffers wind and wave action on bodies of water. Warm water fish may make use of this site type as spawning beds. Along streams, this site type helps to filter out sediments and build streambanks (Hansen and others 1995).

Soil Management and Rehabilitation Opportunities

The *Scirpus pungens* (sharp bulrush) habitat type helps filter sediments to build streambanks. This type is fairly drought tolerant being able to persist through several years of dry conditions. *Scirpus pungens* (sharp bulrush) is a prolific seed producer. Dissemination occurs by both wind and water. Seeds require moist, bare soil for germination. Rhizomes spread into exposed areas, rapidly colonizing mudflats and drawdown areas (Hansen and others 1995).

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = semipermanently flooded.

OTHER STUDIES

Lesica and Shelly (1988) described a similar community for the Blackfeet Indian Reservation. Similar sites in the prairie pothole region of the northern Great Plains have been described by Van der Valk (1989) and for the state of Montana by Hansen and others (1995).

Sparganium emersum Community Type
(Simplestem Bur-reed Community Type)

SPAPEC (SPPE)
Number Of Stands Sampled = 2

LOCATION AND ASSOCIATED LANDFORMS

The *Sparganium emersum* (simplestem bur-reed) community type, an incidental type ranging in elevation from 1,450 to 1,850 m (4,785 to 6,105 ft), appears in broad valleys in eastern Idaho. Sites are located in swales, wet meadows, and at the edges of marshes and ponds where pooled or slowly moving surface water is prevalent. This type occupies some of the wettest riparian sites in Idaho with *Carex* spp. (sedge), *Typha* spp. (Cattail) and *Scirpus* spp.(bulrush).

VEGETATION

Sparganium emersum (simplestem bur-reed) forms monotypic stands on saturated or inundated sites. The dense shoot growth, which may achieve 1 m (39 in) or more in height, thick rhizomatous root mat, and highly saturated site conditions deter most species from infringing on this community type. Associated graminoids and forbs that are present generally express poor coverage and low vigor.

Table 15. Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax stands of the *Sparganium emersum* (simplestem bur-reed) community type (number = 2 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Graminoids			
Beckmannia syzigachne (American Sloughgrass)	<1	0-1	50
Forbs			
Alisma triviale (American Waterplantain)	2	0-3	50
Hippuris vulgaris (Common Mare's-tail)	<1	0-1	50
Sium suave (Hemlock Water-parsnip)	1	1-1	100
Sparganium emersum (Simplestem Bur-reed)	98	98-98	100
Typha spp. (Cattail)	2	0-3	50

SUCCESSIONAL INFORMATION

Typha latifolia (common cattail) and *Scirpus acutus* (hardstem bulrush) appear to be the main competitors of *Sparganium emersum* (simplestem bur-reed) and may represent the climax vegetation on these sites. All three species form dense, monotypic stands with little overlap at the ecotones. Like its competitors, *Sparganium emersum* (simplestem bur-reed) is present in deeper water, 30 cm (12 in) or more, on moderately saturated sites that are wet at the surface for only part of the year, and at all locations between these extremes. Other than saturated conditions, trends are difficult to discern. This type may actually represent a habitat type on some locations, but addi-

tional surveys must be collected to better understand the ecology of this species.

SOILS

Water tables appear at or above the surface for much of the growing season. Soil surface textures, predominantly fine, black silts characterized with a high organic component and decaying, fibrous plant material, may extend to a depth of 30 cm (12 in) or more. Clays, often exhibiting gleyed coloring as a result of anaerobic conditions associated with high water tables, constitute the underlying layers. Deeper subsurface horizons are suspected to be alluvial sands, gravels and cobbles. Soils should classify to Mollisols, or perhaps Histosols or Entisols.

ADJACENT COMMUNITIES

Adjacent deep water sites may be dominated by the *Typha latifolia* (common cattail) or the *Scirpus acutus* (hardstem bulrush) habitat types. *Phalaris arundinacea* (reed canarygrass), *Eleocharis palustris* (common spikesedge), *Polygonum* spp. (smartweed) and *Carex* spp. (sedge) may occupy moderately shallow to saturated sites along the perimeter of these stands. Uplands are primarily grassland/pasturelands used for grazing and as hay fields. *Artemisia tridentata* (big sagebrush) steppe dominates nearby hillsides.

MANAGEMENT INFORMATION

Livestock

Although herbage production in stands of the *Sparganium emersum* (simplestem bur-reed) is high, palatability is probably low. It may be utilized in the spring when young plants are actively growing; however, sites are relatively wet at this time of the year and may limit livestock access.

Wildlife

Forage potential for ungulates is thought to be low, although beaver or muskrat may use it for building materials or forage. The *Sparganium emersum* (simplestem bur-reed) habitat type may provide important shade and hiding cover for waterfowl. Perching birds also may make limited use of this type.

Soil Management and Rehabilitation Opportunities

The rhizomatous nature of *Sparganium emersum* (simplestem bur-reed) makes it an excellent species for rehabilitating disturbed saline or alkali sites.

Recreational Uses and Considerations

Sparganium emersum (simplestem bur-reed) inhabits lakeshores, marshes and other saturated areas often heavily infested by mosquitoes. Camping is not recommended, although stands may provide access to open water for anglers.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = semipermanently flooded.

OTHER STUDIES

Similar communities have not been described elsewhere.

Typha latifolia Habitat Type
(Common Cattail Habitat Type)

TYPLAT (TYLA)
Number Of Stands Sampled = 7

NOTE: The *Typha latifolia* (common cattail) habitat type includes all combinations of *Typha latifolia* (common cattail) and *Typha angustifolia* (narrow-leaved cattail) due to similarities in environmental conditions and management concerns.

LOCATION AND ASSOCIATED LANDFORMS

The *Typha latifolia* (common cattail) habitat type establishes as a fringe along the margins of ponds and reservoirs, as broad stands in marshes and sloughs, and in narrow bands along oxbows and adjacent to stream and river corridors.This major type, ranging in elevation from 909 to 1,750 m (3,000 to 5,775 ft), occurs on wide, level valleys across eastern Idaho. Often inhabiting relatively deep water and representing one of the wettest riparian types in Idaho, it occupies locations characterized by a permanently flooded to semipermanently flooded water regime.

VEGETATION

Species diversity for stands within the *Typha latifolia* (common cattail) habitat type are generally low. An extensive rhizomatous root system, dense foliage obtaining heights of 2 m (6.5 ft) or more, thick mats of annually accumulating litter, and highly saturated site conditions result in a monoculture, dominated by *Typha latifolia* (common cattail) and/or *Typha angustifolia* (narrow-leaved cattail), on most sites. Affiliated herbaceous species are characteristically sparse and exhibit poor health.

Table 16. Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax stands of the *Typha latifolia* (common cattail) habitat type (number =7 stands)

Species	% Canopy Cover		
	Average	Range	Constancy
Shrubs			
Salix lasiandra (Pacific Willow)	<1	0-1	14
Graminoids			

Agrostis stolonifera (Redtop)	<1	0-1	14
Carex vesicaria (Inflated Sedge)	<1	0-1	29
Eleocharis palustris (Common Spikesedge)	3	0-20	29
Juncus balticus (Baltic Rush)	3	0-20	14
Phalaris arundinacea (Reed Canarygrass)	<1	0-1	14
Forbs			
Alisma triviale (American Waterplantain)	<1	0-1	14
Bidens cernua (Nodding Beggar-ticks)	3	0-20	14
Chenopodium rubrum (Red Goosefoot)	<1	0-1	14
Epilobium ciliatum (Common Willow-herb)	<1	0-3	14
Forb (Forb)	<1	0-1	14
Galium trifidum (Small Bedstraw)	<1	0-1	14
Lemna minor (Water Lentil)	3	0-20	14
Mentha arvensis (Field Mint)	<1	0-1	14
Myosotis scorpioides (Common Forget-me-not)	7	0-50	14
Polygonum amphibium (Water Smartweed)	<1	0-1	14
Polygonum punctatum (Water Smartweed)	<1	0-1	14
Sagittaria cuneata (Arumleaf Arrowhead)	1	0-10	14
Sium suave (Hemlock Water-parsnip)	<1	0-1	14
Taraxacum officinale (Common Dandelion)	<1	0-1	14
Typha spp. (Cattail)	89	70-98	100

SUCCESSIONAL INFORMATION

Typha latifolia (common cattail) and *Typha angustifolia* (narrow-leaved cattail) are early colonizers of saturated and inundated sites. They are well adapted to prolonged submergence of their roots and lower stems, but require some period of bare soil exposure for germination and establishment. Because seed production is extremely high, they are capable of rapid colonization of wet mineral soils. Due to the saturated soils with water levels either above or near the soil surface throughout the growing season, sites are minimally impacted. However, heavy livestock use can convert stands of this type to the *Carex nebrascensis* (Nebraska sedge) community type (Hansen and others 1995).

Scirpus acutus (hardstem bulrush) and *Carex rostrata* (beaked sedge) compete for similar locations on some sites. These habitat types could actually replace *Typha* spp. (cattail) communities where changing environmental conditions favor their particular growth strategies. Appropriately, when conditions favor *Typha* spp. (cattail), it may become the dominate community.

SOILS

Hansen and others (1995) note that soils are commonly Entisols (Typic Fluvaquents) or Mollisols (Aquolls), often characterized by accumulations of organic matter overlying deposits of fine silt and clay. These types are commonly inundated with 30-100 cm (12-39 in) of water throughout the year. Redoximorphic features (mottled or gleyed soils) in mineral horizons are common resulting from permanently saturated, anaerobic soil conditions.

ADJACENT COMMUNITIES

Scirpus acutus (hardstem bulrush) may codominant some sites with similar water regimes, although *Scirpus acutus* (hardstem bulrush) appears to tolerate more brackish conditions than *Typha latifolia* (common cattail) (Hansen and others 1995). The *Carex rostrata* (beaked sedge) habitat type frequently occupies adjacent, although moderately drier sites. *Phalaris arundinacea* (reed canarygrass), *Eleocharis palustris* (common spikesedge), *Polygonum* spp. (smartweed) may persist along the periphery of *Typha latifolia* (common cattail) stands. Upper floodplains may be dominated by *Populus trichocarpa* (Black cottonwood) and *Salix* spp. (willow). Hay meadows and pastureland may be present on upland plateaus while *Artemisia tridentata* (big sagebrush) grasslands often populate drier hillsides.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Typha latifolia (common cattail) is normally little used by livestock. However, if water levels drop or upland forage limiting, livestock may heavily utilize this type. *Typha latifolia* (common cattail) is a highly preferred food of muskrats (Allen and Hoffman 1984).

Wildlife

Typha latifolia (common cattail) is an important source of shade, hiding cover, and food for wildlife. It is used by muskrats for construction of huts. Waterfowl use this type for nesting and hiding cover, provided the stands are not too dense. Dense stands of *Typha latifolia* (common cattail) will hinder waterfowl uses. Deer also use this type for forage and hiding cover. This type is a critical source of nesting and roosting cover for yellow-headed and red-winged blackbirds and wrens (Hansen and others 1995).

Fire

Dense stands of *Typha latifolia* (common cattail) can be burned in late fall or early spring in order to improve habitat for waterfowl (Hansen and others 1995).

Soil Management and Rehabilitation Opportunities

Standing water and continually wet conditions restrict most development on these sites.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = permanently flooded to semipermanently flooded.

OTHER STUDIES

Pierce and Johnson (1986) and Chadde and others (1988) described similar *Typha latifolia* (common cattail) communities. A similar community was described by Padgett and others (1989) for Utah and southeastern Idaho, and Hansen and others (1995) for Montana.

Wyethia amplexicaulis Community Type
(Northern Mule's-ears Community Type)

WYEAMP (WYAM)
Number Of Stands Sampled = 1

LOCATION AND ASSOCIATED LANDFORMS

The *Wyethia amplexicaulis* (Northern Mule's-ears) community type is an incidental type at mid to high elevations in the foothills and mountains of northeastern Idaho. Sampled sites occur in the vicinity of 1,950 m (6,534 ft). This type occupies poorly drained wet meadows and flats, or slight depressions near streams where subsurface flows provide moisture to the soil solum.

VEGETATION

The *Wyethia amplexicaulis* (Northern Mule's-ears) community type may represent a grazing disclimax in Idaho. Mueggler (1989) notes that stands typically occur on sites that can support palatable grasses and forbs. This type forms broad meadows, dominated by *Wyethia amplexicaulis* (Northern Mule's-ears) and *Wyethia helianthoides* (White-head Mule's-ears), between groves of *Populus tremuloides* (quaking aspen). A variety of graminoids and forbs may be present on site, including: *Antennaria luzuloides* (Woodrush Pussy-toes), *Festuca idahoensis* (Idaho Fescue), and other perennial grasses.

Table 17. Canopy cover for those species recorded in the sampled stands of the *Wyethia amplexicaulis* (Northern Mule's-ears) community type (number = 1 stand)

Species	% Canopy Cover
Graminoids	
Carex praticola (Meadow Sedge)	1
Festuca idahoensis (Idaho Fescue)	10
Grass perennial (Perennial Grass)	20
Juncus nodosus (Tuberous Rush)	3
Melica spectabilis (Showy Oniongrass)	3
Poa scabrella (Pine Bluegrass)	1

Forbs	
Achillea millefolium (Common Yarrow)	3
Antennaria luzuloides (Woodrush Pussy-toes)	10
Camassia quamash (Common Camas)	3
Collomia linearis (Narrow-leaf Collomia)	3
Collinsia parviflora (Small-flowered Blue-eyed Mary)	3
Delphinium nuttallianum (Nuttall's Larkspur)	3
Forb (Forb)	3
Galium bifolium (Thinleaf Bedstraw)	3
Lithophragma parviflorum (Smallflower Woodlandstar)	1
Perideridia bolanderi (Bolander's Yampah)	3
Senecio crassulus (Thick-leaved Groundsel)	3
Taraxacum officinale (Common Dandelion)	1
Wyethia amplexicaulis (Northern Mule's-ears)	60
Wyethia helianthoides (White-head Mule's-ears)	1

SUCCESSIONAL INFORMATION

Mueggler (1989) suggests that the *Wyethia amplexicaulis* (Northern Mule's-ears) community type occupies sites that are capable of supporting palatable grasses and forbs. Careful observation of physical site parameters and surrounding vegetation may indicate the potential climax community on a site where sites have not been permanently altered by severe, long term grazing. This community may belong to the *Populus tremuloides* (quaking aspen)/*Wyethia amplexicaulis* (Northern Mule's-ears) community type that Mueggler (1989) describes in his classification for the Intermountain Region.

SOILS

Poorly drained clay loam soils dominate surface horizons. Gravel-sized rocks are present on the ground surface and throughout the lower soil layers. Pugging 5 to 10 cm (2 to 4 in) deep indicate saturated conditions or even ponding on some sites. As sites dry, soils crack, suggesting shrink/swell clays. Possible subsurface flows may maintain soil moisture at the surface for part of the growing season.

ADJACENT COMMUNITIES

Populus tremuloides (quaking aspen) groves or coniferous dominated forests may occupy the perimeter of *Wyethia amplexicaulis* (Northern Mule's-ears) meadows. This community type creates broad, homogeneous stands up to a few acres in size.

MANAGEMENT INFORMATION

Livestock

Wyethia amplexicaulis (Northern Mule's-ears) is considered to be unpalatable for livestock (Mueggler 1989).

Wildlife

The *Wyethia amplexicaulis* (Northern Mule's-ears) community type is relatively unpalatable for wild ungulates, and the low structural diversity and poor species diversity offers little value for other forms of wildlife as well (Mueggler 1989).

Soil Management and Rehabilitation Opportunities

Fine textured soils may be susceptible to compaction in the spring when sites are saturated from snowmelt. Livestock and vehicular traffic should be restricted from these sites where practical.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

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APPENDIX A-2. Wetland status, energy value, and protein value

Wetland status refers to to plant species that have exhibited and ability to develop to maturity and reproduce in an environment where all or portions of the soil within the root zone become, periodically or continuously, saturated or inundated during the growing season. The ability to grow and reproduce in wetlands is due to morphological and/or physiological adaptations and/or reproductive strategies of the plant (Reed 1988a; 1988b). Categories are as follows: **OBL** (Obligate Wetland) refers to species that almost always occur (estimated probability greater than 99%) under natural conditions in wetlands; **FACW** (Facultative Wetland) refers to species that usually occur in wetlands (estimated probability 67-99%), but is occasionally found in non-wetlands; **FAC** (Facultative) refers to species that are equally likely to occur in wetlands or non-wetlands (estimated probability 34-66%); **FACU** (Facultative Upland) refers to species that usually occur in non-wetlands (estimated probability 67-99%), but is occasionally found in wetlands (estimated probability 1-33%). The category for the species listed above where obtained from Reed (1988a, 1988b); however, for some species no information was available. In those instances, the authors used professional experience using information available for species with similar morphological or physiological characteristics.

Energy value refers to the usable energy a plant provides to livestock or wildlife during the period from flowering or early seed formation to the following spring, within a ***comparable life form*** (e.g., a grass is compared to other grasses). **H** (High) = retains usable energy value well during fall and winter (e.g., cures well and/or retains leaves); **M** (Medium) = retains usable energy value moderately well during fall and winter; **L** (Low) = poor retention of usable energy value during fall and winter (e.g., cures poorly and/or drops leaves).

Protein value refers to the digestible protein a plant provides to livestock or wildlife during the period from flowering or early seed formation to the following spring, within a comparable life form (e.g., a grass is compared to other grasses). **H** (High) = retains digestible protein value well during fall and winter (e.g., cures well and/or retains leaves); **M** (Medium) = retains digestible protein value moderately well during fall and winter; **L** (Low) = poor retention of digestible protein value during fall and winter (e.g., cures poorly and/or drops leaves).

Species	Wetland Status	Energy Value	Protein Value
Trees			
Abies lasiocarpa (subalpine fir)	FACU	M	L
Acer negundo (box-elder)	FACW	M	L
Elaeagnus angustifolia (Russian olive)	FACW	M	M
Fraxinus pennsylvanica (green ash)	FACW	M	L
Juniperus scopulorum (Rocky Mountain juniper)	FACU	H	M
Picea engelmannii (Engelmann spruce)	FAC	M	L
Picea glauca (white spruce)	FAC	M	L
Pinus contorta (lodgepole pine)	FAC	M	L
Pinus ponderosa (ponderosa pine)	FACU	M	L
Populus angustifolia (narrowleaf cottonwood)	FACW	M	M
Populus deltoides (Great Plains cottonwood)	FACW	M	M
Populus tremuloides (quaking aspen)	FAC	M	M
Populus trichocarpa (black cottonwood)	FACW	M	M
Pseudotsuga menziesii (Douglas fir)	FACU	M	M
Salix amygdaloides (peach-leaf willow)	FACW	M	L
Shrubs			
Acer glabrum (Rocky Mountain maple)	FAC	M	L
Alnus incana (mountain alder)	FACW	M	L
Amelanchier alnifolia (western serviceberry)	FACU	M	M
Artemisia cana (silver sagebrush)	FAC	M	M
Berberis repens (creeping Oregongrape)	FAC	M	M
Betula glandulosa (bog birch)	OBL	L	L
Betula occidentalis (water birch)	FACW	M	M
Clematis ligusticifolia (western virgins-bower)	FACU	L	L

APPENDIX A-2 (cont.)

Species	Wetland Status	Energy Value	Protein Value
Cornus stolonifera (red-osier dogwood)	FACW	M	L
Crataegus douglasii (black hawthorn)	FAC	M	M
Crataegus succulenta (succulent hawthorn)	FAC	M	M
Elaeagnus commutata (silverberry)	FAC	M	M
Kalmia microphylla (small-leaved laurel)	FACW	—	—
Ledum glandulosum (Labrador tea)	FACW	M	M
Lonicera utahensis (Utah honeysuckle)	FACU	L	L
Potentilla fruticosa (shrubby cinquefoil)	FAC	M	L
Prunus americana (wild plum)	FACU	M	M
Prunus virginiana (common chokecherry)	FACU	H	M
Rhus aromatica (fragrant sumac)	FACU	M	L
Ribes lacustre (swamp currant)	FAC	M	L
Ribes odoratum (buffalo currant)	FACU	L	L
Ribes setosum (Missouri gooseberry)	—	L	L
Rosa acicularis (prickly rose)	FACU	L	L
Rosa woodsii (woods rose)	FACU	L	L
Rubus parviflorus (thimbleberry)	FACU	L	L
Salix bebbiana (Bebb willow)	FACW	M	L
Salix boothii (Booth willow)	OBL	M	L
Salix brachycarpa (short-fruited willow)	FACW	M	L
Salix candida (hoary willow)	OBL	M	L
Salix commutata (undergreen willow)	OBL	M	L
Salix drummondiana (Drummond willow)	FACW	M	L
Salix exigua (sandbar willow)	OBL	M	L
Salix geyeriana (Geyer willow)	FACW	M	L
Salix lasiandra (Pacific willow)	FACW	M	L
Salix lutea (yellow willow)	OBL	M	L
Salix planifolia (planeleaf willow)	OBL	M	L
Salix wolfii (Wolf's willow)	FACW	M	L
Sarcobatus vermiculatus (black greasewood)	FACU	M	M
Shepherdia argentea (thorny buffaloberry)	FACU	M	L
Shepherdia canadensis (Canada buffaloberry)	—	M	L
Symphoricarpos albus (common snowberry)	FACU	M	M
Symphoricarpos occidentalis (western snowberry)	FACU	M	M
Vaccinium cespitosum (dwarf huckleberry)	FACU	L	M
Vaccinium scoparium (whortleberry)	FACU	L	M
Graminoids			
Agropyron caninum (bearded wheatgrass)	FAC	H	M
Agropyron repens (quackgrass)	FACU	M	L
Agropyron smithii (western wheatgrass)	FACU	H	M
Agrostis stolonifera (redtop)	FACW	M	L
Beckmannia syzigachne (American sloughgrass)	OBL	L	L
Bromus anomalus (nodding brome)	—	M	L
Bromus ciliatus (fringed brome)	FAC	M	L
Bromus inermis (smooth brome)	FAC	M	L
Calamagrostis canadensis (bluejoint reedgrass)	FACW	M	L
Calamagrostis rubescens (pinegrass)	—	M	L
Calamagrostis stricta (narrow-spiked reedgrass)	FACW	M	L
Carex aquatilis (water sedge)	OBL	M	M
Carex atherodes (awned sedge)	OBL	M	L

APPENDIX A-2 (cont.)

Species	Wetland Status	Energy Value	Protein Value
Carex buxbaumii (Buxbaum's sedge)	OBL	M	M
Carex lanuginosa (woolly sedge)	OBL	M	L
Carex lasiocarpa (slender sedge)	OBL	M	M
Carex lenticularis (lentil-fruit sedge)	FACW	M	M
Carex limosa (mud sedge)	OBL	M	M
Carex microptera (small-winged sedge)	FAC	M	M
Carex nebrascensis (Nebraska sedge)	OBL	H	M
Carex nigricans (black alpine sedge)	FACW	M	M
Carex rostrata (beaked sedge)	OBL	M	L
Carex scopulorum (Holm's Rocky Mountain sedge)	FACW	M	M
Carex simulata (short-beaked sedge)	OBL	M	M
Carex vesicaria (inflated sedge)	OBL	M	L
Deschampsia cespitosa (tufted hairgrass)	FACW	M	L
Distichlis spicata (inland saltgrass)	FACW	M	L
Eleocharis acicularis (needle spike-rush)	OBL	M	L
Eleocharis palustris (common spikesedge)	OBL	M	L
Eleocharis pauciflora (few-flowered spike-rush)	OBL	M	L
Elymus canadensis (Canada wildrye)	FAC	H	L
Elymus cinereus (basin wildrye)	FACU	H	L
Elymus glaucus (blue wildrye)	FACU	H	L
Festuca idahoensis (Idaho fescue)	—	H	M
Glyceria borealis (northern mannagrass)	OBL	M	L
Glyceria grandis (American mannagrass)	FACW	M	L
Glyceria striata (fowl mannagrass)	OBL	M	L
Hordeum jubatum (foxtail barley)	FAC	M	L
Juncus balticus (Baltic rush)	OBL	M	L
Phalaris arundinacea (reed canarygrass)	FACW	M	L
Phleum alpinum (alpine timothy)	FAC	H	L
Phleum pratense (common timothy)	FACU	M	L
Phragmites australis (common reed)	FACW	M	L
Poa palustris (fowl bluegrass)	FAC	M	L
Poa pratensis (Kentucky bluegrass)	FACU	M	L
Puccinellia nuttalliana (Nuttall alkaligrass)	OBL	M	L
Scirpus acutus (hardstem bulrush)	OBL	M	L
Scirpus maritimus (alkali bulrush)	OBL	M	L
Scirpus pungens (sharp bulrush)	OBL	M	L
Scirpus validus (softstem bulrush)	OBL	L	L
Spartina gracilis (alkali cordgrass)	FACW	M	L
Spartina pectinata (prairie cordgrass)	OBL	M	L
Trisetum spicatum (spike trisetum)	FACU	M	L
Forbs			
Achillea millefolium (common yarrow)	FACU	L	L
Actaea rubra (baneberry)	—	L	L
Aralia nudicaulis (wild sarsaparilla)	FACU	L	L
Arnica cordifolia (heart-leaf arnica)	—	L	L
Aster conspicuus (showy aster)	—	L	L
Aster foliaceus (leafy aster)	FACW	L	L
Caltha leptosepala (elkslip marshmarigold)	OBL	L	L
Cirsium arvense (Canada thistle)	FACU	L	L
Cirsium scariosum (elk thistle)	—	L	L

APPENDIX A-2 (cont.)

Species	Wetland Status	Energy Value	Protein Value
Clintonia uniflora (queen's cup)	FAC	L	L
Epilobium angustifolium (fireweed)	FACU	L	L
Epilobium ciliatum (common willow-herb)	FACW	L	L
Equisetum arvense (field horsetail)	FAC	L	L
Equisetum fluviatile (water horsetail)	OBL	L	L
Equisetum laevigatum (smooth scouring-rush)	FACW	L	L
Fragaria virginiana (Virginia strawberry)	—	L	L
Galium boreale (northern bedstraw)	FACU	L	L
Galium trifidum (small bedstraw)	FACW	L	L
Galium triflorum (sweetscented bedstraw)	FACU	L	L
Geranium richardsonii (white geranium)	FACU	L	L
Geranium viscosissimum (sticky geranium)	FAC	L	L
Geum macrophyllum (large-leaved avens)	FACW	L	L
Geum triflorum (old man's whiskers)	FACU	L	L
Glycyrrhiza lepidota (American licorice)	FAC	M	L
Heracleum lanatum (cow-parsnip)	FAC	L	L
Melilotus alba (white sweetclover)	FACU	M	L
Melilotus officinalis (yellow sweet-clover)	FACU	M	L
Mertensia ciliata (mountain bluebell)	FACW	L	L
Osmorhiza occidentalis (western sweet-cicely)	FAC	L	L
Pedicularis groenlandica (elephant's head)	OBL	L	L
Polygonum amphibium (water smartweed)	OBL	L	L
Polygonum bistortoides (American bistort)	FACW	L	L
Polygonum lapathifolium (willow weed)	FACW	L	L
Potentilla anserina (common silverweed)	OBL	L	L
Potentilla diversifolia (diverse-leaved cinquefoil)	FACU	L	L
Potentilla gracilis (slender cinquefoil)	FAC	L	L
Potentilla norvegica (Norwegian cinquefoil)	FAC	L	L
Potentilla palustris (purple cinquefoil)	OBL	L	L
Sagittaria cuneata (arumleaf arrowhead)	OBL	L	L
Salicornia rubra (red glasswort)	OBL	L	L
Senecio hydrophilus (alkali-marsh butterweed)	OBL	L	L
Senecio triangularis (arrowleaf groundsel)	FACW	L	L
Smilacina stellata (starry Solomon-plume)	FAC	L	L
Solidago canadensis (Canada goldenrod)	FACU	L	L
Streptopus amplexifolius (clasping-leaved twisted stalk)	FAC	L	L
Taraxacum officinale (common dandelion)	FACU	L	L
Thalictrum occidentale (western meadowrue)	FACU	L	L
Trifolium repens (white clover)	FACU	L	L
Triglochin maritimum (seaside arrow-grass)	OBL	L	L
Typha angustifolia (hybrid cattail)	OBL	M	L
Typha latifolia (common cattail)	OBL	L	L
Urtica dioica (stinging nettle)	FAC	L	L
Viola adunca (hook violet)	FAC	L	L
Viola canadensis (Canada violet)	FAC	L	L
Viola orbiculata (round-leaved violet)	—	L	L

GLOSSARY

Abandoned Meander Channel. A former stream channel that was cut off from the rest of the river and typically lacks year-long standing water.

Aerobic. Condition in which molecular oxygen is present in the environment.

Albic Soil Horizon. A mineral soil horizon of virtually clean sand and silt particles; clays and free iron oxides have been removed most commonly by leaching, leaving the soil horizon a whitish appearance.

Alfisols. A soil order composed of soils having significantly more clay in the B horizon than in the A horizon and high base status.

Alkaline. Water or soil with a pH greater than 7.4.

Alluvial Soil. Sediments (clay, silt, sand, gravel, cobbles, and boulders) deposited by running water, ordinarily occurring on floodplains and at the base of ridges and slopes.

Alluvial Terrace. Deposits of alluvial soil that mark former floodplains. Typically, a floodplain may have several sets of alluvial terraces at different elevations and of different ages (the higher the elevation, the older the age).

Alluvium. An accumulation of sediments deposited by streams or rivers.

Anaerobic. Condition in which molecular oxygen is absent from the environment. This commonly occurs in wetlands where soils experience prolonged saturation by water.

Andisols. Are dark mineral soils developed in volcanic ash, pumice, cinders, other volcanic ejecta, or volcaniclastic materials.

Aqualfs. Soils with aquic conditions and having clay accumulating in the B horizon: wet Alfisols.

Aquatic Bed (Cowardin and others 1979). A *class* of wetland and deepwater habitat dominated by plants that grow principally on or below the surface of the water for most of the growing season in most years.

Aquents. Soils with aquic conditions and lacking distinct soil horizons in the subsoil: wet Entisols.

Aquepts. Soils with aquic conditions and showing little soil development in the B horizon: wet Inceptisols.

Aquic Conditions. These soils experience continuous or periodic saturation and reduction. The presence of these conditions is indicated by redoximorphic features.

Aquic Moisture Regime (obsolete). A moisture condition associated with a seasonal reducing environment that is virtually free of dissolved oxygen because the soil is saturated by ground water or by water of the capillary fringe, as in soils in Aquic suborders and Aquic subgroups.

Argillic Soil Horizon. A soil horizon that shows evidence of movement or accumulation of silicate clays, and possesses a higher clay content than an overlying horizon.

Available Water Capacity. The ability of a soil to hold water in a form available to plants, expressed in inches of water per inch of soil depth. Classes are: 1) Low = 0 - 0.12, 2) Moderate = 0.13 - 0.17, and 3) High = > 0.17

Average Canopy Cover. Refers to the "average" canopy cover of a particular species for the stands that it was recorded. For example, the number of stands sampled for a habitat type or community type may be 20. However, a particular species may only occur in 7 of the 20 stands. The average canopy cover therefore represents the "average" canopy cover of that particular species in the 7 stands.

Backwater Area. Seasonal or permanent water bodies found in the lowest parts of floodplains, typically circular

or oval in shape.

Bars (Alluvial). Sediment accumulations along waterways deposited by moving water. Examples include: 1) ***point bars*** — bars that are formed on the inside of a meander channel, 2) ***side bars*** — bars that are formed along the edges of relatively straight sections of a river, 3) ***mid-channel bars*** — these are found within the channel and generally become more noticeable during low flow periods, and 4) ***delta bars*** — formed immediately downstream of the confluences of a tributary and the main river.

Beaver Dams. Dams built by beavers that span the stream channel. In general, water is still flowing through the riparian system.

Bog (Mitsch and Gosselink 1986). A sphagnum moss-dominated community whose only water source is rainwater. They are extremely low in nutrients, form acidic peats, and are a northern phenomenon generally associated with low temperatures and short growing seasons.

Browse. Shrubby and woody forage consumed by wildlife.

Calcic Soil Horizon. A subsurface soil horizon with an accumulation of carbonates.

Cambic Soil Horizon. An altered soil horizon that does not have the dark color, organic matter content, or structure of a histic, mollic, or umbric epipedon. Cambic horizons possess the following characteristics: 1) texture is very fine sand, loamy very fine sand, or finer, 2) soil structure or absence of rock structure in at least 1/2 of the horizon (by volume), and 3) the alteration of soil color by the loss of carbonates or aquic conditions.

Canopy Coverage. The percentage of ground covered by the gross outline of an individual plant's foliage; or collectively covered by all individuals of a species within a stand or a sample plot.

Capillary Fringe. A zone immediately above the water table in which water is drawn upward from the water table by capillary action.

Carr. Wetland on organic soil with greater than 25 percent cover of shrubs. Typically, carrs are dominated by willows (*Salix* species).

Climax Community. Refers to the final or steady state plant community which is self-perpetuating and in dynamic equilibrium with its environment.

Colluvium. A deposit of unconsolidated geologic materials and soil accumulated at the base of slopes as a result of gravity.

Community (Plant Community). An assembly of plants living together, reflecting no particular ecological status.

Community Type. An aggregation of all plant communities distinguished by floristic and structural similarities in both overstory and undergrowth layers. A unit of vegetation within a classification. ***For the purposes of this document, a community type represents seral vegetation, and is never considered to be climax.***

Constancy. The percentage of sampled stands in which a species occurs.

Disclimax. Where recurring disturbances, such as grazing (e.g., zootic disclimax) or periodic burning (e.g., fire disclimax), exert the predominant influence in maintaining the structure and composition of the steady-state vegetation. Disclimaxes, such as the zootic climax or fire climax, are not the basis for recognizing habitat types.

Diversity. The kind and amount of species in a community per unit area.
Drained. A condition in which ground or surface water has been removed by artificial means.

Dominance Type (Equivalent to Cover Type). An aggregation of all stands (individual plant communities), grouped and named simply by the species with the greatest canopy coverage in the overstory or upper layer.

In this classification, canopy cover of dominant species is greater than 25 percent.

Emergent Plant. A rooted herbaceous plant species that has parts extending above a water surface.

Emergent Wetland (Cowardin and others 1979). A *class* of wetland habitat characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens

Entisols. A soil order including soils of slight or recent development; common along rivers and floodplains.

Ephemeral Stream. A stream or stretch of a stream that flows only in direct response to precipitation. It receives no water from springs and no long-continued supply from melting snow or other surface source. Its stream channel is at all times above the water table. These streams do not normally flow for 30 consecutive days.

Epipedon. Diagnostic soil horizons formed at the soil surface (e.g., argillic horizon).

Facultative Species. Plant species that can occur both in wetlands and uplands. There are three subcategories of facultative species: 1) facultative wetland plants, 2) facultative plants, and 3) facultative upland plants.

Facultative Plants (FAC). A plant species that is equally likely to occur in wetlands or nonwetlands (estimated probability 34-66 percent).

Facultative Upland Plants (FACU). A plant species that usually occurs in nonwetlands (estimated probability 67-99 percent), but occasionally found in wetlands (estimated probability 1-33 percent).

Facultative Wetland Plants (FACW). A plant species that usually occurs in wetlands (estimated probability 67-99 percent), but occasionally found in nonwetlands.

Fen (Mitsch and Gosselink 1986). A non-acidic peat-forming wetland that receives nutrients form sources other than precipitation, usually through groundwater movement.

Fibric Materials. Plant materials that show very little signs of decomposition. Plant fiber content before rubbing between fingers is at least 3/4 of the soil volume.

Fibrists. Organic soils (peats) in which plant remains show very little decomposition and retain original shape; more than 2/3 of the fibers remain after rubbing the materials between the fingers.

Flooded. A condition in which the soil surface is temporarily covered with flowing water from any source, such as streams overflowing their banks and runoff from adjacent or surrounding slopes, or any combination of sources.

Floodplain. An alluvial plain caused by the overbank deposition of alluvial material. Typically appearing as flat expanses of land bordering a stream or river. Most floodplains are accompanied by a series of alluvial terraces of varying levels.

Fluvial. Pertaining to or produced by the action of moving water.

Forb. A herbaceous plant, usually broadleaved, that is not a graminoid.

Forested Wetland (Cowardin and others 1979). A *class* of wetland habitat characterized by woody vegetation that is 6 m (20 ft) tall or taller.

Forested Wetlands. Occur near springs and seeps and in areas with naturally high water tables, such as river floodplains. Two general types of forested wetlands occur in Montana: 1) those dominated by coniferous tree species, and 2) those dominated by deciduous angiosperm tree species.

Frequently Flooded. A class of flood frequency in which flooding is common during most years (more than a 50 percent chance of flooding in any year, or more than 50 times in 100 years).

Gallery Forest. A strip of forest confined to a stream margin or floodplain in an otherwise unforested landscape.

Gleization. A process in saturated or nearly saturated soils which involves the reduction of iron. This process tends to give gray colors (low chroma) to those parts of the soil from which the iron has been reduced or removed and rust colors (high chroma) to those where the iron has oxidized and accumulated.

Gleyed Soil (obsolete). A soil condition resulting from prolonged soil saturation, which is manifested by the presence of bluish or greenish colors through the soil mass or in mottles (spots or streaks) among other colors. Gleying occurs under reducing soil conditions resulting from soil saturation, by which iron is reduced predominantly to the ferrous state. See also redox depletions.

Graminoid. Grass or grass-like plant, such as species of the Poaceae (grasses), Cyperaceae (sedges), and Juncaceae (rushes).

Ground Water. Water occupying the interconnected pore spaces in the soil or geologic material below the water table, this water has a positive pressure.

Growing Season. The portion of the year when soil temperatures are above biologic zero (41° F) as defined by *Soil Taxonomy;* the following growing season months are assumed for each of the soil temperature regimes: 1) thermic (February-October), 2) mesic (March-October), 3) frigid (May-September), 4) cryic (June-August), and 5) pergelic (July-August).

Habitat Type. The land area that supports, or has the potential of supporting, the same primary climax vegetation. A habitat type classification is a vegetation based ecological site classification. It is based on the potential of the site to produce a specific plant community (plant association). It has been used to classify grasslands, shrublands, woodlands, and forests throughout western United States.

Herbaceous. Nonwoody vegetation, such as graminoids and forbs.

Histic Epipedon. A 20 to 40 cm (8 to 16 in) soil layer at or near the surface that is saturated for 30 consecutive days or more during the growing season in most years and contains a minimum of 20 percent organic matter when no clay is present or a minimum of 30 percent of organic matter when 60 percent or more clay is present. Generally a thin horizon of peat or muck is present if the soil has not been plowed.

Histosols. A soil order composed of organic soils (peats and mucks) with generally greater than 50 percent organic matter in the upper 80 cm (32 in), or that are of any thickness if overlying rock.

Horizon. A distinct layer of soil, more or less parallel with soil surface, having similar properties such as color, texture, and permeability; the soil profile is subdivided into the following major horizons: 1) ***A horizon*** — a surface horizon characterized by an accumulation of organic material, 2) ***E horizon*** — most commonly a surface horizon, characterized by leaching of organic material, iron, and clay, 3) ***B horizon*** — a subsurface horizon characterized by relative accumulation of organic matter, iron, clay, or aluminum, 4) ***C horizon*** — undisturbed, unaltered parent material.

Hydric Soil (USDA SCS 1990). A soil that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part of the soil profile. Hydric soil indicators are Histosol, histic epipedon, sulfidic odor, aquic moisture regime, reducing conditions, gleyed or low-chroma colors, concretions, high organic content in surface layer in sandy soils, organic streaking in sandy soils, listed on local Hydric Soils List, and listed on National Hydric Soils List (Environmental Laboratory 1987)

Hydrology. The science dealing with the properties, distribution, and circulation of water.

Hydrophyte. Any macrophytic plant that grows in water or on a substrate that is at least potentially deficient in oxygen as a result of excessive water content; plants typically found in wetland and other aquatic habitats.

Hydrophytic Vegetation. Plant life growing in water or on a substrate that is at least potentially deficient in oxygen as a result of excessive water content.

Inceptisols. A soil order composed of soils of intermediate development; morphological characteristics are generally too weak to meet requirements of other soil orders.

Incidental Type. Refers to a habitat type or community type that rarely occurs or occupies only a small area of a wetland zone.

Intermittent Stream. A stream or reach of stream which flows only at certain times of the year when it receives water from springs or from some surface source (e.g., melting snow). They are usually divided with respect to the source of their water into spring-fed or surface-fed intermittent streams. These streams generally flow continuously during periods of at least one month or more during the year.

Inundation. A condition in which water temporarily or permanently covers a land surface.

Irrigation Canal. Included all types of canals associated with irrigation systems.

Lacustrine System (Cowardin and others 1979). Any wetland or deepwater habitat with the following characteristics: 1) situated in a topographic depression or dammed river channel, 2) lacking trees, shrubs, persistent emergents, emergent mosses or lichens with greater than 30 percent areal coverage, and 3) total area exceeds 8 ha (20 acres).

Lake. A natural topographic depression collecting a body of water covering at least 8 ha (20 acres) with surface water.

Lentic Wetland. See still water wetland.

Long Duration (Flooding). A duration class in which inundation for a single event ranges from 7 days to 1 month.

Lotic Wetland. See riparian wetland.

Major Type. Refers to a habitat type or community type that occupies an extensive area within a wetland zone.

Marsh. A frequently or continually inundated wetland on often developing in shallow ponds, depressions, and river margins. Marshes are dominated by herbaceous plants, such as grasses (e.g., *Phragmites*), sedges, cattails (e.g., *Typha*), and bulrushes (e.g., *Scirpus*). Waters are usually neutral to basic.

Mineral Soil. Soils composed of predominantly mineral materials (sands, silts, and clays) instead of organic materials. The soil contains less than 20 percent organic matter.

Minor Type. Refers to a habitat type or community type that seldom occupies large areas but may be common within a wetland zone.

Mollic Epipedon. A surface layer that consists of mineral soil materials and have the following properties: 1) soil structure that is not both massive and hard or very hard when dry, 2) Munsell color value less than 3 moist and 5 dry, and chroma less than 3, 3) base saturation of at least 50 percent, 4) at least 1 percent organic matter throughout the horizon, 5) typically moist for at least 3 months in most years, and 6) at least 18 cm (7 in) thick.

Mollisols. A soil order including soils with a thick dark brown to black surface horizon (mollic epipedon), has a high base saturation, and a well-developed structure. Typically associated with grassland soils.

Monotypic Stands. Stands composed primarily of a single species.

Montane. That region between the subalpine zone and the grassland zone or more broadly, mountain slopes below the alpine zone.

Mottling (obsolete). Spots or blotches of different color or shades of color interspersed within the dominant color in a soil layer, usually resulting from the presence of periodic reducing soil conditions. See also redox concen-

trations.

Natric Horizon. A special kind of argillic horizon. Natric horizons have all the properties of argillic horizons but, in addition, are 15 percent or more sodium saturated. Their formation is favored where leaching results in the accumulation of sodium on the cation-exchange complex.

Nonhydric Soils. A soil that has developed under predominantly unsaturated soil conditions.

Nonpersistent Vegetation. Plants that break down readily after the growing season; no evidence of previous year's growth at the beginning of the next grow season.

Nonwetland. Any area that has sufficiently dry conditions that hydrophytic vegetation, hydric soils, and/or wetland hydrology are lacking; it includes upland as well as former wetlands that are effectively drained.

Obligate Wetland Plant. Refers to a plant species that occurs almost always (estimated probability greater than 99 percent) under natural conditions in wetlands.

Organic Soil. Soils composed of primarily organic rather than mineral material. Equivalent to **Histosols** and includes peats and mucks.

Overbank Flooding. Any situation in which inundation occurs as a result of the water level of a river or stream rising above bank level.

Overflow Channel. An abandoned channel in a floodplain that may carry water during periods of high stream or river flows.

Oxbow Lake. A meander channel of a stream or river that is formed by breaching of a meander loop during flood stage. The ends of the cut-off meander are blocked by bank sediments.

Palustrine System (Cowardin and others 1979). Any nontidal wetland of a class dominated by trees, shrubs, persistent emergents, or emergent mosses or lichens.

Parent Material. The unconsolidated and undeveloped mineral or organic matter from which the solum (soil) is developed.

Peraquic Moisture Regime. A soil condition in which reducing conditions always occur due to the presence of ground water at or near the soil surface.

Perennial Stream. A stream or reach of a stream that flows continuously. They are generally fed in part by springs. Surface water elevations are commonly lower than water table elevations in adjacent soils.

Permanently Flooded. A water regime condition where standing water covers the land surface throughout the year (but may be absent during extreme droughts).

Permeability. The quality of the soil that enables water to move downward through the profile, measured as the number of cm (in) per hour that water moves downward through the saturated soil.

Phase. A subdivision of a habitat type or representing a characteristic variation in climax vegetation and environmental conditions.

Pioneer Species. Species that colonize bare areas (e.g., gravel bars) where there is little or no competition from other species.

Plant Association. Used to group together all those stands of climax vegetation which occur in environments so similar that there is much floristic similarity throughout all layers of the vegetation.

Playa. A periodically flooded wetland basin. Playas are common in parts of southwest Montana.

Pond. Bodies of water encircled by wetland vegetation. Wave action is minimal, allowing emergent vegetation to establish.

Ponded. A condition in which free water covers the soil surface, for example, in a closed depression. The water is removed only by percolation, evaporated, or transpiration.

Pooled Channel Stream. An intermittent stream with significant surface pool area and without flowing surface water. The water sources for the pools are springs within the channel.

Poorly Drained. Water is removed from the soil so slowly that the soil is saturated periodically during the growing season or remains wet for long periods (greater than 7 days).

Pothole. A depressional wetland community caused by glaciation and is common to portions of the Northern Great Plains. The body of water is less than 8 ha (20 acres) in size.

Primary Succession. Occurs on a bare surface not previously occupied by plants, such as a recently deposited alluvial bar.

Range Of Canopy Cover. Refers to the "range" (e.g., low and high values) of canopy cover of a particular species for all the stands sampled for a habitat type or community type.

Redox Concentrations. A redoximorphic feature characterized by zones in the soil of apparent accumulation of iron and manganese oxides. These may form as nodules, concretions, soft bodies, or pore linings and vary in shape, size, and color.

Redox Depletions. A redoximorphic feature characterized by zones in the soil of low chroma (less than 3) where iron and manganese oxides alone have been removed, or where both iron/manganese oxides and clay have been removed.

Redoximorphic Features. Soil features associated with wetness and are formed as a result of the reduction and oxidation of iron and manganese compounds in the soil following saturation with water (See redox concentrations and redox depletions).

Reduced Matrix. A redoximorphic feature characterized by a soil matrix having low chroma (less than 3) in situ, but increases in hue or chroma when exposed (within 30 minutes) to air.

Reservoir. An artificial (dammed) water body with at least 8 ha (20 acres) covered by surface water.

Riparian. *adj.* Of, on, or relating to the banks of a natural course of water (Latin *riparius*, from *ripa*, bank).

Riparian Plant Association. A plant community representing the latest successional stage attainable on a specific, hydrologically influenced surface (equivalent potential natural community type).

Riparian Wetlands (Lotic Wetlands). Riparian wetlands are wetlands associated with running water systems found along rivers, streams, and drainageways. Such wetlands contain a defined channel and floodplain. The channel is an open conduit which periodically, or continuously, carries flowing water, dissolved and suspended material. Beaver ponds, seeps, springs, and wet meadows on the floodplain of, or associated with, a river or stream are part of the riparian wetland.

Riparian or Wetland Ecosystem. The ecosystem located between aquatic and terrestrial environments. Identified by hydric soil characteristics and riparian or wetland plant species that requires or tolerates free water conditions of varying duration.

Riparian or Wetland Species. Plant species occurring within the riparian or wetland zone. Obligate riparian or wetland species require the environmental conditions associated with the riparian or wetland zone. Facultative riparian or wetland species are tolerant of these environmental conditions, but also occur in uplands.

Riparian Zone. A geographically delineated portion of the riparian ecosystem based on management concerns.

River. Rivers are usually larger than streams. They flow year around, in years of normal precipitation, and when significant amounts of water are not being diverted out of them.

Riverbank. That portion of the channel bank cross-section that controls the lateral movement of water.

Riverine System (Cowardin and others 1979). Any wetland or deepwater habitat contained within a channel, with exception of wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens.

Salic Horizon. A mineral soil horizon 15 cm (6 in) or more thick enriched with secondary soluble salts.

Saline. Soil or water containing sufficient soluble salts to interfere with the growth of most plants.

Saturated. A soil condition in which all voids (pore spaces) between soil particles are filled with water.

Secondary Succession. The process of changing biotic communities that occurs following disturbances to a site that has previously been occupied by living organisms.

Seep. Groundwater discharge areas. In general, seeps have less flow than a spring.

Seral. Refers to vegetation that has not theoretically attained a steady state with its environment, and current populations of some species are being replaced by other species; a community or species that is replaced by another community or species as succession progresses.

Series. Refers to a group of habitat types having the same climax species.

Scrub-Shrub Wetland (Cowardin and others 1979). A *class* of wetland habitat which includes areas dominated by woody vegetation less than 6 m (20 ft) tall. It may include true shrubs, young trees, or trees or shrubs that are small or stunted because of environmental conditions.

Shrub. A multi-stemmed woody plant generally shorter than 4.8 m (16 ft).

Small Mountain Lake. A natural topographic depression collecting a body of water covering less than 8 ha (20 acres) with surface water.

Soil Series. A subdivision of a soil family and consists of soils that are similar in all major soil profile characteristics and arrangements.

Solum. The upper and most weathered part of the soil profile; the A and B horizons.

Somewhat Poorly Drained. Water is removed slowly enough that the soil is wet for significant periods during the growing season.

Spring. Groundwater discharge areas. In general, springs are considered to have more flow than seeps.

Stable Community. The condition of little or no perceived change in plant communities that are in relative equilibrium with existing environmental conditions. It describes persistent but not necessarily climax stages in plant succession.

Stand. A plant community that is relatively uniform in composition, structure, and habitat conditions; a sample unit.

Stream. A natural waterway that is defined as first to third order.

Streambank. That portion of the channel bank cross-section that controls the lateral movement of water.

Stream Order. A classification of streams according to the number of tributaries. Order 1 streams have no tributaries; a stream of order 2 or higher has 2 or more tributaries of the next lower order.

Still Water Wetlands (Lentic Wetlands). These wetlands occur in basins and lack a defined channel and floodplain. Included are permanent (e.g., perennial) or intermittent bodies of water such as lakes, reservoirs, potholes, marshes, ponds, and stockponds. Other examples include fens, bogs, wet meadows, and seeps not associated with a defined channel.

Stockpond. An artificial (dammed) body of water of less than 8 ha (20 acres) covered by surface water.

Subterranean Stream. A stream that flows underground for part of the stream reach.

Succession. The change or sequence of plant, animal, and microbial communities that successively occupy an area over a period of time. ***Primary succession*** begins on a bare surface not previously occupied by living organisms, such as a recently deposited gravel bar. ***Secondary succession*** occurs following disturbances on sites that previously supported living organisms.

Swale. A depression or topographical low area.

Sward. An expanse of grass or grass-like plants.

Tree. A single-stemmed woody plant generally taller than 4.8 m (16 ft).

Unconsolidated Bottom (Cowardin and others 1979). A *class* of wetland or deepwater habitat with at least 25 percent cover of particles smaller than stones, and a vegetative cover less than 30 percent.

Unconsolidated Shore (Cowardin and others 1979). A *class* of wetland habitat having three characteristics: 1) unconsolidated substrates with less than 75 percent areal cover of stones, boulders, or bedrock, 2) less than 30 percent areal cover of vegetation other than pioneering plants, and 3) any of the following water regimes: irregularly exposed, regularly flooded, seasonally flooded, irregularly flooded, temporarily flooded, intermittently flooded, saturated, or artificially flooded.

Uplands. Any area that does not qualify as a wetland because the associated hydrologic regime is not sufficiently wet to elicit development of vegetation, soils, and/or hydrologic characteristics associated with wetlands. Such areas occurring in floodplains are more appropriately termed nonwetlands.

Very Long Duration (Flooding). A duration class in which inundation for a single event is greater than 1 month.

Very Poorly Drained. Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season.

Water Mark. A line on vegetation or other upright structures that represents the maximum height reached during a flood, ponding, or inundation event.

Water Regime (Nontidal) (Cowardin and others 1979). Includes the following types: 1) ***Permanently flooded*** — water covers the land surface throughout the year in all years. Vegetation is composed of obligate hydrophytes. 2) ***Intermittently exposed*** — surface water is present throughout the year except in years of extreme drought. 3) ***Semipermanently flooded*** — surface water persists throughout the growing season in most years. When surface water is absent, the water table is usually at or very near the land surface. 4) ***Seasonally flooded*** — surface water is present for extended periods especially early in the growing season, but is absent by the end of the season in most years. When surface water is absent, the water table is often near the soil surface. 5) ***Saturated*** — the substrate is saturated to the surface for extended periods during the growing season, but surface water is seldom present. 6) ***Temporarily flooded*** — surface water is present for brief periods during the growing season, but the water table usually lies well below the soil surface for most of the season. Plants that grow both in uplands and wetlands are characteristic of the temporarily flooded regime. 7) ***Intermittently flooded*** — the substrate is usually exposed, but surface water is present for variable periods without detectable seasonal periodicity. Weeks, months, or even years may intervene between periods of inundation. The

dominant plant communities under this regime may change as soil moisture conditions change. Some areas exhibiting this regime may not fall within the wetland definition because they do not have hydric soils or support hydrophytic plants.

Water Table. The upper surface of the zone of saturation within the soil or geologic material.

Wet Meadow. A herbaceous wetland on mineral soil. Generally, wet meadows occur in seasonally flooded basins and flats. Soils are usually dry for part of the growing season.

Wetlands. Areas that under normal circumstances have hydrophytic vegetation, hydric soils, and wetland hydrology. It includes landscape units such as bogs, fens, carrs, marshes, and lowlands covered with shallow, and sometimes ephemeral or intermittent waters. Wetlands are also potholes, sloughs, wet meadows, riparian zones, overflow areas, and shallow lakes and ponds having submerged and emergent vegetation. Permanent waters of streams and water deeper than 3 m (approximately 10 ft) in lakes and reservoirs are not considered wetlands.

Wetland Hydrology. Permanent or periodic inundation or prolonged soil saturation sufficient to create anaerobic conditions in the soil. Primary wetland hydrology indicators are: inundated, saturated in upper 4.7 cm (12 in), water marks, drift lines, sediment deposits, drainage patterns in wetlands. Secondary wetland hydrology indicators are: oxidized root channels in upper 4.7 cm (12 in), water-stained leaves, local soil survey data, FAC-neutral test (Environmental Laboratory, 1987).

Wetland Status. Refers to to plant species that have exhibited an ability to develop to maturity and reproduce in an environment where all or portions of the soil within the root zone become, periodically or continuously, saturated or inundated during the growing season. The ability to grow and reproduce in wetlands is due to morphological and/or physiological adaptations and/or reproductive strategies of the plant (Reed 1988a; 1988b). Categories are as follows:

OBL (Obligate Wetland). Refers to species that almost always occur (estimated probability greater than 99 percent) under natural conditions in wetlands.

FACW (Facultative Wetland). Refers to species that usually occur in wetlands (estimated probability 67-99 percent), but is occasionally found in nonwetlands.

FAC (Facultative). Refers to species that are equally likely to occur in wetlands or nonwetlands (estimated probability 34-66 percent).

FACU (Facultative Upland). Refers to species that usually occur in nonwetlands (estimated probability 67-99 percent), but are occasionally found in wetlands (estimated probability 1-33 percent).

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