Prime Farmland

For more than two decades, the State of Oregon has maintained a strong policy to protect farmland through "preservation of a maximum amount of the limited supply of agricultural land" (ORS 215.243). Counties inventory agricultural land, designate it in their comprehensive plan, and adopt policies to preserve it. The acres of BLM land zoned as agricultural are shown in Table 4. Lands zoned as Exclusive Farm Use (EFU), have restrictions designed to limit development that would conflict with agriculture. It keeps farmland from being divided into parcels too small for commercial agriculture.

Vegetation

Vegetation within the planning area is a product of the physical and climate properties associated with the Subecoregions and modifications introduced by natural processes, including, fire, insect infestations, disease, and floods as well as human uses such as grazing management, introduction of exotic species, farming, mining, fire suppression, and timber harvest.

The primary disturbance element has been wildfire. Occasional episodes of insect/disease epidemics and wind and moisture driven erosion have also formed the vegetation patterns across the John Day Basin. Climatic variations and associated disturbance elements created a landscape of vegetative conditions that varied within a range referred to as a Historic Range of Variability (HRV) Sagebrush and juniper dot the slopes, grass lines the valleys, and pine forests ring mountain peaks. Lush green vegetation trims the many streams, rivers and springs in the planning area. Along the plateaus swaths of wheat fields alternate with remnant grasslands. Spring wildflowers of lupine, balsamroot and paintbrush created brilliant displays of purple, yellow and red.

Table 4: Acres of BLM Land Zoned as "Agriculture"

County	Zone	Acres
Gilliam		56,029
	Gilliam County AE Zone	56,029
Grant		124,648
	Multiple Use Range MUR40	120,758
	Primary Farm EFU20	3,769
	Primary Farm EFU40	121
	Primary Farm EFU80	0
Jefferson		22,940
	Rangeland Zone RL	22,940
Morrow		438
	EFU Zone	438
Sherman		37,960
	EFU F1 Zone	37,960
Wasco		26,006
	Wasco County A1-80 Zone	26,006
Wheeler		137,437
	EFU Zone	137,437

Riparian Vegetation

Riparian Vegetation occurs along the margins of streams, ditches, springs, seeps, and seasonally ponded soils in the planning area. The structure and type of vegetation is critical to wildlife and fish, even when it does not control stream condition and function as discussed in the "Stream Channels and Floodplains" section. Hardwoods such as aspen, some taller willows, and cottonwood supply vertical structure for neo-tropical birds. As the trees age and decay, cavity nesters make use of them. Vegetation also supplies shade to the stream and helps to cool the water. Leaves from hardwoods supply nutrients to the riparian and aquatic system. In some areas, these leaves can be the driving force as a food source for aquatic macro invertebrates and therefore for the native fish.

Riparian areas and associated vegetation continuously evolve. Lakes and ponds gradually fill with sediments, and rivers and stream channels move about within the valley floor. Vegetation types gradually develop to fit the newly created environments associated with movement of the stream, its soil and water features. Stable plant communities are short lived, except in armored bedrock or low gradient meadows. Vegetation units within riparian areas are constantly moving or swapping their community types.

Riparian areas in the planning area occur as deciduous stands of trees and shrubs including a mosaic of herbaceous species that occur along the riparian margin. These woodlands and shrublands require periodic flooding and bare, moist substrates for reestablishment. Low-elevation canyons and draws contain shade intolerant shrubs on higher gradient cobble streams. On reaches with developed floodplains and finer soils sedges and rushes line the streambanks. In higher elevation steep-sided canyons or in narrow V-shaped valleys a mix of birch, alder, willow, and dogwood form thickets. Sites are subject to temporary flooding during spring runoff. In interrupted reaches, underlying gravels may keep the water table just below the ground surface, and are favored substrates for establishment of cottonwoods.

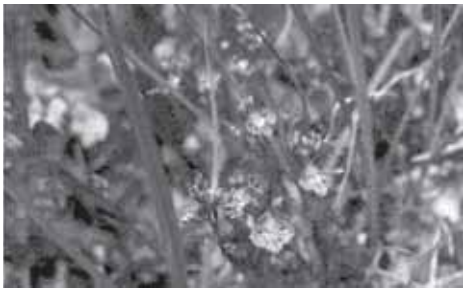
Some of the most common riparian/wetland plant associations include sandbar or coyote willow, common cattail, American Speedwell, creeping spike, 3-square bulrush, reed canarygrass, Torrant sedge, Great Basin wild rye, Netleaf hackberry-Lewis' mockorange, alder/dogwood, peachleaf willow, and Baltic rush. Brief descriptions of these associations, with photos, are displayed below.

Figure 5: Coyote willow on Bridge Creek

Salix exigua (Sandbar or coyote willow) association is a tall shrub community found across much of the western United States and is common in the planning area. In the Blue Mountains, this association occurs on gravelly or cobbly alluvial bars and banks along streams with a sequence of pools and riffles. Sites frequently contain deep fine textured soils overlaying cobble gravels. Between the willows grows a patchy herbaceous layer with reed canarygrass, quackgrass, bentgrasses and stinging nettle or thistles. This type frequently appears between a streamside grass or rush community and various more stable or drier shrub riparian type.

FIGURE 6: *TYPHA LATIFOLIA* (COMMON CATTAIL)

Typha latifolia (Common Cattail) is a wide spread association. It occurs on cobbly and/or gravelly alluvial bars or developing floodplains. It is typically found adjacent to pool/riffle sequence streams and recovering incised stream channels. This association is found at permanently or semipermanently flooded sites at the edges of lakes and ponds and in ditches, oxbows and backwater areas.



Gary A. Monroe @ USDA-NRCS PLANTS Database

The *Veronica americana* (American Speedwell) association is found mostly in streams on channel shelves (alluvial bars parallel to the banks of a stream) in extremely shallow, gentle gradient sections of faster-moving streams.

FIGURE 7: THE VERONICA AMERICANA (AMERICAN SPEEDWELL)

FIGURE 8: LAYERING OF CREEKING SPIKE RUSH, 3-SQUARE FULL RUSH UP TO COCKLEBUR ON THE MAIN-STEM JOHN DAY RIVER

Along the mainstem John Day river and other major tributaries, a community of *Eleocharis palustris* (creeping spikerush) and *Schoenoplectus americanus* (3-square bulrush) line the banks and shift in relative dominance. This association occurs along the low water line with *Salex exidua* (coyote willow), and *Phalaris arundinacea* (reed canary grass) along elevations corresponding to higher river flow levels. *Xanthium strumarium* (cocklebur) grows among the willows and in sandy deposits near bankfull.

FIGURE 9: *PHALARIS ARUNDINACEA* (REED CANARY GRASS)

Phalaris arundinacea (reed canary grass) grows in open areas and on more developed soils of floodplains. It is extremely aggressive and often forms persistent, monocultures in wetlands and riparian areas. Infestations threaten the diversity of these areas, since the plant chokes out native plants and grows too densely to provide adequate cover for small mammals and waterfowl. Once established, reed canarygrass is difficult to control because it spreads rapidly by rhizomes. (Washington State Department of Ecology)

FIGURE 10: CAREX NUDATA (TORRENT SEDGE) NEAR BURNT RANCH ON THE JOHN DAY RIVER

Carex nudata (Torrent sedge) association is abundant along all the forks of the John Day River. Torrent sedge plants are scattered along the lower John Day River but rarely form large groups. Sites are bouldery stream banks and narrow alluvial bars adjacent to the banks of streams with well developed point bars. Asters, field mint, spring bank clover, horsetails, and hairy willow-herb are scattered at low abundance among the boulders. The sedge plants grow on top of boulders with their root masses sitting in the stream most of the growing season.

Leymus cinereus Association (Great Basin wildrye) Association is commonly found in swales and at the base of alluvial fans and toeslopes in lower precipitation zones. Soils are generally deep and fine-textured and have moderate water holding capacity. Sites are moist to wet in the spring and moist to dry by mid summer. Great Basin wildrye dominates the site. Other herbaceous species and occasionally shrubs are minimal.

Celtis laevigata var. reticulata-Philadelphus lewisii (Netleaf hackberry-Lewis' mockorange) Association is found at low elevations along streambanks and high floodplains in high gradient, narrow with moderate sideslopes. This association grows in soils with high coarse fragment contents. Netleaf hackberry forms a scattered to dense tall shrub layer. Lewis' mockorange is a co-dominant feature. Blue elderberry and oceanspray occasionally occur alongside the hackberry and mock orange. In the planning area, this association occurs along streams and rivers and where talus slopes meet the river.

FIGURE 11: *ALNUS RHOMBIFOLIA* (WHITE ALDER) IN PINE HOLLOW

Alnus rhombifolia/Cornus sericea ssp. sericea (White alder/Red-osier dogwood) Association. This association occurs mainly on the lower elevation streams of the Blue Mountains Ecoregion and sporadically in the Columbia Basin Ecoregion. Sites are streambanks and floodplains along cobbly pool/riffle streams. Valleys are north-facing, moderate gradient, narrow with moderately steep sideslopes. This association is probably the result of a disturbance event such as intense flooding. White alder may form an open to dense canopy over red-osier dogwood, netleaf hackberry and Lewis' mockorange. Other shrubs may occur, including common chokecherry, elderberry, cascara, Wood's rose and currants. Herbaceous species are sparse. Upland vegetation types adjacent to sites are sideslopes of sagebrush steppe, Idaho fescue and bluebunch wheatgrass.

FIGURE 12: *ALNUS INCANA / CORNUS SERICEA* (MOUNTAIN ALDER / REDOSIER DOGWOOD) ASSOCIATION ON DEER CREEK

Alnus incana / Cornus sericea (Mountain alder / redosier dogwood) association is found at moderate elevations in the Blue Mountains Ecoregion. It occurs in V-, box or trough-shaped valleys with moderate gradients. It grows on streambanks, alluvial bars, and

floodplains. Soils are shallow, skeletal, mineral alluvium over waterworked gravel and cobbles that remains wet throughout the growing season. In the planning area, this association occurs at higher elevations than the White alder association. This community is a closed canopy with an 8 to 10-foot tall shrub thicket of mountain alder and redosier dogwood. Either shrub can be dominant but both always contribute significantly to total cover. Mountain alder can appear as a tree above the redosier dogwood in some areas. This association usually contains a shorter, sparse shrub layer of Wood's rose and golden current with white clematis draped among the branches.

FIGURE 13: MIXED RIPARIAN SHRUBS ON COUGAR GULCH

Salix amygdaloides (peachleaf willow) association occurs on open, sites with little shade. The understory consists of white clematis and patches of smooth brome and common horsetail. Peachleaf willow is a rapidly growing, short-lived medium-sized deciduous tree that is typically from 20 to 40 feet tall. Peachleaf willow is an early successional species which pioneers floodplain alluvium. Peach leaf willow is found along the lower reaches of the South Fork John Day and in rangeland streams.

Juncus balticus (Baltic rush) association The JUBA community type is widespread. It is found at moderate elevations in moderately wide, low gradient, trough- and flat-shaped valleys with gentle to moderate side slopes. Sites are dry to wet basins, floodplains, and springs. Most of the soils are fine textured and have high water holding capacity. This associate occurs in lower gradient, depositional reaches of the planning area streams. Most sites are flooded during the spring and early summer. The water table drops late in the growing season. Baltic rush cover ranges from 20-99%. Other herbaceous species found in this association include Woolly sedge (*Carex pellita*), Nebraska sedge (*Carex nebrascensis*), and Slender-beaked sedge (*Carex athrostachya*). This is a common association in the lower gradient reaches of tributaries in the North Fork John Day planning area.

Riparian Key Features

Aspen and cottonwood forest woodlands historically occur across large portions of the planning area. Historic photos show large riparian forests near Dayville and at Clarno which have vanished. Major causes of decline of black cottonwood stands in eastern Oregon include: conversion of stands for pasture, farmland, or urbanization, conversion of streams from multiple to single channel systems, and restriction of lateral movement of streams across floodplains. Overbrowsing by livestock, elk, and deer, reduced fire frequency, and logging for firewood have also had impacts.

Cottonwood deserves special consideration in the discussion of riparian vegetation. Many cottonwood stands have declined in the area. Streamside black cottonwoods contribute to favorable aquatic habitat by providing streambank stability and reduced siltation, maintaining low water temperatures through shading, increasing debris recruitment for variable stream habitats, and providing nutrient-rich litter for aquatic food webs. Black cottonwood is an important source of cover for wildlife and livestock.

Along BLM streams in the Middle and North Fork subbasin, 11 small segments were found to contain an occasional relic cottonwood tree: Matlock, Stony, Rush, West Fork Boneyard, Cabin, Ditch, Squaw, Graves, Mallory, unnamed tributary to Mallory, and an

unnamed tributary to Little Wall Creek from the east. The South Fork John Day River drainage has relic areas of aspen and cottonwood communities along the mainstem. Relic areas on the tributaries are being encroached by surrounding conifers. In the Lower subbasin, relic areas are scattered and include portions on Long Hollow and Hay Creek. Native cottonwood stock is grown at Clarno. Outplantings have been successful along tributaries such as Bridge Creek and along the mainstem John Day River near Clarno.

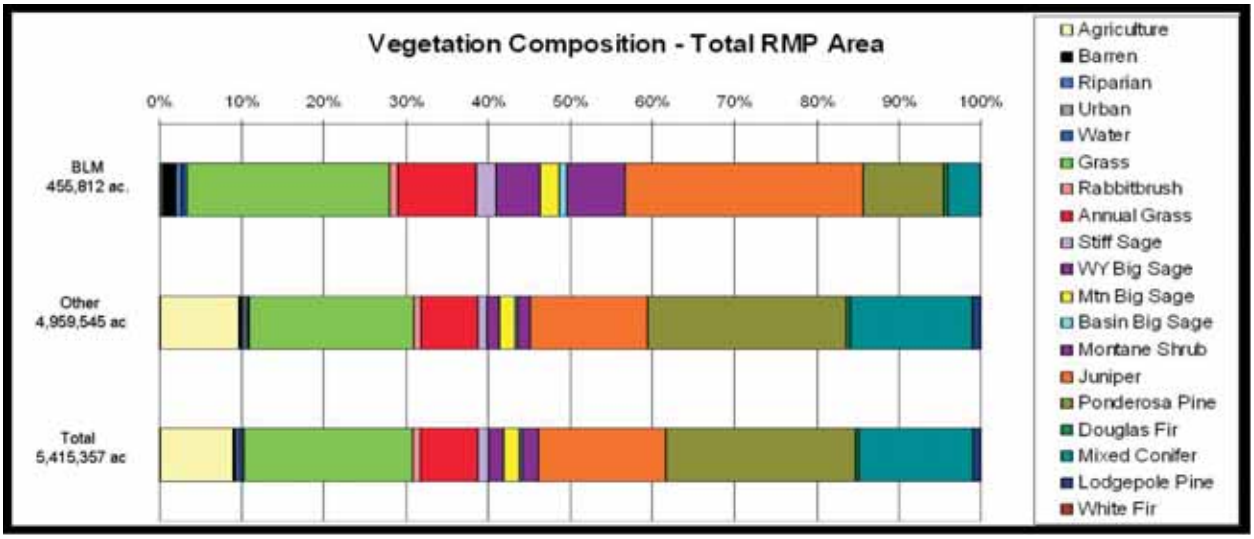
Generally aspen occupy moderate, mid-elevation slopes as small, scattered stands in the mixed conifers of Douglas-fir and ponderosa pine (3000 to 5000 feet.). A few Aspen woodlands appear in riparian zones at lower elevations, In the Middle and North Fork Subbasin BLM land, aspen was found on only three small tributaries (West Fork of Boneyard Canyon, No Name Creek and South Tributary to Little Wall Creek). The aspen were decadent or suppressed and occurred on small alluvial valleys or on the edges of down cutting meadows. None of the stream reaches containing aspen are in functioning condition, and some have a downward trend.

Terrestrial Vegetation

Terrestrial Vegetation within the planning area reflects a range of conditions represented by the many Subecoregions within the planning area. The following text describes the primary non-riparian vegetation communities found within the planning area. The BLM's understanding of the distribution of terrestrial vegetation types is based on remote sensing data collected in 2004 and 2005.

Figure 4: Vegetation Composition, displays existing proportions of major vegetation groups within the 5.5 million acres of the planning area. Percent compositions are for lands managed by the BLM, lands owned/managed by private owners or other government agencies. Of note is the larger percentage of BLM land with riparian, shrub species, and juniper habitats. Other land ownerships have higher percentages of agriculture (Private) and forest species (Primarily Forest Service). Because the BLM manages less than 10 percent of the planning area the proportions of the groups managed by the BLM barely influences the proportions for the entire planning area. Vegetation conditions and trends by major plant communities will be addressed in more detail below.

Figure 14: Vegetation Composition



Palouse Prairie

The Columbia Plateau Ecoregion of northeastern Oregon and southeastern Washington is an elevated plateau containing considerable area of open palouse grassland that remains unfarmed because of thin soils and a short growing season. North central Oregon has the largest area of remaining true palouse prairie (Holechek, 1989 pg. 87)

Disturbance

The fire return interval for sagebrush and bunch grass is estimated at 25 years. The native bunchgrass habitat apparently lacked extensive herds of large grazing and browsing animals until the later 1800s. Burrowing animals and their predators likely played important roles in creating small-scale patch patterns (Johnson and O'Neil, 2001 pg. 49). Typical patch sizes were large with maximum fire sizes of 10,000 acres and an average of 1,000 acres (Landfire BPS 081142 – Draft, 2006).

Conditions/Influences

The Palouse prairie, also referred to as the northwest bunchgrass prairie, has had the highest percentage conversion into farmland of all western range types. The Palouse is one of the most endangered ecosystems in the U.S. with only 1% of the original habitat remaining; it is highly fragmented with most sites <10 acres (Johnson and O'Neil, 2001 pg. 49). Today it is used primarily for wheat production (Holechek, 1989 pg. 87). Blue Bunch wheatgrass and Idaho Fescue, the two primary bunch grasses in this type are decreasers under heavy grazing pressure. Additionally historic over grazing and the increase of nonnative annual grasses such as cheat grass and Medusa head have altered fire return intervals and effects. Figure 14 shows the amount of agricultural conversion.

Trend

Since 1900, 94% of the Palouse grasslands have been converted to crop, hay, or pasture lands (Map 6) (Johnson and O'Neil, 2001 pg. 491). Over-grazing and expansion of nonnative annual grasses and noxious weeds will continue to be a management concern.

Early seral communities dominated by nonnative annual grass stands are in a relatively stable state. These sites are not expected to return to native communities within the next 50+ years without active management intervention.

Shrub Steppe

The shrub-steppe plant community occurs in lower elevations of the Blue Mountain Ecoregion and valley terraces and steeper slopes of the Columbia Plateau Ecoregion. Although western juniper can occur on these sites, fires at 10 – 20 year intervals relegated juniper to a subordinate position in the community or eliminated it altogether.

Disturbance

Drier low sagebrush sites averaged 87 year fire return intervals with replacement fires occurring every 227 years (BPS – 081127 and 091079 Draft 2006). Tall sagebrush sites averaged 20 year fire return intervals with replacement fires occurring every 90 years. Typical patch sizes ranged from 10 to 2,000+ acres (BPS – 091125, 081125, and 081080 Draft 2006). Burrowing animals and their predators likely played important roles in creating small-scale patch patterns (Johnson and O'Neil, 2001 pg.51).

Conditions/Influences

Shrub steppe communities were historically a small component of the Columbia Plateau Ecoregion. Patch sizes were smaller and typically tied to micro sites with Wyoming and Mountain sagebrush found on slopes and benches with deeper soils and low and ridged sagebrush on shallower rocky soils. Shrub steppe communities in the Blue Mountain Ecoregion were more extensive. The combination of fire control and historic grazing management has allowed juniper expansion and reduced the quantity and vigor of understory species. Many of these sites have been invaded by nonnative annual grasses or noxious weeds.

Trend

Quigley and Arbelbide concluded that Big Sagebrush and Mountain Sagebrush cover types are significantly smaller in area than before 1900, and that Bitterbrush/Bluebunch Wheatgrass cover types are similar to the pre-1900 extent. More than half of the Pacific Northwest shrub-steppe habitat community types listed in the National Vegetation Classification are considered imperiled or critically imperiled (Johnson and O'Neil 2001 pg. 51). Without active management or a change in fire control standards juniper expansion is expected to continue to invade these communities and decrease the shrub and grass components.

Numerous areas have been converted to annual grass dominated sites (Map 6) with expected trends being the same as those described in the Palouse Prairie described above.

Western Juniper Steppe

Western juniper steppe is predominantly found in the Blue Mountain Ecoregion and drainages (particularly north aspects) of the Columbia River Ecoregion.

Disturbance:

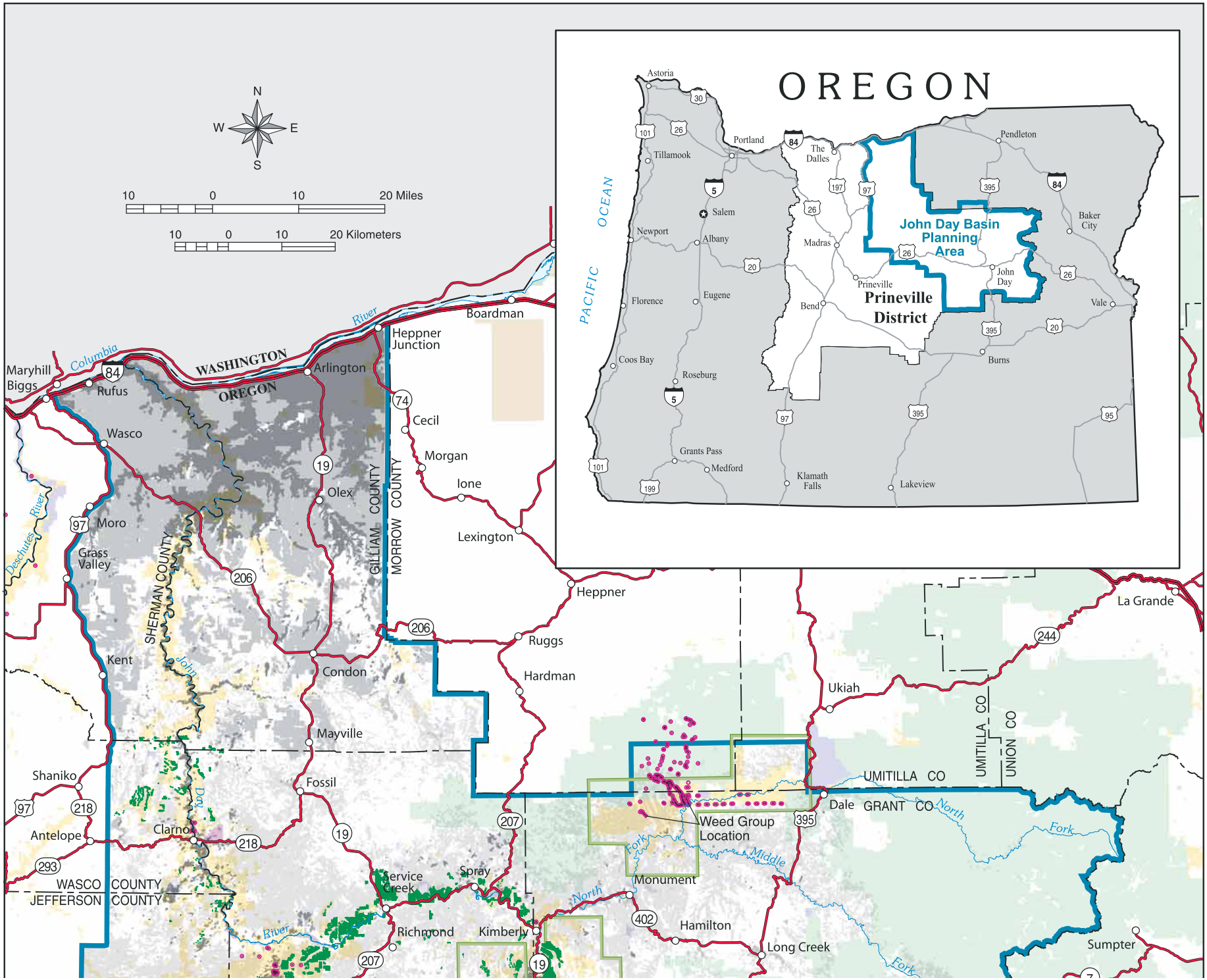
The presence of old growth stands of western juniper on rocky ridges and along small stream channels is probably a function of the protection afforded by those sites (Burkhardt and Tisdale, 1976). Typical patch sizes ranged from 100 to 10,000 acres (BPS – 091017 Draft 2006). Map 6 displays "old growth" potential and current juniper population extent.

Conditions/Influences

Over the past 150 years, with fire suppression, overgrazing, and climatic factors, western juniper has increased its range. Inland Woodlands are significantly greater in extent than before 1900 (Miller, 1999). As these sites become dominated by juniper understory species cannot thrive and in their absence natural fire can burn through these stands only under the most severe conditions.

Trend

Given the current fire control policies it is expected that without active intervention juniper will continue to expand. The majority of juniper within the analysis area became established within the last 100 years. The majority of these stands are reaching a state where juniper dominance is beginning to alter understory conditions. In the last 10 years private land owners and the BLM have begun to control juniper densities.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Astoria
Portland
Tillamook
Pendleton
The Dalles
Salem
Albany
Newport
Madras
Baker City
John Day Basin Planning Area
Prineville
Prineville District
John Day
Florence
Eugene
Bend
Vale
Coos Bay
Roseburg
Burns
Grants Pass
Medford
Klamath Falls
Lakeview
Columbia River
WASHINGTON
OREGON
Maryhill
Biggs
Rufus
Wasco
Arlington
Boardman
Heppner Junction
Cecil
Morgan
Ione
Olex
Lexington
Moro
Grass Valley
Deschutes River
SHERMAN COUNTY
GILLIAM COUNTY
MORROW COUNTY
Heppner
Ruggs
Hardman
Kent
Condon
John Day
Mayville
Fossil
Shaniko
Antelope
Clarno
WASCO COUNTY
JEFFERSON COUNTY
Service Creek
Spray
Richmond
Kimberly
Monument
Hamilton
Long Creek
Ukiah
La Grande
Sumpter
UMATILLA CO
UNION CO
UMITILLA CO
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North Fork Middle Fork
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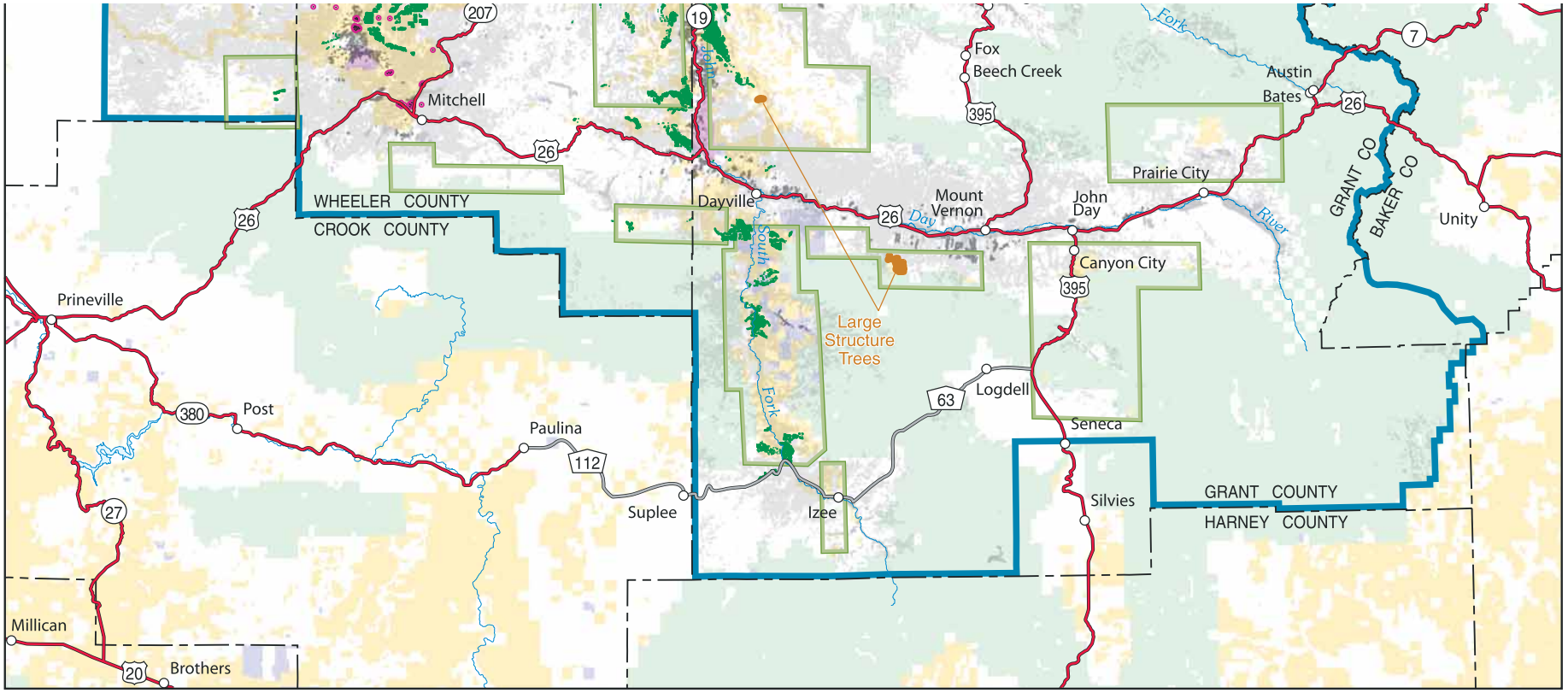


LEGEND

- Large Structure Trees
- Known Weed Location (incomplete coverage)
- Timber Management Unit
- Potential for Old Growth Juniper
- Juniper Expansion
- Agriculture
- Greater then 25% Annual Grass
- Planning Area Boundary

Administered Land

- Bureau of Land Management
- Forest Service
- John Day Fossil Beds National Monument
- Other Federal
- State
- Private or Other

U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management

PRINEVILLE DISTRICT

John Day Basin Resource Management Plan

2006

M06-09-01:11-15-06

Map 6: Key Vegetation Elements

Dry Forest (Ponderosa Pine, Mixed Conifer, Douglas Fir)

The majority of forest vegetation occurs within the Dry Forest vegetation group (receives 12-17" of precipitation annually). Dry forests are defined as forests that were historically open and supported widely spaced large ponderosa pine, western larch, and Douglas-fir in the overstory with little underbrush and only occasional clumps of smaller trees. These plant communities occur primarily in higher elevations and drainages of the Blue Mountain Ecoregion.

Disturbance:

The mean fire interval ranges from 48 years in drier pine sites, 6 years in moister pine sites, and 20 years in mixed conifer sites with replacement fires in all groups occurring in the 130 year range (BPS – 081053x, 081053m, and 081045 Draft 2006). Insects and disease created small openings and altered stand structure with some agents targeting overstory trees and others thinning understory trees. Typical patch sizes: Small openings (<2 acres) emulate spots created by low intensity fire, root rot, pockets, or insect disturbances.

Conditions/Influences:

Forest stands in dry forest climates are generally limited by low moisture and are often subject to drought. Dry forests can also be affected by limited nutrients and/or competition stress. Fire suppression has allowed understory densities to increase with a corresponding species shift to more shade tolerant species. These vegetative communities were also historically logged in a manner that removed the large tree component. Many of the remaining large trees are being stressed by understory competition and subject to higher risk of insect and disease, stand replacement fire, and drought. Stands of large diameter ponderosa pine with an open understory are one of the most limited conditions in the Columbia Basin. Many of the pure ponderosa pine stands have been converted to mixed conifer stands with understories of Douglas fir and white fir. In addition, the vegetation inventory shows that slash loads range from 5-80 tons per acre. The average slash load range is 20-30 tons per acre. This is much higher than the John Day RMP recommended limits of 12-15 tons per acre. "With heavy ground fuels and high tree densities, these dry forests are now much more likely to have severe fires". (USDA FS Science Update, p.5, Sept., 2002)

The majority of forest stands within this planning area contain a large tree component; however stands are not dominated by large trees (Vidourek, 2005). This can be attributed to the fact that past green tree management projects did not remove 30-50% of the healthy large trees on site. However, there are few stands that are primarily composed of large trees. Basal areas ranging from 80-400 square feet per acre were identified during the forest vegetation inventory (Vidourek, 2005). The average basal area across the planning area is 160-200 square feet per acre.

Trend

As a result of this trend of high basal areas, trees have become stressed and are succumbing to insects and diseases. (Vidourek, 2005) Insect populations have reached epidemic populations in scattered stands across the planning area. As the trees die and fall to the ground the stands are accumulating excessive slash loads and becoming more susceptible to wild fires.

"A large number of mixed conifer stands in the Blue Mountains have been severely damaged by a variety of insects and diseases, compounded by protracted drought, overstocking, and inappropriate past management." "Additionally, large areas in the ponderosa pine type are drastically overstocked and in imminent danger of a bark beetle population buildup and resultant epidemic." (Schmitt and Scott, 1993) Insect populations throughout the planning area are spreading each year. Due to passive forest management over the past nine years, insect disturbances are being left unchecked. As a result, many forest stands are losing trees including the larger size trees that were left for seed sources during past management treatments. "Once an outbreak begins, beetles select the largest trees in a stand. The natural resistance of trees and stand to attack by mountain pine beetles decreases as age and competition increase". (Blue Mountain Forest Health Project, 1991 p.46) "When bark beetle mortality reduces stand density in unthinned stands, some of the best trees are lost, and the mortality often occurs in clumps, resulting in uneven distribution of growing space among remaining trees". (USDA-FS, PNW-RP-508, 1999)

Currently large diameter components of these communities are at high risk of increased mortality.

Moist Forest (Mixed Conifer, Douglas Fir, White/Grand Fir and Lodgepole pine)

Some of the forest stands are pure or single species stands, but the majority are mixed stands to varying degrees. In general these communities occurred in large stands; however ponderosa pine and Douglas Fir occur as isolates and stringers associated with drainages. The Viable Ecosystem Guide developed by the Ochoco NF recommends – forest stands that are contiguous and at least 1,000 acres in size. Small openings (<2 acres) emulate spots created by low intensity fire, root rot, pockets, or insect disturbances. Large patches (500+ acres) simulate large stand replacement fires. These openings occurred at 70-200 year intervals (USDA Viable Guide, 1994 pg. 47 and 31).

Lodgepole Pine – The ecological status of lodgepole pine is typically that of a pioneer or invader species and is normally seral to other tree species such as ponderosa pine grand fir, or Engelmann spruce. It thrives on disturbance and can establish quickly in an area ravaged by fire, windthrow, insects or disease. This short lived species is dependent on disturbance for its regeneration, health and vigor with a fire return interval of 80 -100 years (BPS – 091050, Draft 2006).

Disturbance

In moister areas including riparian associations stand densities may reach levels where insect and disease episodes had localized effects to stand dynamics including the removal of the largest trees. Dwarf mistletoe could be significant in those stands where their host species are abundant. Dwarf mistletoe alters stands by killing heavily infected overstory and restricting development of host understory trees. Fires were probably of moderate frequency (30-100 years) in presettlement times. Typical stand-replacement fire-return intervals are 150-500 years with moderate severity-fire intervals of 50-100 years. Generally, wetter sites burn less frequently and stands are older than drier sites (Johnson and O'Neil, 2001 pg. 33). Hall (1976, 1980) estimates that natural under burns occurred every 10 years in drier sites of the Blue Mountains. Stands which occur on mid and upper slope positions had more frequent fires than stands in a toe slope or lower slope position (USDA Viable Guide, 1994).

Conditions/Influences:

The majority of these communities are overstocked with high levels of ground fuels. In addition, the vegetation inventory shows that slash loads range from 5-80 tons per acre. The average slash load range is 20-30 tons per acre. This is much higher than the John Day RMP recommended limits of 12-15 tons per acre. "With heavy ground fuels and high tree densities, these dry forests are now much more likely to have severe fires". (USDA FS Science Update, p.5, 2002). Historic over logging of the large diameter trees has left an overabundance of pole and small log size classes.

Trend

Many of these stands have a high risk of stand replacement fires, insect loss, and loss of large tree components due to competition stress.

Unique Features

Riparian associations in the drier areas of the Columbia Ecoregion provide unique diversity.

- Palouse Prairie communities in the Lower John Day provide key habitats for Sensitive species and are some of the last remaining in the Columbia Basin.
- Two unique areas exist for the forest vegetation. Both contain the oldest and largest trees within the planning area. One is located in Timber Basin (less than 500 acres) at the south base of Rudio Mountain and the other is isolated near the north face of Aldrich Mountain (Big Canyon Creek- approximately 1100+ acres). The Timber Basin size was reduced significantly by the Timber Basin wildfire in August, 2000 (See Map 6). Both areas are similar and are the closest resemblance of a stand exhibiting some old multi-story forest characteristics. They have some trees (ponderosa pine and Douglas fir) in excess of 40 inch DBH in the overstory and both have an understory of mixed conifers (both shade-tolerant and shade-intolerant).
- Old growth juniper stands associated with rocky rims along the main stem of the John Day River north of Picture gorge.
- Aspen and black cottonwood stands associated with the main stem, North, South, and Main stem of the John Day River, drainages, and springs.
- Western Larch communities require a unique set of disturbance conditions to become established. Currently population levels are declining.

Regional Context

Vegetation patterns and trends within the planning area are generally consistent with findings in ICBEMP (Jones, and Hann, 1996) and other regional reviews which included:

- Overall, an increasing trend of forest cover types dominated by shade-tolerant species that are generally more susceptible to fires, insects and pathogens, and a declining trend of forest cover types dominated by shade-intolerant species that are more resistant to fire, insects, and pathogens.
  Significant increases of grand fir/white fir, and Interior Douglas-fir were observed.
- The large tree (>20"dbh) component is believed below historic levels.
- Pole-sized seral/structural stages are found in greater abundance than at any time during the last several hundred years.
- Increases of the croplands and grand fir/white fir cover types, and declines of the fescue bunchgrass and Interior ponderosa pine types.
  Agricultural conversion of 46 percent of the big sagebrush, 79 percent of the Agropyron bunchgrass, and 91 percent of the fescue bunchgrass cover types.
- Conifer and juniper expansion into shrubland habitats was the predominant factor

responsible within 46 percent of the subbasins in which the upland woodland community type occurred above its historical range. (Jones, Hessburg, Smith, 1996).

Western juniper woodlands in eastern Oregon with more than 10 percent canopy cover increased from 456,000 acres in 1936 (Cowlin et al., 1942) to 2.2 million acres in 1988 (Gedney et al., 1999). In much of its range, western juniper has increased the area it occupies by an estimated 10-fold in the past 130 years (Miller et al., 1999a).

- The introduction of European annual grasses has drastically altered disturbance regimes, moisture and nutrient capture capabilities, and habitat suitability.
- Significant declining trends of cottonwood/willow, Interior ponderosa pine, and western larch were observed.
- Fragmentation of landscape patterns of subwatersheds within the Blue Mountains and Columbia Plateau increased between historical and current periods.
- The greatest fire regime changes are associated with the dry forest vegetation types, such as ponderosa pine and Douglas-fir, and in shrub lands, such as mountain big sagebrush and big sagebrush. Fire severity has increased in all of these vegetation types. Fires have become less frequent (due to fire suppression) and more severe. Non-lethal fire regimes have become mixed-severity (a combination of stand-replacing and non-lethal fire effects) fire regimes and mixed severity fire regimes have become increasingly stand-replacement fire regimes. Mixed-severity and stand-replacement fire regimes are extensive.

Special Status Plants

Special status plants include those species listed by BLM as “Bureau Sensitive” and “Bureau Assessment” (BLM OSO, 2006) as well as plants listed by either the federal or state governments as “endangered” or “threatened.” (ONHIC, 2004) Plants so designated include species that are rare or uncommon, and face possible extinction or endangerment throughout all or a significant portion of their range (or within the State of Oregon), and for which special consideration and/or management is needed. Appendix A lists special status plants documented or suspected within the planning area. There are no federally-listed Endangered or Threatened plants known or suspected within the planning area.

These plants occupy small, usually isolated and scattered sites across the planning area, although four main locales have a greater site density: the Lower John Day River south of Cottonwood Bridge; the South Fork of the John Day River, BLM lands between Service Creek and Kimberly; and the Sutton Mountain area.

Of the five species known to occur on BLM lands within the planning area, two (South Fork John Day milkvetch and arrow-leaf thelypody) are endemic to the John Day Basin and the BLM plays an important part in their conservation. The hepatic monkeyflower is found only in Oregon (historically from Washington as well) with the majority of its known sites in the John Day Basin. Oregon sites of the dwarf evening-primrose, known also from eastern Washington and Idaho, are found predominantly in the John Day Basin as well.

Special status plant sites on BLM lands in the John Day Planning Area are generally in stable condition. Of the 108 sites referred to in Appendix A, 73% are stable, 7% are in downward trend and 1% in upward trend. The remaining 19% have not been assessed and therefore trend has not been determined. Assessment is accomplished through periodic monitoring visits which include counts of plants on site and a qualitative evaluation of their vigor, reproductive status and apparent threats.

Isolated downward trends appear to be the result of natural causes, such as long-term drought, soil slippage and flooding. Unless determined to be caused by natural phenomena, downward trends may be corrected through changes in management. Some examples of this could be implementing a change in livestock use, closures of roads and/or trails, removal of competing vegetation, weed control, fire treatment, and similar management prescriptions.

Only one site, for which there is an apparent downward trend, requires a change in the management of the site, and this is related to the need for a small, site-specific livestock exclusion fence.

Due to the inaccessible and/or inhospitable habitat occupied by the dwarf evening-primrose, hepatic monkeyflower and South Fork John Day milkvetch, it is unlikely these species have ever been more numerous or in better condition than they are today. However, the arrowleaf thelypody and porcupine sedge occupy riparian and related habitat, much of which has been altered since European settlement. Remaining sites are mostly in areas relatively inaccessible to livestock.

Of those species listed in Appendix A, only Laurence's milkvetch is likely to have occurred on BLM land within the John Day Basin and has since been extirpated from Public Lands. Sightings have not been recorded since the 1950s.

Special status plants contributed to the finding that botanical values are an outstandingly remarkable value of the John Day River, resulting in its designation as a Wild and Scenic River. The South Fork John Day milkvetch is found in Segment 10 and is suspected to occur in Segment 11. Arrowleaf thelypody, is found within Segments 3, 4 and 6 and is suspected to occur in Segments 10 and 11. Hepatic monkeyflower is found on moist rock walls in Segment 2 and is suspected to occur anywhere there are moist cliffs, particularly on the lower river.

Noxious Weeds

Noxious weeds and expansion of some native species (e.g., juniper) are increasing problems within the John Day Basin (BPA 2005). The rapidly expanding occupation of the John Day Basin by noxious weeds represents the single greatest threat to native rangeland biodiversity and recovery of less-than-healthy watersheds (Ditomaso, 2000). The initiation and spread of noxious plants have been furthered by human disturbances such as recreational use, grazing management, and fire suppression. Native bunchgrasses have been depleted in many areas as the range of the western juniper (Juniperus occidentalis) expanded. Exotic annual grasses such as cheatgrass and medusahead have filled the niche formerly occupied by the perennial grasses.

"Noxious" is a legal classification rather than an ecological term. Plants that can exert substantial negative environmental or economic impact can be designated as noxious by various government agencies. Noxious weeds affect livestock grazing, recreation, timber production, and wildlife and scenery viewing by displacing native plant species and lessening natural biological diversity; degrading soil integrity, nutrient cycling, and energy flow; and interfering with site-recovery mechanisms, such as seed banks, that allow a site to recover following disturbance (Quigley and Arbelbide 1997).

The weeds causing the most concern in the John Day Basin are diffuse, spotted and Russian knapweeds (Centaurea stoebe), Dalmatian toadflax (Linaria dalmatica), yellow star-thistle (Centaurea solstitialis), perennial pepperweed (Lepidium perfoliatum), leafy

spurge (Euphorbia esula), tamarisk (Tamarix), Scotch thistle (Onopordum acanthium), purple loosestrife (Lythrum salicaria), rush skeletonweed (Chondrilla juncea), leafy spurge (Euphorbia esula), white top (Cardaria draba), wavyleaf thistle (Cirsium undulatum), puncturevine (Tribulus terrestris), poison hemlock (Conium maculatum), and medusahead rye (Taeniatherum caput-medusae). Weeds of special concern are those beginning to occupy very small niches with just a few plants along the high water lines, and small patches on islands (mainly diffuse knapweed and Dalmatian toadflax) that could spread very rapidly. Also, small infestations of Russian knapweed and dalmatian toadflax are becoming more prevalent on the upper, sheltered alluvial flats. This is especially noted on almost all riparian zones below the confluence of Thirtymile Canyon at RM 84, but a few plants of purple loosestrife and rush skeletonweed have also been found and hand pulled. In the Clarno area, medusahead rye is common on the west side of the river to the north and south of Highway 219, in previously burned areas. It is also prevalent in the Murderer's Creek drainage and in clay soils across the basin. Diffuse knapweed is found along the road right-of-way, south of Clarno. Russian knapweed is also very prevalent in the Clarno and Bridge Creek areas, and has also been found in many very small patches along the river almost always on the upper alluvial flats. Dalmatian toadflax is also found on these flats and is beginning to move up slopes in a few spots, especially below Thirtymile Canyon. Chemical control of Dalmatian Toadflax in the John Day River system is quite difficult where access is limited. The thistles (Scotch, bull and Canada) and poison hemlock are found most commonly at the small tributaries near and in riparian areas. Yellow starthistle has been found in several locations in the Clarno area and is especially prevalent in the upper Bridge Creek area near Mitchell. It is also prevalent near the Columbia River at Biggs and Horn Butte.

The BLM Prineville District coordinates weed prevention, detection, and control efforts with the local County Weed Boards, ODA, ODOT, National Forests, local Soil and Water Conservation Districts, as well as private land owners and neighborhood community groups. The BLM's Partners Against Weeds Strategic Plan highlights cooperative partnerships to control and manage invasive and noxious weeds. BLM is a partner in the Bridge Creek Cooperative Weed Management Areas. The BLM has six agreements with the counties in the planning area. The BLM uses these partnerships to combat invasive weeds and conduct inventories.

Hydrology

Stream Channels and Floodplains

BLM manages land and water in 146 different watersheds in the planning area. The planning area includes 28,000 miles of streams including:

- Ephemeral streams which do not flow during an average water year but do flow in response to large precipitation events.
- Intermittent streams which flow during spring runoff of an average water year, but generally dry up later in the summer.
- Perennial streams which flow some water all year of an average water year.

One third of planning area streams are ephemeral, half are intermittent, and the remainder are perennial.

Figure 15 illustrates that BLM manages approximately 1600 miles of intermittent and perennial stream channels within the plan area.

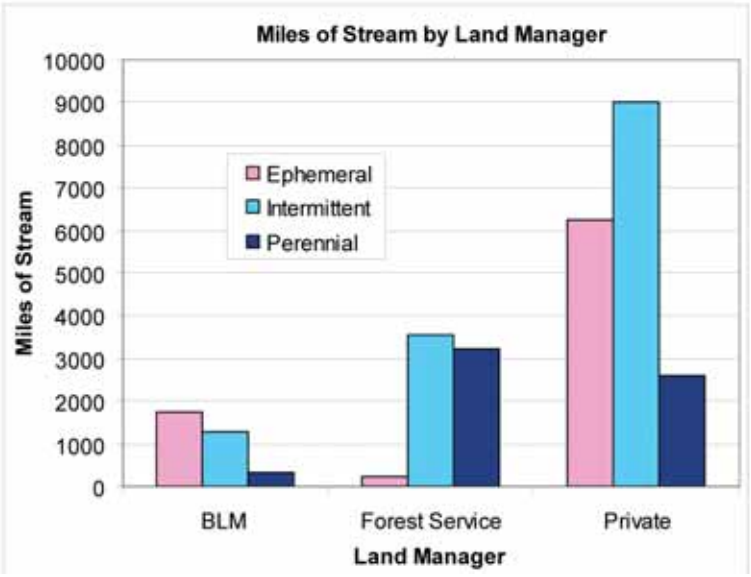


FIGURE 15: MILES OF STREAM BY LAND MANAGER

The majority of the perennial stream channels in the plan area occur on National Forest Lands while private land owners own the majority of the intermittent and ephemeral stream channels. This distribution of stream ownership is largely due to the elevation of subject lands across the planning area. The Forest Service manages the headwater reaches and high elevation areas. These areas receive the highest precipitation levels from snow and produce the majority of the water for the planning area. Private land ownership generally lies downhill from Forest Service, but also centers around good perennial water sources that were important when the area was settled. The BLM manages many bottomlands and dry upland hill slopes. Overall, BLM managed land receives the least amount of precipitation of the three major ownerships, about 7 percent. Most of the snowmelt has been funneled into scattered perennial streams and major rivers by the time the water flows down to BLM land. Although BLM ownership is the smallest of the three major landowners, BLM manages many miles of large streams, rivers and floodplains with diverse public values.

Stream channels and flood plains are important because their shape and condition affect how rapidly water flows through a river system how much water is stored within the basins, how clean the water is, and how much erosion occurs. These functions in turn affect fish and wildlife habitat, agriculture, recreation and the susceptibility of local communities and landowners to floods.

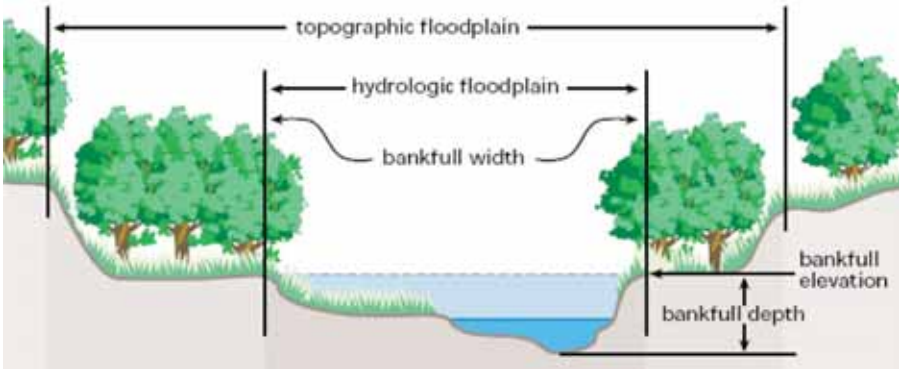


FIGURE 16: STREAM CHANNEL AND FLOOD PLAIN CONFIGURATION

Prior to disturbances such as grazing, mining, and farming initiated during European settlement, the planning area stream channels were generally well vegetated and had frequent interaction with their floodplains (Figure 16).

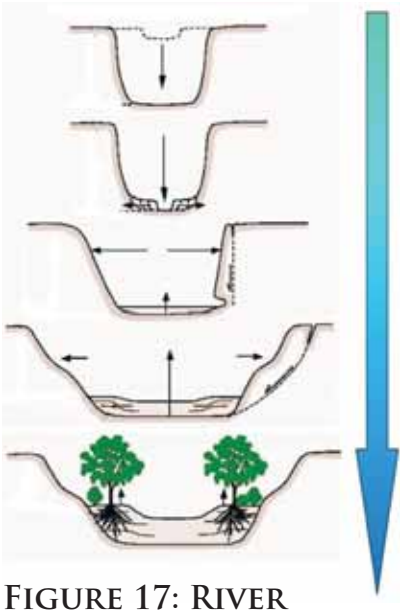


FIGURE 17: RIVER CHANNEL EVOLUTION

As early land management reduced the watershed cover overland flow of water increased and stream channels deepened to match the increased supply of water and sediment. Major flood events in the 1894 were the likely immediate cause of the deepening of the channels. Channel incisions eventually lead to bank failures and subsequent channel widening (see Figure 17). As channel widening and bank failures continued, a new low-flow channel begins to form in debris from bank failure. Many of the stream channels in the plan area were in this process of this initial buildup in the 1980s.

The result of this process is that the new channels are usually lower than the predisturbance channel, and the old floodplain now functions primarily as a terrace. Some terraces may be the result of climatic variations and the associated changes in flow and sediment supply. The final stage of channel evolution results in a new bankfull channel and active floodplain at a new, lower elevation. Many stream channels in the plan area have new, lower elevation channels and floodplains.

The BLM has adopted Proper Functioning Condition (PFC) assessment (USDI-BLM, 1991) as a standard for evaluating riparian areas and uses this to supplement existing stream channel and riparian evaluations and assessments. Streams and wetlands located on BLM managed land have been assessed for condition using the PFC methodology. The PFC assessment employs a consistent approach for considering hydrology, vegetation, and erosion/deposition attributes and processes (Prichard, et al., 1998). The assessment of the on-the-ground condition refers to how well the physical processes are functioning.

The majority of BLM stream channels and floodplains within the planning area are not meeting the BLM standard of Properly Functioning Condition (PFC). On the other hand relatively few steam channels are non-functioning. More intermittent stream channels are in non-functioning condition than perennial streams, but they also have more miles of stream at potential and Properly Functioning Condition. The condition of inventoried stream channels in areas managed by the BLM is displayed in Figure 18.

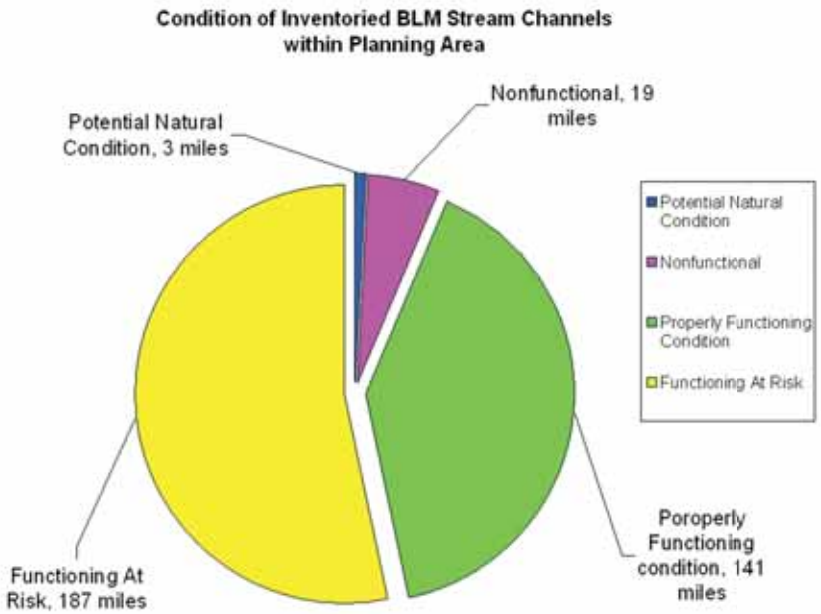
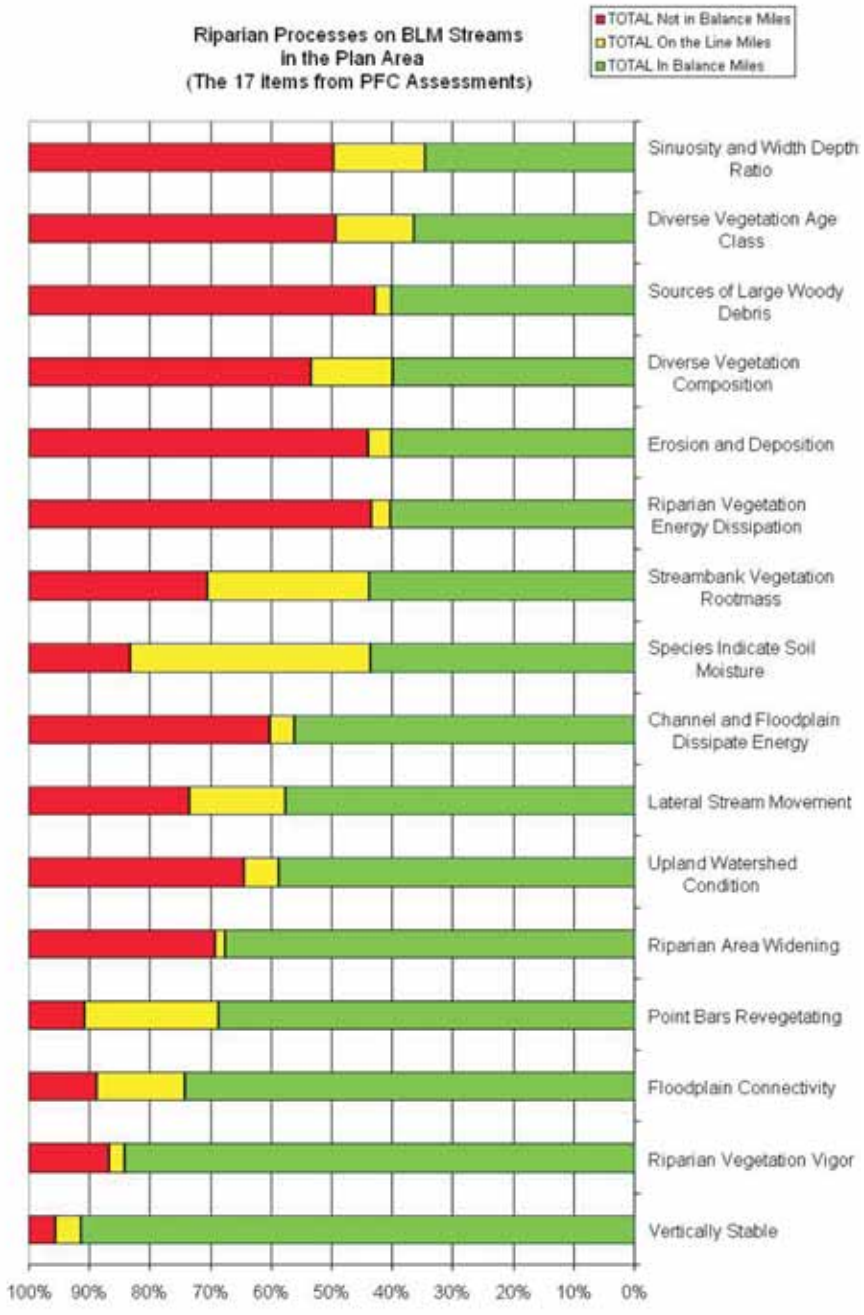


FIGURE 18: CONDITION OF INVENTORIED STREAM CHANNELS

Figure 19: Evaluation of Riparian Processes on BLM Streams



The physical function of stream channels is based on their hydrology, vegetation and erosion/deposition. These physical functions are captured in the 17 question checklist from the PFC inventory (see Figure 19). Figure 18 also summarizes the current condition of the physical stream processes in the planning area by miles of stream. The physical stream functions are in order from the least to greatest percentage of planning area streams in balance with the landscape.

The upper portion of Figure 19 illustrates two generalities about BLM stream channels. First, is the relative youth of restoration process in the planning area. Diversity in age class and composition of riparian areas and development of dense streambank root masses are rare. These functions require consistent management over an extended period, sometimes more than 100 years. A second general observation is the need to reduce stream energy, which can be achieved by restoring sinuosity and width to depth ratios. A majority of stream channels need time to recruit large wood and dense riparian vegetation.

The three processes in the mid portion of Figure 19 indicate that many streams are still actively aggrading and widening. Although streams are connected to new floodplains, many of these new floodplains are insufficient for dissipating stream energy. Insufficient time has passed for large wood and overflow channels to develop under the current system condition. Many upland watershed conditions are still contributing to elevated stream energy, inhibiting the achievement of channel equilibrium.

Physical processes including vertical stability, vegetative vigor, and flood plain connectivity are generally functioning across the landscape. There are currently more than 40 active head cuts, but most stream channels are vertically stable. Many channels, down cut during floods more than 100 years ago, and have reached a new equilibrium

or intercepted an erosion-resistant layer. Changes in riparian area management over the last 20 years have allowed growth of vigorous riparian vegetation and point bars are revegetating. Almost three-quarters of the stream channels have a floodplain above bankfull that is inundated relatively infrequently. Nevertheless, the floodplains are typically narrow and are just beginning to establish in the bottoms of incised and aggrading channels. As these floodplains establish, riparian vegetation should continue to widen.

Management across the planning area has emphasized riparian area restoration since the Two Rivers and John Day RMPs were signed. Since 1992, efforts to improve riparian habitat have benefited from prioritized aquatic and riparian habitat improvement. Management of timber, grazing, and road building have emphasized actions compatible with achieving an upward trend in stream channel and floodplain function. These measures have been effective to improving trend on BLM channels and floodplains. For example, 63 percent of at-risk riparian areas exhibited an upward trend at the time they were inventoried while only 9% of exhibited a downward trend.

In 2005 the condition of streams for which Properly Functioning Condition assessments have been completed was compared with condition of the same streams in the 1980 Inventory stream channel condition. The results of the comparison are displayed in Table 5.

It is apparent, from Table 5, that there has been a slight improvement in condition, but overall the stream channels are in Fair or At-Risk condition.

Key Features

Three stream channels have been identified as being at potential. They are an unnamed tributary to Rudio Creek off Miller Flat, an unnamed tributary to Franks Creek on Scott Creek allotment, and Marks Creek. Streams at potential are extremely rare. For the planning area, less than one percent of all inventoried BLM stream channels have been determined to be at potential. These areas provide important reference areas and provide bench marks for achieving desired conditions. These areas also serve an important function for wildlife that depend on conditions typical of a later seral stage.

Water Quality

Water quality accounts for the biological, chemical, and physical condition of a water body. Water quality is evaluated based on a water body's ability to support beneficial uses of the water. Generally key water qualities are those that support native fish and wildlife and support human uses such as agriculture, recreation, and domestic water supply.

Table 5: Stream Channel Conditions 1980s-2000s

1980 Inventory - 2000s Inventory Class	1980s	2000s
Poor - Non-Functioning	12%	5%
Fair - At-Risk	76%	74%
Good - PFC	12%	21%
Excellent - Potential	<1%	<1%

The Oregon Department of Environmental Quality (DEQ) monitors selected waterbodies for water quality. DEQ has analyzed water quality in the John Day basin between 1995 and 2004. Each site with sufficient data has been analyzed for general water quality. Table 6 illustrates that the majority of the John Day Basin major rivers have achieved a status of good or are in an upward trend.

Many streams within the planning area are designated as water quality limited under section 303d of the Clean Water Act. Section 303(d) requires that each state develop water quality criteria and delineate streams that fail to meet water quality standards. The 303d listed streams flowing through BLM managed land in the planning area are displayed in Map 7 and the specific parameters for listing and stream names are included in Table 7.

In general, the water quality concerns expressed for the planning area are similar to the surrounding region. For the John Day River Basin, as with the Columbia River Basin, the major water quality concern has been water temperature. These water temperature concerns correlate to the beneficial use of fish spawning and rearing habitat.

Conditions that affect stream temperature can be grouped as near-stream vegetation and land cover, channel shape, and hydrology; including humidity and air temperature (see Figure 20). Many of these conditions are interrelated and many vary considerably across the landscape. For example, channel width measurements can change greatly over even small distances along a stream. Some conditions vary daily and/or seasonally.

Removal of riparian vegetation and the shade it provides contributes to elevated stream temperatures (Rishel et al., 1982; Brown, 1983; Beschta et al., 1987). Channel widening can similarly increase the solar radiation load. The principal source of heat energy delivered to the water column is solar energy striking the stream surface directly (Brown 1970). Exposure to direct solar radiation will often cause a dramatic increase in stream temperatures. The ability of riparian vegetation to shade the stream throughout the day depends on vegetation height, width, density and position relative to the stream, as well as aspect the stream flows (streamside vegetation provides less shade on a north or south flowing stream than on an east or west flowing stream).

Table 6: Oregon Water Quality Index Status and Trends Summary (1994-2004)

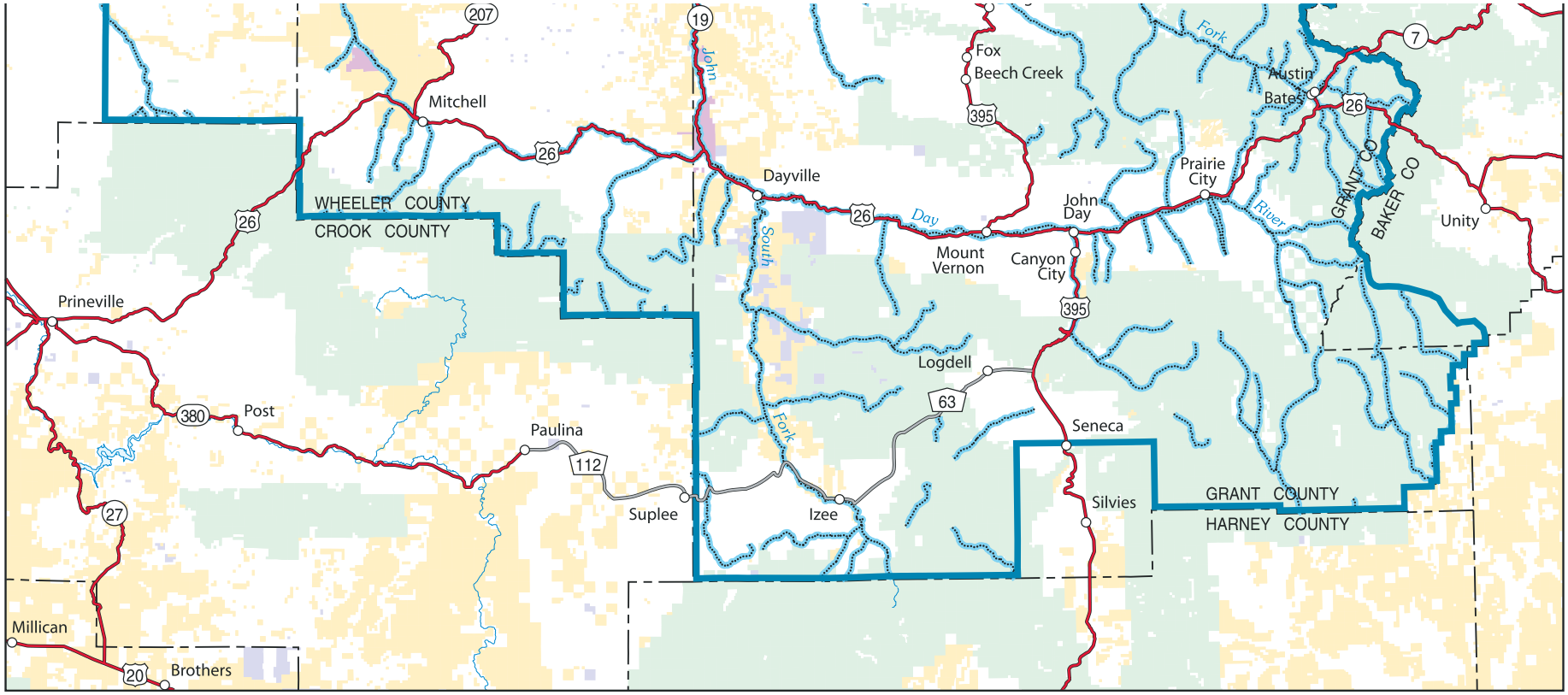
Major River Sites	At River Mile	Score out of 100	Category	Trend	Trend Magnitude
John Day River at HWY 206	39.5	80	fair	No Trend	
John Day River at Service Creek	157.4	85	good	No Trend	
North Fork John Day River at Kimberly	0.2	89	good	No Trend	
South Fork John Day River at Dayville	0.2	88	good	Improving	2.5
John Day River upstream of Dayville	215.4	83	fair	Improving	4.6

Table 7: Name of 303d Streams with BLM 2002 Listing

Parameter and Criteria for Listing

John Day River river mile 9.7 to 181.
Temperature for Rearing: 17.8 C
North Fork John Day River river mile 31.7 to 86.
Temperature for Rearing: 17.8 C
Temperature for Spawning: 12.8 C
Big Wall Creek river mile 0 to 21.3
Sedimentation
Temperature for Rearing: 17.8 C
Temperature for Spawning: 12.8 C
South Fork John Day River river mile 0 to 57.3
Temperature for Rearing: 17.8 C
North Fork John Day River river mile 0 to 31.7
Temperature for Rearing: 17.8 C
Temperature for Spawning: 12.8 C
Bridge Creek river mile 0 to 28.7
Temperature for Rearing: 17.8 C
John Day River river mile 182 to 265
Dissolved Oxygen for Cold water: 8 mg/l
Fecal Coliform for Geometric Mean of 2
Temperature for Rearing: 17.8 C
Ditch Creek river mile 0 to 19.5
Temperature for Rearing: 17.8 C
Battle Creek river mile 0 to 7.3
Temperature for Rearing: 17.8 C
Potamus Creek river mile 0 to 18.4
Temperature for Rearing: 17.8 C
Mallory Creek river mile 0 to 14.3
Temperature for Rearing: 17.8 C
Sorefoot Creek river mile 0 to 7.5
Temperature for Rearing: 17.8 C
Deer Creek river mile 0 to 11.9
Temperature for Rearing: 17.8 C
Grass Valley Canyon river mile 0 to 39.8
Temperature for Rearing: 17.8 C
Bear Creek river mile 0 to 4.6
Temperature for Rearing: 17.8 C
Gable Creek river mile 0 to 7.7
Temperature for Rearing: 17.8 C
Middle Fork John Day River river mile 0 to 69.8
Temperature for Rearing: 17.8 C
Temperature for Spawning: 12.8 C
Flat Creek river mile 0 to 11.7
Temperature for Rearing: 17.8 C
Temperature for Spawning: 12.8 C
Little Pine Creek river mile 0 to 5.1
Temperature for Rearing: 17.8 C
John Day River river mile 0 to 9.7
Temperature for Rearing: 17.8 C
Nelson Creek river mile 0 to 5.7
Temperature for Rearing: 17.8 C
Canyon Creek river mile 0 to 27.5
Temperature for Rearing: 17.8 C
Cottonwood Creek river mile 0 to 16.4
Temperature for Rearing: 17.8 C
Trout Creek river mile 0 to 50.7
Sedimentation
Temperature for Rearing: 17.8 C
Sunflower Creek river mile 0 to 8.7
Temperature for Rearing: 17.8 C
Thirtymile Creek river mile 0 to 39.3
Temperature for Rearing: 17.8 C
Temperature for Spawning: 12.8 C
John Day River river mile 36 to 40
pH for pH: 6.5 to 8.5
Indian Creek river mile 0 to 5.4
Temperature for Rearing: 17.8 C
Temperature for Spawning: 12.8 C
Willow Creek river mile 0 to 51.7
pH for pH: 6.5 to 8.5
Temperature for Rearing: 17.8 C
Murderers Creek river mile 0 to 24.7
Temperature for Rearing: 17.8 C
Dads Creek river mile 0 to 8.6
Temperature for Rearing: 17.8 C
Rock Creek river mile 0 to 24.7
Temperature for Rearing: 17.8 C
Mountain Creek river mile 0 to 21.7
Temperature for Rearing: 17.8 C


N
W
E
S
10 0 10 20 Miles
10 0 10 20 Kilometers
OREGON
PACIFIC OCEAN
John Day Basin Planning Area
Prineville District
Astoria
Portland
Tillamook
Pendleton
The Dalles
Baker City
Salem
Newport
Albany
Madras
Prineville
John Day
Vale
Florence
Eugene
Bend
Burns
Coos Bay
Roseburg
Grants Pass
Medford
Klamath Falls
Lakeview
WASHINGTON
OREGON
Columbia River
Maryhill
Biggs
Rufus
Wasco
Arlington
Boardman
Heppner Junction
Cecil
Morgan
Ione
Olex
Lexington
Heppner
Ruggs
Hardman
Condon
Kent
Grass Valley
Moro
Deschutes River
John Day River
SHERMAN COUNTY
GILLIAM COUNTY
Mayville
Shaniko
Fossil
Antelope
Clarno
WASCO COUNTY
JEFFERSON COUNTY
Service Creek
Spray
Richmond
Kimberly
Monument
Hamilton
Long Creek
Ukiah
La Grande
Dale
Sumpter
MORROW COUNTY
GRANT COUNTY
UMATILLA CO
UNION CO
North Fork Middle Fork
84
74
19
97
206
218
293
207
402
395
244



LEGEND

Planning Area Boundary

Oregon Department Environmental Quality 2002 303d Listed Stream

Administered Land

- Bureau of Land Management
- Forest Service
- John Day Fossil Beds National Monument
- Other Federal
- State
- Private or Other

U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management

PRINEVILLE DISTRICT

John Day Basin Resource Management Plan

2006

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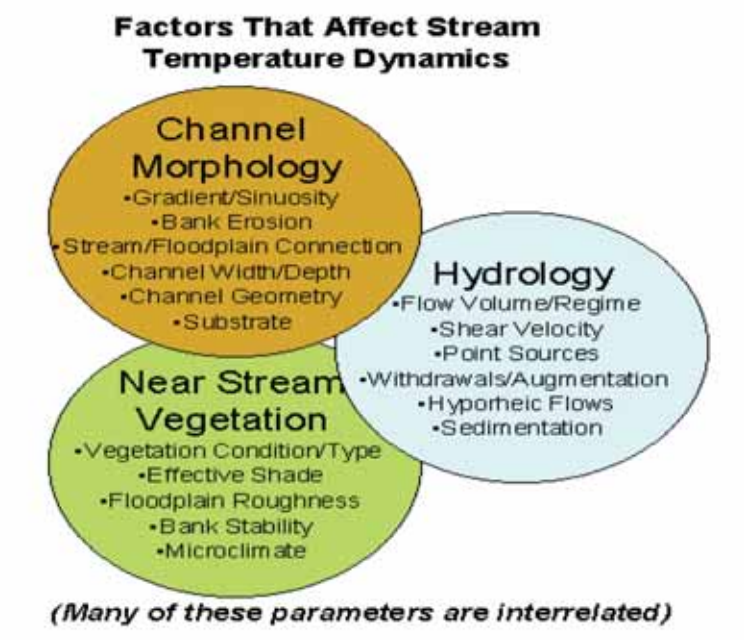
Map 7: 303d Listed Streams

FIGURE: 20
FACTORS THAT
AFFECT STREAM
TEMPERATURE
DYNAMIC



Stream shade is a function of landscape and stream geometry. Some of the factors that influence shade are listed in the Table 8.

Figure 21 indicates water temperatures of the John Day River relative to the distance from the mouth of the river. The temperatures of many important tributaries are also indicated.

Preliminary analysis by the BLM of changes in river width between 1944 and 2006 indicates that the river is about 50 percent wider now than in 1944. There was also an increase in the number of islands; 44 in 1944 and 66 in 2005. The total acreage of islands also increased 42 percent.

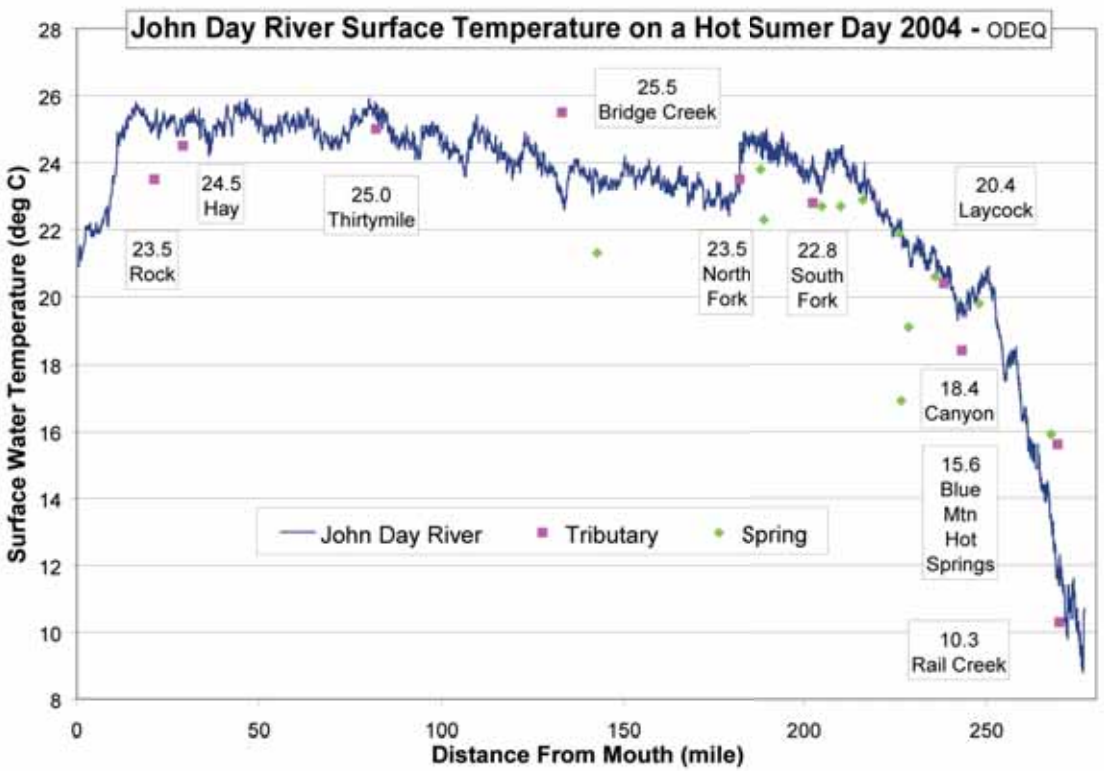
WATER QUANTITY

The average annual precipitation within the John Day Basin is 7.5 million acre-feet (acre-ft). An acre-foot is the volume of water that covers one acre to a depth of one foot. Of this total an average of about 1.5 million acre feet flows past the McDonald Ferry Gaging Station 20 miles above the mouth of the John Day River. The amount of water entering

Table 8: Factors that Influence Stream Surface Shade

Description	Measure
Season/Time	Date/Time
Stream Characteristics	Aspect, Near-Stream Disturbance Zone Width
Geographic Position	Latitude, Longitude
Vegetative Characteristics	Buffer Height, Buffer Width, Buffer Density
Solar Position	Solar Altitude, Solar Azimuth

FIGURE 21: JOHN DAY RIVER SURFACE TEMPERATURE



the river below this point is extremely small due to a small drainage area and low rainfall level. The remaining 6 million acre feet or 80% remains in the ground or evaporates or transpires from living things into the atmosphere. For comparison, the water balance across the entire United States is approximately 30% runoff plus 70% evapo-transpiration (Leopold, 1994). Precipitation in the Basin varies by location, elevation, and season.

The North Fork John Day River at Monument accounts for two thirds of the average annual stream flow near the outlet of the John Day River at McDonald Ferry. Flow is measured in cubic feet per second (cfs) or amount of flow required to pass one cubic foot of water in one second. The average annual flow at Service Creek is almost identical to the flow near the River outlet below McDonald Ferry. The contribution of the North Fork John Day River flow increases to approximately 80% during low summer flows. Similarly during low precipitation years the North Fork John Day contribution to mainstem flow is magnified compared to years with abundant precipitation. Seasons and years of low water yield are particularly crucial periods for most of the plan area's beneficial uses of water.

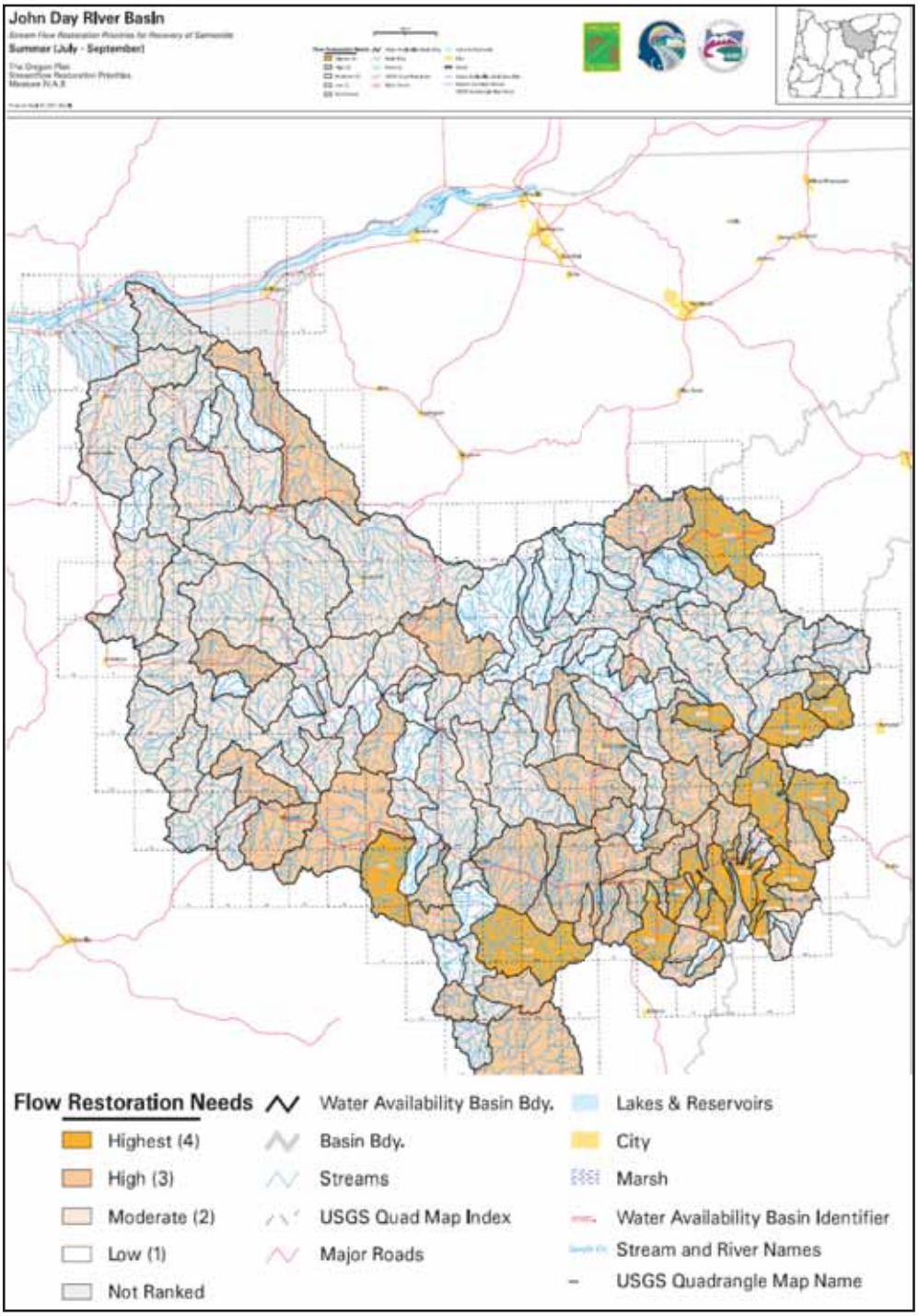
Regardless of the condition of BLM managed lands the impact on water conditions in the basin is limited. This is because the 9 percent of the John Day Basin managed by the BLM (measured from McDonald Gage) intercepts only 7 percent of the total volume of basin precipitation. By contrast, the Forest Service manages only 33 percent of the drainage area, but those lands intercept 43 percent of the precipitation volume of the basin.

The annual flow patterns have changed since the 19th century. Historical descriptions of the John Day Subbasin indicate that the John Day River was once a relatively stable river with good summer streamflows and water quality, and heavy riparian cover. Streambanks were covered with dense growths of aspen, poplar, and willow; cottonwood galleries were thick and wide; and beaver were very abundant (Wissmar *et al*. 1994). Now peak flows

are greater and late season flows are more diminished. It is suspected that these effects are due to greatly reduced rates of soil infiltration, reduced capacity for ground water / riparian storage, and loss of in channel storage in beaver ponds (NWPPC 2001).

Oregon Department of Fish and Wildlife and Oregon Water Resources Department have jointly recognized this trend and have identified watersheds with high flow restoration needs for salmonid recovery. These agencies identified streams and rivers with flow restoration needs in a map displayed as Figure 22.

FIGURE 22: JOHN DAY RIVER BASIN STREAM FLOW RESTORATION PRIORITIES



Fisheries

The John Day River basin provides habitat for 29 documented species of native and non-native fish populations. Five of the native species are "special status species" including: Middle Columbia distinct population segment (DPS) summer steelhead DPS (*Oncorhynchus mykiss)* listed under the Endangered Species Act (1973) as Threatened (12/23/05), bull trout (*Salvelinus confluentus)* as Threatened (6/10/98), interior redband trout DPS (12/23/05) (*Oncorhynchus mykiss)* as sensitive, westslope cutthroat trout (*Oncorhynchus clarki lewisi)* as sensitive and Pacific lamprey (*Lampetra tridentata)* as sensitive. Chinook salmon (*Oncorhynchus tshawytscha)* is an important native game species that spawns in the John Day basin.

Information on trends and distribution has focused primarily on anadromous (sea run) salmonids, and to a lesser extent on resident salmonids and warm water game species. Native and introduced non-game species populations and distribution have generally not been assessed. Introduced game species typically have been analyzed to determine if the introduction was successful and if so what fishery could be sustained.

Fall Run Pacific Lamprey and Chinook Salmon

Pacific lamprey and a small run of fall Chinook salmon in the lower John Day River are species of interest in the John Day system. Although these runs have been less extensively monitored than other runs, restoration efforts designed to protect and restore habitat for spring Chinook salmon and summer steelhead will benefit these anadromous species and native resident species in the John Day River System.

Spring Chinook and Summer Steelhead

The John Day River system supports one of the few remaining wild runs of Spring Chinook salmon (Lindsey et al. 1986, OWRD 1986, Quigley and Arbelbide 1997) and summer steelhead (Quigley and Arbelbide 1997, OWRD 1986) in the Columbia Basin, providing approximately 117 miles of spawning habitat for spring Chinook and 1,800 miles for summer steelhead (ODFW 1997).

Salmonid habitat is similar for the various species. Summer steelhead spawn in cool, clear streams with suitable gravel (pea size to marble size), depth and current velocity. Steelhead enter streams and arrive at spawning grounds weeks or even months before they spawn and are vulnerable to disturbance and predation during this time. Eggs hatch in 30 to 60 days depending on water temperature. Fry emerge from the gravel and within a few days absorb the yolk sack and become free swimming. Rearing habitat is cool, clean water with an optimum temperature of 55 degrees Fahrenheit. Channel structure includes pools and riffle/glides with adequate depth and overhead cover (vegetation, banks and/or woody debris). Vegetation near the channel is desirable to reduce solar radiation and also provided a food base for aquatic and terrestrial insects that, in turn, serve as a food for fish. Summer steelhead begin to spawn as the temperature of the water warms and approaches optimal levels in spring to early summer depending on elevations.

Chinook salmon spawning habitat is similar to that used by steelhead although ideal gravels are golf-ball to baseball sized. Spring Chinook spawn in the fall and eggs overwinter in the gravel with emergence occurring in the spring. Rearing occurs in the