APPENDIX A

PRESIDENTIAL PROCLAMATION

June 9, 2000

ESTABLISHMENT OF THE CASCADE-SISKIYOU NATIONAL MONUMENT
BY THE PRESIDENT OF THE UNITED STATES OF AMERICA
A PROCLAMATION

With towering fir forests, sunlit oak groves, wildflower-strewn meadows, and steep canyons, the Cascade-Siskiyou National Monument is an ecological wonder, with biological diversity unmatched in the Cascade Range. This rich enclave of natural resources is a biological crossroads -- the interface of the Cascade, Klamath, and Siskiyou ecoregions, in an area of unique geology, biology, climate, and topography.

The monument is home to a spectacular variety of rare and beautiful species of plants and animals, whose survival in this region depends upon its continued ecological integrity. Plant communities present a rich mosaic of grass and shrublands, Garry and California black oak woodlands, juniper scablands, mixed conifer and white fir forests, and wet meadows. Stream bottoms support broad-leaf deciduous riparian trees and shrubs. Special plant communities include rosaceous chaparral and oak-juniper woodlands. The monument also contains many rare and endemic plants, such as Greene's Mariposa lily, Gentner's fritillary, and Bellinger's meadowfoam.

The monument supports an exceptional range of fauna, including one of the highest diversities of butterfly species in the United States. The Jenny Creek portion of the monument is a significant center of fresh water snail diversity, and is home to three endemic fish species, including a long-isolated stock of redband trout. The monument contains important populations of small mammals, reptile and amphibian species, and ungulates, including important winter habitat for deer. It also contains old growth habitat crucial to the threatened Northern spotted owl and numerous other bird species such as the western bluebird, the western meadowlark, the pileated woodpecker, the flammulated owl, and the pygmy nuthatch.

The monument's geology contributes substantially to its spectacular biological diversity. The majority of the monument is within the Cascade Mountain Range. The western edge of the monument lies within the older Klamath Mountain geologic province. The dynamic plate tectonics of the area, and the mixing of igneous, metamorphic, and sedimentary geological formations, have resulted in diverse lithologies and soils. Along with periods of geological isolation and a range of environmental conditions, the complex geologic history of the area has been instrumental in producing the diverse vegetative and biological richness seen today.

One of the most striking features of the Western Cascades in this area is Pilot Rock, located near the southern boundary of the monument. The rock is a volcanic plug, a remnant of a feeder vent left after a volcano eroded away, leaving an out-standing example of the inside of a volcano. Pilot Rock has sheer, vertical basalt faces up to 400 feet above the talus slope at its base, with classic columnar jointing created by the cooling of its andesite composition.

The Siskiyou Pass in the southwest corner of the monument contains portions of the Oregon/California Trail, the region's main north/south travel route first established by Native Americans in prehistoric times, and used by Peter Skene Ogden in his 1827 exploration for the Hudson's Bay Company.

Section 2 of the Act of June 8, 1906 (34 Stat. 225, 16 U.S.C. 43 1), authorizes the President, in his discretion, to declare by public proclamation historic landmarks, historic and prehistoric structures, and other objects of historic or scientific interest that are situated upon the lands owned or controlled by the Government of the United States to be national monuments, and to reserve as a part thereof parcels of land, the limits of which in all cases shall be confined to the smallest area compatible with the proper care and management of the objects to be protected.

WHEREAS it appears that it would be in the public interest to reserve such lands as a national monument to be known as the Cascade-Siskiyou National Monument:

NOW, THEREFORE, I, WILLIAM J. CLINTON, President of the United States of America, by the authority vested in me by section 2 of the Act of June 8, 1906 (34 Stat. 225, 16 U.S.C. 43 1), do proclaim that there are hereby set apart and reserved as the Cascade-Siskiyou National Monument, for the purpose of protecting the objects identified above, all lands and interests in lands owned or controlled by the United States within the boundaries of the area described on the map entitled "Cascade-Siskiyou National Monument" attached to and forming a part of this proclamation. The Federal land and interests in land reserved consist of approximately 52,000 acres, which is the smallest area compatible with the proper care and management of the objects to be protected.

All Federal lands and interests in lands within the boundaries of this monument are hereby appropriated and withdrawn from all forms of entry, location, selection, sale, or leasing or other disposition under the public land laws, including but not limited to withdrawal from location, entry, and patent under the mining laws, and from disposition under all laws relating to mineral and geothermal leasing, other than by exchange that furthers the protective purposes of the monument.

There is hereby reserved, as of the date of this proclamation and subject to valid existing rights, a quantity of water sufficient to fulfill the purposes for which this monument is established. Nothing in this reservation shall be construed as a relinquishment or reduction of any water use or rights reserved or appropriated by the United States on or before the date of this proclamation.

The commercial harvest of timber or other vegetative material is prohibited, except when part of an authorized science-based ecological restoration project aimed at meeting protection and old growth enhancement objectives. Any such project must be consistent with the purposes of this proclamation. No portion of the monument shall be considered to be suited for timber production, and no part of the monument shall be used in a calculation or provision of a sustained yield of timber. Removal of trees from within the monument area may take place only if clearly needed for ecological restoration and maintenance or public safety.

For the purpose of protecting the objects identified above, the Secretary of the Interior shall prohibit all motorized and mechanized vehicle use off road and shall close the Schoheim Road, except for emergency or authorized administrative purposes.

Lands and interests in lands within the monument not owned by the United States shall be reserved as a part of the monument upon acquisition of title thereto by the United States.

The Secretary of the Interior shall manage the monument through the Bureau of Land Management, pursuant to applicable legal authorities (including, where applicable, the Act of August 28, 1937, as amended (43 U.S.C. 11 8 la-I 18 lj)), to implement the purposes of this proclamation.

The Secretary of the Interior shall prepare, within 3 years of this date, a management plan for this monument, and shall promulgate such regulations for its management as he deems appropriate. The manage-

ment plan shall include appropriate transportation planning that addresses the actions, including road closures or travel restrictions, necessary to protect the objects identified in this proclamation.

The Secretary of the Interior shall study the impacts of livestock grazing on the objects of biological interest in the monument with specific attention to sustaining the natural ecosystem dynamics. Existing authorized permits or leases may continue with appropriate terms and conditions under existing laws and regulations. Should grazing be found incompatible with protecting the objects of biological interest, the Secretary shall retire the grazing allotments pursuant to the processes of applicable law. Should grazing permits or leases be relinquished by existing holders, the Secretary shall not reallocate the forage available under such permits or for livestock grazing purposes unless the Secretary specifically finds, pending the outcome of the study, that such reallocation will advance the purposes of the proclamation.

The establishment of this monument is subject to valid existing rights.

Nothing in this proclamation shall be deemed to enlarge or diminish the jurisdiction of the State of Oregon with respect to fish and wildlife management.

Nothing in this proclamation shall be deemed to revoke any existing withdrawal, reservation, or appropriation; however, the national monument shall be the dominant reservation.

Warning is hereby given to all unauthorized persons not to appropriate, injure, destroy, or remove any feature of this monument and not to locate or settle upon any of the lands thereof.

IN WITNESS WHEREOF, I have hereunto set my hand this ninth day of June, in the year of our Lord two thousand, and of the Independence of the United States of America the two hundred and twenty-fourth.

WILLIAM J. CLINTON

APPENDIX B

SPECIAL STATUS SPECIES

SPECIAL STATUS PLANT SPECIES

The monument's unique geology, climate, and topography contribute to the presence of many rare and endemic plants. The region including and surrounding the monument has one of the highest rates of plant endemism in the United States (The Nature Conservancy 2000). The monument contains known populations of 33 plant species that are on the current Special Status Species list (Table B-1), including Gentner's fritillary, which is listed as threatened under the Endangered Species Act.

Occurrences of special species plants are documented in grasslands, chaparral, oak woodlands, conifer communities, rocky openings, vernal pools, seeps, and riparian areas within the Diversity Emphasis Area (DEA) and in the Old-Growth Emphasis Area (OGEA) as defined in the CSNM PRMP/FEIS. Open grasslands, chaparral and oak woodlands, and conifer communities blend into a mosaic on the landscape, providing a diversity of habitats for groups of special species plants. As a result, many of these communities are spread out across the landscape.

Some special status species are known for fairly specific habitats: California milkvetch (*Astragalus californicus*) occurs only in open grasslands; the rare fungi *Plectani milleri,* and *Bondarzewia mesenterica* occur only in white fir communities; Coralseed popcorn flower (*Plagiobothrys figuratus* spp. *corallicarpus*) is found only in vernal pools and meadows; and a terrestrial orchid, clustered lady's slipper (*Cypripedium fasciculatum*), is found in old growth Douglas-fir in the monument, often under older madrone and canyon live oak. Other special status plant species can be found in several different types of communities, or are found in transitional zones between different community types. Species like Gentner's fritillary is known from mixed evergreen, oak woodlands, and chaparral and grassland edges. Green's mariposa lily (*Calochortus greenei*) can be found in Oregon white oak-western juniper/wedgeleaf ceanothus-Klamath plum communities, Ponderosa pine-white oak/savanna , and on the margin of open grasslands in heavy clay soils (now often dominated by annual grasses). Some species occur in microsites within larger, more discrete communities. Special status plant species like *Nemacladus capillaris, Monardella glauca* and *Hieracium greenei* are documented in "rocky openings" within many different community types. Thus, management activities within grasslands, riparian areas, oak woodlands, mixed conifer and old growth conifer communities have the potential to influence special status plant species.

In 2004, the Oregon Natural Heritage Program re-evaluated all rare Oregon plants and fungi. A few species documented for the monument were dropped, and no longer have ONHP or Bureau status. These species were left on the following table for reference as they are still found in the Cascade-Siskiyou National Monument.

Table B-1. Overview of Current Special Status Plant Species within the CSNM.
BS=Bureau Sensitive **BA**=Bureau Assessment **BT**=Bureau Tracking **FE**=Federally Endangered

Species	Status	Habitat	Emphasis Area	Number Sites[1]	Documented Individuals
Astragalus californicus (California milk-vetch)	BA	Grassland	DEA	15	972
Asarum wagneri (green-flowered ginger)	BT	Moist conifer	OGEA	1	Unknown
Boletus pulcherrimus	BS	White fir	OGEA	1	Unknown
Bondarzewia mesenterica (Bondarzew's polypore)	Dropped	White fir	OGEA	1	Unknown
Calochortus greenei (Greene's mariposa lily)	BS	Oak woodlands–chaparral	DEA	110[2]	13,355
Carex livida (livid sedge)	BA	Riparian–meadow	DEA	1	20
Carex praticola (meadow sedge)	BT	Riparian–wet meadow	DEA	1	45
Carex serratodens (two-tooth sedge)	BA	Riparian–wet meadow	DEA	1	30
Cirsium ciliolatum (Ashland thistle)	BS	Grassland–oak woodlands	DEA	18	10,327
Cypripedium fasciculatum (clustered lady's slipper)	BA	Mixed conifer	OGEA	2	48
Cypripedium montanum (mountain lady's slipper)	BT	Mixed conifer–evergreen–oak woodland	OGEA DEA	10	246
Delphinium nudicale (red larkspur)	BA	Rock outcrop	OGEA	1	10,000
Fritillaria gentneri (Gentner's fritillary)	FE	Mixed conifer–oak woodland–mountain mahogany chaparral	DEA	22	368
Fritillaria glauca (Siskiyou fritillary)	BA	Dry, open, rocky ridgeline with mountain mahogany	DEA	7	315
Hackelia bella (greater showy stickseed)	BA	Riparian–grassy meadows–openings in white fir	OGEA	23	896
Hieracium greenei (Greene's hawkweed)	BT	Dry, open, ponderosa pine ridgelines	DEA	1	7
Iliamna bakeri (Baker's wild hollyhock)	BS	White fir openings	OGEA	4	9
Enemion stipitatum [Isopyrum stipitatum] (Siskiyou false rue-anemone)	BT	Grasslands–oak woodlands with ceanothus	DEA	28	177,530
Lathyrus lanzwertii tracyi (Tracy's peavine)	BT	Oak woodland–mountain mahogany chaparral	DEA	3	64
Limnanthes floccosa bellingeriana (Bellinger's meadowfoam)	BS	Wet meadows–vernal pools	DEA (moist meadows in OGEA)	11	16,151

Table B-1. Overview of Current Special Status Plant Species within the CSNM.
BS=Bureau Sensitive **BA**=Bureau Assessment **BT**=Bureau Tracking **FE**=Federally Endangered

Species	Status	Habitat	Emphasis Area	Number Sites[1]	Documented Individuals
Mimulus kelloggii (Kellogg's monkeyflower)	BT	Moist microsites in oak woodland	DEA	1	100
Microseris laciniata detlingii (Detling's silverpuffs)	BS	Grasslands–oak woodlands	DEA	21	2,212,193
Monardella glauca (pale monardella)	BT	Open mixed conifer–rocky openings	OGEA	1	Unknown
Nemacladus capillaris (common threadplant)	BA	Rocky openings in mixed conifer	OGEA	4	4,705
Perideridia howellii (Howell's false-caraway)	Dropped	Wet meadows, moist slopes, riparian	DEA OGEA	11	101,034
Plagiobothrys austinae (Austin's popcorn flower)	BA	Grassy meadows–vernal pools	DEA	1	10
Plagiobothrys figuratus corallicarpus (coral seeded popcorn flower)	BS	Grassy meadows– vernal pools	DEA	4	14,500
Plectania milleri (Miller's cup fungus)	BT	White fir	OGEA	4	Unknown
Poa rhizomata (rhizome bluegrass)	BA	Grasslands – oak woodlands	DEA	10	3,340
Ranunculus austro-oreganus (southern Oregon buttercup)	BS	Grasslands–oak woodlands–chaparral	DEA	1	2,000
Ribes inerme klamathense (Klamath gooseberry)	BT	Riparian–moist meadow edge	DEA	3	25
Solanum parishii (Parish's nightshade)	BA	Oak–pine woodlands–chaparral	DEA	3	20
Tremiscus helvelliodes	Dropped	White fir	OGEA	1	Unknown

[1]Based on 2004 data from the BLM Medford Rare Plant Database.
[2]Does not include 20 new sites documented in 2003 by non-government surveys that report to have over 3,000 plants.

SPECIAL STATUS ANIMAL SPECIES - TERRESTRIAL WILDLIFE

The diverse plant communities, varied topography, and broad range of climatic zones come together to foster a diverse assemblage of terrestrial wildlife species. The monument is home to 45 animal species that are on the current special status species list (Table B-2).

Some special status animal species occupy well-defined habitat areas (e.g. Oregon spotted frog (*Rana pretiosa*) occurs only in association with ponds or lakes). Other species range widely across the landscape, utilizing a variety of habitats. For example, great gray owls (*Strix nebulosa*) choose nest sites in late-successional and old-growth conifer stands while foraging in meadows and other open areas, as well as traveling 10 miles or more and utilizing a variety of habitat including oak savannah, and mixed conifer.

Management activities across all habitat types have the potential to affect terrestrial wildlife species.

Table B-2. Terrestrial Wildlife Species Documented or Likely to Occur in the CSNM.

BS=Bureau Sensitive BA=Bureau Assessment BT=Bureau Tracking
FE/FT/FC=Federally Endangered/Federally Threatened/Federal Candidate Species

Species	Status
Acorn Woodpecker *Melanerpes formicivorus*	BT
American Peregrine Falcon *Falco peregrinus anatum*	BS
American Marten *Martes Americana*	BT
Bald Eagle *Haliaeetus leucocephalus*	FT
Band-tailed Pigeon *Columba fasciata*	BT
Black Salamander *Aneides flavipunctatus*	BA
California Mountain Kingsnake *Lampropeltis zonata*	BT
California Myotis *Myotis californicus*	BT
Cascade Frog *Rana cascadae*	BT
Common Kingsnake *Lampropeltis getula*	BT
Common Nighthawk *Chordeiles minor*	BT
Coronis Fritallary Butterfly *Speyeria coronis coronis*	BT
Fisher *Martes pennanti pacifica*	FC
Flammulated Owl *Otus flammeolus*	BS
Foothill Yellow-legged Frog *Rana boylii*	BA
Fringed Myotis *Myotis thysanodes*	BA
Great Gray Owl *Strix nebulosa*	BT
Greater Sandhill Crane *Grus Canadensis*	BT
Hoary Bat *Laiurus cinereus*	BT
Klamath Mardon Skipper *Polites mardon klamathensis*	FC

Table B-2. Terrestrial Wildlife Species Documented or Likely to Occur in the CSNM.

BS=Bureau Sensitive BA=Bureau Assessment BT=Bureau Tracking
FE/FT/FC=Federally Endangered/Federally Threatened/Federal Candidate Species

Species	Status
Lewis' Woodpecker *Melanerpes lewis*	BS
Long-eared Myotis *Myotis evotis*	BT
Long-legged Myotis *Myotis volans*	BT
Mountain Quail *Oreortyx pictus*	BT
Northern Goshawk *Accipiter gentilis*	BS
Northern Pygmy Owl *Glaucidium gnoma*	BT
Northern Sagebrush Lizard *Sceloporus graciosus graciosus*	BT
Northern Spotted Owl *Strix occidentalis caurina*	FT
Northwestern Pond Turtle *Clemmys marmorata marmorata*	BS
Olive-sided Flycatcher *Contopus cooperi*	BT
Oregon Shoulderband *Helminthoglypta hertleini*	BS
Pacific Pallid Bat *Antrozous pallidus pacificus*	BA
Pileated Woodpecker *Dryocopus pileatus*	BT
Pygmy Nuthatch *Sitta pygmaea*	BT
Ringtail *Bassariscus astutus*	BT
Silver-haired Bat *Lasionycteris noctivagans*	BT
Spotted Frog *Rana pretiosa*	FC
Townsend's Big-eared Bat *Corinorhynus townsendii*	BS
Western Bluebird *Siala mexicana*	BT
Western Gray Squirrel *Sciurus griseus*	BT

Table B-2. Terrestrial Wildlife Species Documented or Likely to Occur in the CSNM.

BS=Bureau Sensitive BA=Bureau Assessment BT=Bureau Tracking
FE/FT/FC=Federally Endangered/Federally Threatened/Federal Candidate Species

Species	Status
Western Meadowlark *Stunella neglecta*	BT
Western Toad *Bufo boreas*	BT
White-headed Woodpecker *Dendrocopos albolarvatus*	BS
Willow Flycatcher *Empidonax traillii adastus*	BT
Yuma Myotis *Myotis yumanensis*	BT

SPECIAL STATUS ANIMAL SPECIES – AQUATIC WILDLIFE

The monument is home to a variety of aquatic organisms including several special status species: Jenny Creek redband trout (*Oncorhynchus mykiss spp.*) a BLM special status species, Jenny Creek sucker (*Catostomus rimiculus*) a BLM special status species, and Fredenberg pebblesnail (*Fluminicola n. sp. 17*), Nerite pebblesnail (*Fluminicola n. sp. 10*), Toothed pebblesnail (*Fluminicola n. sp. 11*), Diminutive Pebblesnail (*Fluminicola n. sp. 12*), Fall Creek pebblesnail (*Fluminicola n. sp. 14*), Keene Creek pebblesnail (*Fluminicola n. sp. 16*), all Bureau Sensitive Species in Oregon.

APPENDIX C

STANDARDS FOR RANGELAND HEALTH AND GUIDELINES FOR LIVESTOCK GRAZING MANAGEMENT

STANDARDS FOR RANGELAND HEALTH
AND
GUIDELINES FOR LIVESTOCK
GRAZING MANAGEMENT
FOR
PUBLIC LANDS ADMINISTERED BY THE
BUREAU OF LAND MANAGEMENT
IN THE STATES OF OREGON AND WASHINGTON
AUGUST 12, 1997

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STANDARDS FOR RANGELAND HEALTH AND GUIDELINES FOR LIVESTOCK GRAZING MANAGEMENT FOR PUBLIC LANDS IN OREGON AND WASHINGTON

INTRODUCTION

These Standards for Rangeland Health and Guidelines for Livestock Grazing Management for Public Lands in Oregon and Washington were developed in consultation with Resource Advisory Councils and Provincial Advisory Committees, tribes and others. These standards and guidelines meet the requirements and intent of 43 Code of Federal Regulations, Subpart 4180 (Rangeland Health) and are to be used as presented, in their entirety. These standards and guidelines are intended to provide a clear statement of agency policy and direction for those who use public lands for livestock grazing, and for those who are responsible for their management and accountable for their condition. Nothing in this document should be interpreted as an abrogation of Federal trust responsibilities in protection of treaty rights of Indian tribes or any other statutory responsibilities including, but not limited to, the Taylor Grazing Act, the Clean Water Act, and the Endangered Species Act.

FUNDAMENTALS OF RANGELAND HEALTH

The objectives of the rangeland health regulations referred to above are: "to promote healthy sustainable rangeland ecosystems; to accelerate restoration and improvement of public rangelands to properly functioning conditions; . . . and to provide for the sustainability of the western livestock industry and communities that are dependent upon productive, healthy public rangelands."

To help meet these objectives, the regulations on rangeland health identify fundamental principles providing direction to the States, districts, and on-the-ground public land managers and users in the management and use of rangeland ecosystems.

A hierarchy, or order, of ecological function and process exists within each ecosystem. The rangeland ecosystem consists of four primary, interactive components: a physical component, a biological component, a social component, and an economic component. This perspective implies that the physical function of an ecosystem supports the biological health, diversity and productivity of that system. In turn, the interaction of the physical and biological components of the ecosystem provides the basic needs of society and supports economic use and potential.

The Fundamentals of Rangeland Health stated in 43 CFR 4180 are:

1. Watersheds are in, or are making significant progress toward, properly functioning physical condition, including their upland, riparian-wetland, and aquatic components; soil and plant conditions support infiltration, soil moisture storage and the release of water that are in balance with climate and landform and maintain or improve water quality, water quantity and the timing and duration of flow.
2. Ecological processes, including the hydrologic cycle, nutrient cycle and energy flow, are maintained, or there is significant progress toward their attainment, in order to support healthy biotic populations and communities.
3. Water quality complies with State water quality standards and achieves, or is making significant progress toward achieving, established Bureau of Land Management objectives such as meeting wildlife needs.
4. Habitats are, or are making significant progress toward being, restored or maintained for Federal threatened and endangered species, Federal Proposed, Category 1 and 2 Federal candidate and other special status species.

The fundamentals of rangeland health combine the basic precepts of physical function and biological health with elements of law relating to water quality, and plant and animal populations and communities. They provide direction in the development and implementation of the standards for rangeland health.

STANDARDS FOR RANGELAND HEALTH

The standards for rangeland health (standards), based on the above fundamentals, are expressions of the physical and biological condition or degree of function necessary to sustain healthy rangeland ecosystems. Although the focus of these standards is on domestic livestock grazing on Bureau of Land Management lands, on-the-ground decisions must consider the effects and impacts of all uses.

Standards that address the physical components of rangeland ecosystems focus on the roles and interactions of geology and landform, soil, climate and water as they govern watershed function and soil stability. The biological components addressed in the standards focus on the roles and interactions of plants, animals and microbes (producers, consumers and decomposers), and their habitats in the ecosystem. The biological component of rangeland ecosystems is supported by physical function of the system, and it is recognized that biological activity also influences and supports many of the ecosystem's physical functions.

Guidance contained in 43 CFR 4180 of the regulations directs management toward the maintenance or restoration of the physical function and biological health of rangeland ecosystems. Focusing on the basic ecological health and function of rangelands is expected to provide for the maintenance, enhancement, or creation of future social and economic options.

The standards are based upon the ecological potential and capability of each site. In assessing a site's condition or degree of function, it must be understood that the evaluation compares each site to its own potential or capability. Potential and capability are defined as follows:

> **Potential –** The highest level of condition or degree of function a site can attain given no political, social or economic constraints.
>
> **Capability –** The highest level of condition or degree of function a site can attain given certain political, social or economic constraints. For example, these constraints might include riparian areas permanently occupied by a highway or railroad bed that prevent the stream's full access to its original flood plain. If such constraints are removed, the site may be able to move toward its potential.

In designing and implementing management strategies to meet the standards of rangeland health, the potential of the site must be identified, and any constraints recognized, in order that plan goals and objectives are realistic and physically and economically achievable.

STANDARDS AND GUIDELINES IN RELATION TO THE PLANNING PROCESS

The standards apply to the goals of land use plans, activity plans, and project plans (Allotment Management Plans, Annual Operating Plans, Habitat Management Plans, etc.). They establish the physical and biological conditions or degree of function toward which management of publicly-owned rangeland is to be directed. In the development of a plan, direction provided by the standards and the social and economic needs expressed by local communities and individuals are brought together in formulating the goal(s) of that plan.

When the standards and the social and economic goals of the planning participants are woven together in the plan goal(s), the quantifiable, time specific objective(s) of the plan are then developed. Objectives describe and quantify the desired future conditions to be achieved within a specified timeframe. Each plan objective should address the physical, biological, social and economic elements identified in the plan goal. Standards apply to all ecological sites and land forms on public rangelands throughout Oregon and Washington. The standards require site-specific information for full on-ground usability. For each standard, a set of indicators is identified for use in tailoring the standards to site-specific situations. These indicators are used for rangeland ecosystem assessments and monitoring and for developing terms and conditions for permits and leases that achieve the plan goal.

Guidelines for livestock grazing management offer guidance in achieving the plan goal and objectives. The guidelines outline practices, methods, techniques and considerations used to ensure that progress is achieved in a way, and at a rate, that meets the plan goal and objectives.

INDICATORS OF RANGELAND HEALTH

The condition or degree of function of a site in relation to the standards and its trend toward or away from any standard is determined through the use of reliable and scientifically sound indicators. The consistent application of such indicators can provide an objective view of the condition and trend of a site when used by trained observers.

For example, the amount and distribution of ground cover can be used to indicate that infiltration at the soil surface can take place as described in the standard relating to upland watershed function. In applying this indicator, the specific levels of plant cover necessary to support infiltration in a particular soil should be identified using currently available information from reference areas, if they exist; from technical sources like soil survey reports, Ecological Site Inventories, and Ecological Site Descriptions, or from other existing reference materials. Reference areas are lands that best represent the potential of a specific ecological site in both physical function and biological health. In many instances potential reference areas are identified in Ecological Site Descriptions and are referred to as "type locations." In the absence of suitable reference areas, the selection of indicators to be used in measuring or judging condition or function should be made by an interdisciplinary team of experienced professionals and other trained individuals.

Not all indicators identified for each standard are expected to be employed in every situation. Criteria for selecting appropriate indicators and methods of measurement and observation include, but are not limited to: 1. the relationship between the attribute(s) being measured or observed and the desired outcome; 2. the relationship between the activity (e.g., livestock grazing) and the attribute(s) being measured or observed; and 3. funds and workforce available to conduct the measurements or observations.

ASSESSMENTS AND MONITORING

The standards are the basis for assessing and monitoring rangeland condition and trend. Carrying out well-designed assessment and monitoring is critical to restoring or maintaining healthy rangelands and determining trends and conditions.

Assessments are a cursory form of evaluation based on the standards that can be used at different landscape scales. Assessments, conducted by qualified interdisciplinary teams (which may include but are not limited to physical, biological and social specialists, and interagency personnel) with participation from lessees and other interested parties, are appropriate at the watershed and sub-watershed levels, at the allotment and pasture levels and on individual ecological sites or groups of sites. Assessments identify the condition or degree of function within the rangeland ecosystem and indicate resource problems and issues that should be monitored or studied in more detail. The results of assessments are a valuable tool for managers in assigning priorities within an administrative area and the subsequent allocation of personnel, money and time in resource monitoring and treatment. The results of assessments may also be used in making management decisions where an obvious problem exists.

Monitoring, which is the well documented and orderly collection, analysis and interpretation of resource data, serves as the basis for determining trends in the condition or degree of function of rangeland resources and for making management decisions. Monitoring should be designed and carried out to identify trends in resource conditions, to point out resource problems, to help indicate the cause of such problems, to point out solutions, and/or to contribute to adaptive management decisions. In cases where monitoring data do not exist, professional judgement, supported by interdisciplinary team

recommendation, may be relied upon by the authorized officer in order to take necessary action. Review and evaluation of new information must be an ongoing activity.

To be effective, monitoring must be consistent over time, throughout administrative areas, and in the methods of measurement and observation of selected indicators. Those doing the monitoring must have the knowledge and skill required by the level or intensity of the monitoring being done, as well as the experience to properly interpret the results. Technical support for training must be made available.

MEASURABILITY

It is recognized that not every area will immediately meet the standards and that it will sometimes be a long-term process to restore some rangelands to properly functioning condition. It is intended that in cases where standards are not being met, measurable progress should be made toward achieving those standards, and significant progress should be made toward fulfilling the fundamentals of rangeland health. Measurability is defined on a case-specific basis based upon the stated planning objectives (i.e., quantifiable, time specific), taking into account economic and social goals along with the biological and ecological capability of the area. To the extent that a rate of recovery conforms with the planning objectives, the area is allowed the time to meet the standard under the selected management regime.

IMPLEMENTATION

The material contained in this document will be incorporated into existing Land Use Plans and used in the development of new Land Use Plans. According to 43 CFR 4130.3-1, permits and leases shall incorporate terms and conditions that ensure conformance with 43 CFR 4180. Terms and conditions of existing permits and leases will be modified to reflect standards and guidelines at the earliest possible date with priority for modification being at the discretion of the authorized officer. Terms and conditions of new permits and leases will reflect standards and guidelines in their development.

Indicators identified in this document will serve as a focus of interpretation of existing monitoring data and will provide the basis of design for monitoring and assessment techniques, and in the development of monitoring and assessment plans.

The authorized officer shall take appropriate action as soon as practicable but not later than the start of the next grazing year upon determining, through assessment or monitoring by experienced professionals and interdisciplinary teams, that a standard is not being achieved and that livestock are a significant contributing factor to the failure to achieve the standards and conform with the guidelines.

STANDARDS FOR RANGELAND HEALTH

STANDARD 1 WATERSHED FUNCTION – UPLANDS

UPLAND SOILS EXHIBIT INFILTRATION AND PERMEABILITY RATES, MOISTURE STORAGE AND STABILITY THAT ARE APPROPRIATE TO SOIL, CLIMATE AND LANDFORM.

Rationale and Intent

This standard focuses on the basic physical functions of upland soils that support plant growth, the maintenance or development of plant populations and communities, and promote dependable flows of quality water from the watershed.

To achieve and sustain rangeland health, watersheds must function properly. Watersheds consist of three principle components: the uplands, riparian/wetland areas and the aquatic zone. This standard addresses the upland component of the watershed. When functioning properly, within its potential, a watershed captures, stores and safely releases the moisture associated with normal precipitation events (equal to or less than the 25 year, 5 hour event) that falls within its boundaries. Uplands make up the largest part of

the watershed and are where most of the moisture received during precipitation events is captured and stored.

While all watersheds consist of similar components and processes, each is unique in its individual make-up. Each watershed displays its own pattern of landform and soil, its unique climate and weather patterns, and its own history of use and current condition. In directing management toward achieving this standard, it is essential to treat each unit of the landscape (soil, ecological site, and watershed) according to its own capability and how it fits with both smaller and larger units of the landscape.

A set of potential indicators has been identified for which site-specific criteria will be used to determine if this standard is being met. The appropriate indicators to be used in determining attainment of the standard should be drawn from the following list.

Potential Indicators

Protection of the soil surface from raindrop impact; detention of overland flow; maintenance of infiltration and permeability, and protection of the soil surface from erosion, consistent with the potential/capability of the site, as evidenced by the:

- amount and distribution of plant cover (including forest canopy cover);
- amount and distribution of plant litter;
- accumulation/incorporation of organic matter;
- amount and distribution of bare ground;
- amount and distribution of rock, stone, and gravel;
- plant composition and community structure;
- thickness and continuity of A horizon;
- character of micro-relief;
- presence and integrity of biotic crusts;
- root occupancy of the soil profile;
- biological activity (plant, animal, and insect); and
- absence of accelerated erosion and overland flow.

Soil and plant conditions promote moisture storage as evidenced by:

- amount and distribution of plant cover (including forest canopy cover);
- amount and distribution of plant litter;
- plant composition and community structure; and
- accumulation/incorporation of organic matter.

STANDARD 2 WATERSHED FUNCTION - RIPARIAN/WETLAND AREAS

RIPARIAN-WETLAND AREAS ARE IN PROPERLY FUNCTIONING PHYSICAL CONDITION APPROPRIATE TO SOIL, CLIMATE, AND LANDFORM.

Rationale and Intent

Riparian-wetland areas are grouped into two major categories: 1. lentic, or standing water systems such as lakes, ponds, seeps, bogs, and meadows; and 2. lotic, or moving water systems such as rivers, streams, and springs. Wetlands are areas that are inundated or saturated by surface or ground water at a frequency and duration to support, and which under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated soil conditions. Riparian areas commonly occupy the transition zone between the uplands and surface water bodies (the aquatic zone) or permanently saturated wetlands. Properly functioning condition of riparian and wetland areas describes the degree of physical function of these components of the watershed. Their functionality is important to water quality in the capture and

retention of sediment and debris, the detention and detoxification of pollutants, and in moderating seasonal extremes of water temperature. Properly functioning riparian areas and wetlands enhance the timing and duration of streamflow through dissipation of flood energy, improved bank storage, and ground water recharge. Properly functioning condition should not be confused with the Desired Plant Community (DPC) or the Desired Future Condition (DFC) since, in most cases, it is the precursor to these levels of resource condition and is required for their attainment.
A set of indicators has been identified for which site-specific criteria will be used to determine if this standard is being met. The criteria are based upon the potential (or upon the capability where potential cannot be achieved) of individual sites or land forms.

Potential Indicators

Hydrologic, vegetative, and erosional/depositional processes interact in supporting physical function, consistent with the potential or capability of the site, as evidenced by:

- frequency of floodplain/wetland inundation;
- plant composition, age class distribution, and community structure;
- root mass;
- point bars revegetating;
- streambank/shoreline stability;
- riparian area width;
- sediment deposition;
- active/stable beaver dams;
- coarse/large woody debris;
- upland watershed conditions;
- frequency/duration of soil saturation; and
- water table fluctuation.

Stream channel characteristics are appropriate for landscape position as evidenced by:

- channel width/depth ratio;
- channel sinuosity;
- gradient;
- rocks and coarse and/or large woody debris;
- overhanging banks;
- pool/riffle ratio;
- pool size and frequency; and
- stream embeddedness.

STANDARD 3 ECOLOGICAL PROCESSES

HEALTHY, PRODUCTIVE AND DIVERSE PLANT AND ANIMAL POPULATIONS AND COMMUNITIES APPROPRIATE TO SOIL, CLIMATE AND LANDFORM ARE SUPPORTED BY ECOLOGICAL PROCESSES OF NUTRIENT CYCLING, ENERGY FLOW AND THE HYDROLOGIC CYCLE.

Rationale and Intent

This standard addresses the ecological processes of energy flow and nutrient cycling as influenced by existing and desired plant and animal communities without establishing the kinds, amounts or proportions of plant and animal community compositions. While emphasis may be on native species, an ecological site may be capable of supporting a number of different native and introduced plant and animal populations and communities while meeting this standard. This standard also addresses the hydrologic cycle which is essential for plant growth and appropriate levels of energy flow and nutrient cycling. Standards 1 and 2 address the watershed aspects of the hydrologic cycle.

With few exceptions, all life on earth is supported by the energy supplied by the sun and captured by plants in the process of photosynthesis. This energy enters the food chain when plants are consumed by insects and herbivores and passes upward through the food chain to the carnivores. Eventually, the energy reaches the decomposers and is released as the thermal output of decomposition or through oxidation.

The ability of plants to capture sunlight energy, to grow and develop, to play a role in soil development and watershed function, to provide habitat for wildlife and to support economic uses depends on the availability of nutrients and moisture. Nutrients necessary for plant growth are made available to plants through the decomposition and metabolization of organic matter by insects, bacteria and fungi, the weathering of rocks and extraction from the atmosphere. Nutrients are transported through the soil by plant uptake, leaching and by rodent, insect and microbial activity. They follow cyclical patterns as they are used and reused by living organisms.

The ability of rangelands to supply resources and satisfy social and economic needs depends on the build-up and cycling of nutrients over time. Interrupting or slowing nutrient cycling can lead to site degradation, as these lands become increasingly deficient in the nutrients plants require.

Some plant communities, because of past use, frequent fire or other histories of extreme or continued disturbance, are incapable of meeting this standard. For example, shallow-rooted winter-annual grasses that completely dominate some sites do not fully occupy the potential rooting depth of some soils, thereby reducing nutrient cycling well below optimum levels. In addition, these plants have a relatively short growth period and thus capture less sunlight than more diverse plant communities. Plant communities like those cited in this example are considered to have crossed the threshold of recovery and often require great expense to be recovered. The cost of recovery must be weighed against the site's potential ecological/economic value in establishing treatment priorities.

The role of fire in natural ecosystems should be considered, whether it acts as a primary driver or only as one of many factors. It may play a significant role in both nutrient cycling and energy flows.

A set of indicators has been identified for which site-specific criteria will be used to determine if this standard is being met.

Potential Indicators

Photosynthesis is effectively occurring throughout the potential growing season, consistent with the potential/capability of the site, as evidenced by plant composition and community structure.
Nutrient cycling is occurring effectively, consistent with the potential/capability of the site, as evidenced by:

- plant composition and community structure;
- accumulation, distribution, incorporation of plant litter and organic matter into the soil;
- animal community structure and composition;
- root occupancy in the soil profile; and
- biological activity including plant growth, herbivory, and rodent, insect and microbial activity.

STANDARD 4 WATER QUALITY

SURFACE WATER AND GROUNDWATER QUALITY, INFLUENCED BY AGENCY ACTIONS, COMPLIES WITH STATE WATER QUALITY STANDARDS.

Rationale and Intent

The quality of the water yielded by a watershed is determined by the physical and chemical properties of the geology and soils unique to the watershed, the prevailing climate and weather patterns, current resource conditions, the uses to which the land is put and the quality of the management of those uses. Standards 1, 2 and 3 contribute to attaining this standard.

States are legally required to establish water quality standards and Federal land management agencies are to comply with those standards. In mixed ownership watersheds, agencies, like any other land owners, have limited influence on the quality of the water yielded by the watershed. The actions taken by the agency will contribute to meeting State water quality standards during the period that water crosses agency administered holdings.

Potential Indicators

Water quality meets applicable water quality standards as evidenced by:

- water temperature;
- dissolved oxygen;
- fecal coliform;
- turbidity;
- pH;
- populations of aquatic organisms; and
- effects on beneficial uses (i.e., effects of management activities on beneficial uses as defined under the Clean Water Act and State implementing regulations).

STANDARD 5 NATIVE, T&E, AND LOCALLY IMPORTANT SPECIES

HABITATS SUPPORT HEALTHY, PRODUCTIVE AND DIVERSE POPULATIONS AND COMMUNITIES OF NATIVE PLANTS AND ANIMALS (INCLUDING SPECIAL STATUS SPECIES AND SPECIES OF LOCAL IMPORTANCE) APPROPRIATE TO SOIL, CLIMATE AND LANDFORM.

Rationale and Intent

Federal agencies are mandated to protect threatened and endangered species and will take appropriate action to avoid the listing of any species. This standard focuses on retaining and restoring native plant and animal (including fish) species, populations and communities (including threatened, endangered and other special status species and species of local importance). In meeting the standard, native plant communities and animal habitats would be spatially distributed across the landscape with a density and frequency of species suitable to ensure reproductive capability and sustainability. Plant populations and communities would exhibit a range of age classes necessary to sustain recruitment and mortality fluctuations.

Potential Indicators

Essential habitat elements for species, populations and communities are present and available, consistent with the potential/capability of the landscape, as evidenced by:

- plant community composition, age class distribution, productivity;
- animal community composition, productivity;
- habitat elements;
- spatial distribution of habitat;
- habitat connectivity; and
- population stability/resilience.

GUIDELINES FOR LIVESTOCK GRAZING MANAGEMENT

Guidelines for livestock grazing management offer guidance in achieving plan goals, meeting standards for rangeland health and fulfilling the fundamentals of rangeland health. Guidelines are applied in accordance with the capabilities of the resource in consultation, cooperation, and coordination with lessees and the interested public. Guidelines enable managers to adjust grazing management on public lands to meet current and anticipated climatic and biological conditions.

GENERAL GUIDELINES

1. Involve diverse interests in rangeland assessment, planning and monitoring.
2. Assessment and monitoring are essential to the management of rangelands, especially in areas where resource problems exist or issues arise. Monitoring should proceed using a qualitative method of assessment to identify critical, site-specific problems or issues using interdisciplinary teams of specialists, managers, and knowledgeable land users.

Once identified, critical, site-specific problems or issues should be targeted for more intensive, quantitative monitoring or investigation. Priority for monitoring and treatment should be given to those areas that are ecologically at-risk where benefits can be maximized given existing budgets and other resources.

Livestock Grazing Management

1. The season, timing, frequency, duration and intensity of livestock grazing use should be based on the physical and biological characteristics of the site and the management unit in order to:
   a. provide adequate cover (live plants, plant litter and residue) to promote infiltration, conserve soil moisture and to maintain soil stability in upland areas;

   b. provide adequate cover and plant community structure to promote streambank stability, debris and sediment capture, and floodwater energy dissipation in riparian areas.

   c. promote soil surface conditions that support infiltration;

   d. avoid sub-surface soil compaction that retards the movement of water in the soil profile;

   e. help prevent the increase and spread of noxious weeds;

   f. maintain or restore diverse plant populations and communities that fully occupy the potential rooting volume of the soil;

   g. maintain or restore plant communities to promote photosynthesis throughout the potential growing season;

h. promote soil and site conditions that provide the opportunity for the establishment of desirable plants;

i. protect or restore water quality; and

j. provide for the life cycle requirements, and maintain or restore the habitat elements of native (including T&E, special status, and locally important species) and desired plants and animals.

2. Grazing management plans should be tailored to site-specific conditions and plan objectives. Livestock grazing should be coordinated with the timing of precipitation, plant growth and plant form. Soil moisture, plant growth stage and the timing of peak stream flows are key factors in determining when to graze. Response to different grazing strategies varies with differing ecological sites.

3. Grazing management systems should consider nutritional and herd health requirements of the livestock.

4. Integrate grazing management systems into the year-round management strategy and resources of the permittee(s) or lessee(s). Consider the use of collaborative approaches (e.g., Coordinated Resource Management, Working Groups) in this integration.

5. Consider competition for forage and browse among livestock, big game animals, and wild horses in designing and implementing a grazing plan.

6. Provide periodic rest from grazing for rangeland vegetation during critical growth periods to promote plant vigor, reproduction and productivity.

7. Range improvement practices should be prioritized to promote rehabilitation and resolve grazing concerns on transitory grazing land.

8. Consider the potential for conflict between grazing use on public land and adjoining land uses in the design and implementation of a grazing management plan.

Facilitating the Management of Livestock Grazing

1. The use of practices to facilitate the implementation of grazing systems should consider the kind and class of animals managed, indigenous wildlife, wild horses, the terrain and the availability of water. Practices such as fencing, herding, water development, and the placement of salt and supplements (where authorized) are used where appropriate to:

   a. promote livestock distribution;

   b. encourage a uniform level of proper grazing use throughout the grazing unit;

   c. avoid unwanted or damaging concentrations of livestock on streambanks, in riparian areas and other sensitive areas such as highly erodible soils, unique wildlife habitats and plant communities; and

   d. protect water quality.

2. Roads and trails used to facilitate livestock grazing are constructed and maintained in a manner that minimizes the effects on landscape hydrology; concentration of overland flow, erosion and sediment transport are prevented; and subsurface flows are retained.

Accelerating Rangeland Recovery

1. Upland treatments that alter the vegetative composition of a site, like prescribed burning, juniper management and seedings or plantings must be based on the potential of the site and should:

   a. retain or promote infiltration, permeability, and soil moisture storage;

   b. contribute to nutrient cycling and energy flow;

   c. protect water quality;

   d. help prevent the increase and spread of noxious weeds;

   e. contribute to the diversity of plant communities, and plant community composition and structure;

   f. support the conservation of T&E, other special status species and species of local importance; and
   g. be followed up with grazing management and other treatments that extend the life of the treatment and address the cause of the original treatment need.

2. Seedings and plantings of non-native vegetation should only be used in those cases where native species are not available in sufficient quantities; where native species are incapable of maintaining or achieving the standards; or where non-native species are essential to the functional integrity of the site.

3. Structural and vegetative treatments and animal introductions in riparian and wetland areas must be compatible with the capability of the site, including the system's hydrologic regime, and contribute to the maintenance or restoration of properly functioning condition.

GLOSSARY

Appropriate action--implementing actions pursuant to subparts 4110, 4120, 4130 and 4160 of the regulations that will result in significant progress toward fulfillment of the standards and significant progress toward conformance with the guidelines (see significant progress below).

Assessment--a form of evaluation based on the standards of rangeland health, conducted by an interdisciplinary team at the appropriate landscape scale (pasture, allotment, sub-watershed, watershed, etc.) to determine conditions relative to standards.

Compaction layer--a layer within the soil profile in which the soil particles have been rearranged to decrease void space, thereby increasing soil bulk density and often reducing permeability.

Crust, Abioti--(physical crust) a surface layer on soils, ranging in thickness from a few millimeters to a few centimeters, that is much more compact, hard and brittle, when dry, than the material immediately beneath it.

Crust, Bioti--(microbiotic or cryptogamic crust) a layer of living organisms (mosses, lichens, liverworts, algae, fungi, bacteria, and/or cyanobacteria) occurring on, or near the soil surface.

Degree of function--a level of physical function relative to properly functioning condition commonly expressed as: properly functioning, functioning-at-risk, or non-functional.

Diversity--the aggregate of species assemblages (communities), individual species, and the genetic variation within species and the processes by which these components interact within and among themselves. The elements of diversity are: 1. community diversity (habitat, ecosystem), 2. species diversity; and 3. genetic diversity within a species; all three of which change over time.

Energy flow--the processes in which solar energy is converted to chemical energy through photosynthesis and passed through the food chain until it is eventually dispersed through respiration and decomposition.

Groundwater--water in the ground that is in the zone of saturation; water in the ground that exists at, or below the water table.

Guideline--practices, methods, techniques and considerations used to ensure that progress is made in a way and at a rate that achieves the standard(s).

Gully--a channel resulting from erosion and caused by the concentrated but intermittent flow of water usually during and immediately following heavy rains.

Hydrologic cycle--the process in which water enters the atmosphere through evaporation, transpiration, or sublimation from the oceans, other surface water bodies, or from the land and vegetation, and through condensation and precipitation returns to the earth's surface. The precipitation then occurring as overland flow, stream flow, or percolating underground flow to the oceans or other surface water bodies or to other sites of evapo-transpiration and recirculation to the atmosphere.

Indicators--parameters of ecosystem function that are observed, assessed, measured, or monitored to directly or indirectly determine attainment of a standard(s).

Infiltration--the downward entry of water into the soil.

Infiltration rate--the rate at which water enters the soil.

Nutrient cycling--the movement of essential elements and inorganic compounds between the reservoir pool (soil, for example) and the cycling pool (organisms) in the rapid exchange (i.e., moving back and forth) between organisms and their immediate environment.

Organic matter--plant and animal residues accumulated or deposited at the soil surface; the organic fraction of the soil that includes plant and animal residues at various stages of decomposition; cells and tissues of soil organisms, and the substances synthesized by the soil population.

Permeability--the ease with which gases, liquids or plant roots penetrate or pass through a bulk mass of soil or a layer of soil.

Properly functioning condition--Riparian-wetland: adequate vegetation, landform, or large (coarse) woody debris is present to dissipate stream energy associated with high water flows, thereby reducing erosion and improving water quality; filter sediment, capture bedload, and aid in flood plain development; improve flood-water retention and ground water recharge; develop root masses that stabilize streambanks against cutting action; develop diverse channel and ponding characteristics to provide the habitat and water depth, duration and temperature necessary for fish production, waterfowl breeding, and other uses; and support greater biodiversity. The result of interaction among geology, soil, water, and vegetation.

Uplands-- soil and plant conditions support the physical processes of infiltration and moisture storage and promote soil stability (as appropriate to site potential); includes the production of plant cover and the accumulation of plant residue that protect the soil surface from raindrop impact, moderate soil temperature in minimizing frozen soil conditions (frequency, depth, and duration), and the loss of soil moisture to evaporation; root growth and development in the support of permeability and soil aeration. The result of interaction among geology, climate, landform, soil, and organisms.

Proper grazing use--grazing that, through the control of timing, frequency, intensity and duration of use, meets the physiological needs of the desirable vegetation, provides for the establishment of desirable plants and is in accord with the physical function and stability of soil and landform (properly functioning condition).

Reference area--sites that, because of their condition and degree of function, represent the ecological potential or capability of similar sites in an area or region (ecological province); serve as a benchmark in determining the ecological potential of sites with similar soil, climatic, and landscape characteristics.

Rill--a small, intermittent water course with steep sides; usually only a few inches deep.

Riparian area--a form of wetland transition between permanently saturated wetlands and upland areas. These areas exhibit vegetation or physical characteristics reflective of permanent surface or subsurface water influence. Lands along, adjacent to, or contiguous with perennially and intermittently flowing rivers and stream, glacial potholes, and shores of lakes and reservoirs with stable water levels area typical

riparian areas. Excluded are such sites as ephemeral streams or washes that do not exhibit the presence of vegetation dependent upon free water in the soil. Includes, but is not limited to, jurisdictional wetlands.

Significant progress--when used in reference to achieving a standard: (actions), the necessary land treatments, practices and/or changes to management have been applied or are in effect; (rate), a rate of progress that is consistent with the anticipated recovery rate described in plan objectives, with due recognition of the effects of climatic extremes (drought, flooding, etc.), fire, and other unforeseen naturally occurring events or disturbances. Monitoring reference areas that are ungrazed and properly grazed may provide evidence of appropriate recovery rates. (See Proper Grazing Use)

Soil density--(bulk density)--the mass of dry soil per unit bulk volume.

Soil moisture--water contained in the soil; commonly used to describe water in the soil above the water table.

Special status species--species proposed for listing, officially listed (T/E), or candidates for listing as threatened or endangered by the Secretary of the Interior under the provisions of the Endangered Species Act; those listed or proposed for listing by the State in a category implying potential endangerment or extinction; those designated by each Bureau of Land Management State Director as sensitive.

Species of local importance--species of significant importance to Native American populations (e.g., medicinal and food plants).

Standard--an expression of the physical and biological condition or degree of function necessary to sustain healthy rangeland ecosystems.

Uplands--lands that exist above the riparian/wetland area, or active flood plains of rivers and streams; those lands not influenced by the water table or by free or unbound water; commonly represented by toe slopes, alluvial fans, and side slopes, shoulders and ridges of mountains and hills.

Watershed--an area of land that contributes to the surface flow of water past a given point. The watershed dimensions are determined by the point past, or through which, runoff flows.

Watershed function--the principal functions of a watershed include the capture of moisture contributed by precipitation; the storage of moisture within the soil profile, and the release of moisture through subsurface flow, deep percolation to groundwater, evaporation from the soil, and transpiration by live vegetation.

Wetland--areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and which under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

APPENDIX D

LITERATURE SURVEY OF PLANT COMMUNITY CHANGES ASSOCIATED WITH LIVESTOCK EXCLOSURES IN OTHER ECOSYSTEMS

CASE STUDIES OF LONG-TERM VEGETATION DYNAMICS - UPLAND COMMUNITIES

Anderson and Holte (1981) reported a doubling in the cover of shrubs and perennial grasses after 25 years of rest from livestock grazing at Idaho National Engineering Laboratory (INEL). The 20-fold increase in grasses is thought not to be at the expense of shrubs, but related to increased seed reserves with the development of the perennial grass plants. The authors described a stage of slow recovery (the initial 10 years) followed by more rapid recovery related to seed reserves. No obvious seral stages could be defined. The study showed high variance between plots. Anderson and Inouye (1988) discussed the establishment of dense stands of non-native cheatgrass (*Bromus tectorum*) since monitoring the initial presence of non-native cheatgrass (*Bromus tectorum*) at the INEL sites in 1975. The authors noted that establishment occurred in the absence of fire and grazing and during a period of higher than average rainfall (1966-1975). A subsequent decrease during drier years implied a dependence on rainfall.

Burning of good condition plots, including perennial grasses, resulted in an increase in palatable grasses, in spite of an initial large increase in cheatgrass (Hosten 1995). The exclusion of cattle during the recovery period after burning is thought to be crucial (West and Hassan 1985, Hassan and West 1986).

Yorks et al. (1992) reported on the repetition of a 63-year-old transect covering several vegetation types, including sagebrush-dominated communities in Pine Valley, Utah. Many factors, including a moderation in livestock grazing, could be responsible for the substantial increases in canopy cover observed for several perennial grasses. This trend was less noticeable with sagebrush and attributed to a filling out of individual plants rather than increased numbers. The proportion of understory cover relative to total plant cover also showed an increase.

West et al. (1984) found that shrub-dominated communities (sagebrush semidesert) in 5 large paddocks in west central Utah did not show significant increases in perennial grasses following 13 years of rest under favorable precipitation conditions. The presence of annual grasses increased the possibility of community deflection towards cheatgrass domination.

Eckert and Spencer (1986) examined changes in shrub canopy cover, basal cover of herbaceous species, and frequency of occurrence of all species at 2 sites in northern Nevada. Both sites were managed under a 3-pasture rest rotation grazing system. One site showed no long-term change in frequency of species. The other site showed increased shrub cover and decreased palatable grass (*Stipa thurberiana* and *Agropyron spicatum*) cover over the 10 years examined. At one of the above sites, Eckert and Spencer (1987) found heavy periodic grazing to be the major cause for restriction of basal area growth and reproduction of palatable grass species over a 9-year study period.

VARIOUS LIVESTOCK EXCLOSURE STUDIES - UPLAND COMMUNITIES

Peters et al. (1993) commented on vegetation changes in 2 livestock exclosures near Burley and Castleford (Idaho) over 50+ years following crop-land abandonment. Using frequency of occurrence data, the authors showed that 1 site showed change toward late-seral perennial grass species (*Agropyron riparium* and *Poa secunda*) while the other site remained dominated by annuals and biennials.

Rose and Miller (1993) reported on inside versus outside differences of 13 livestock exclosures 66 years after establishment using cover and density data. No statistically significant differences in cover between grazed pastures and livestock exclosures were found for shrubs, although *Artemisia tridentata* showed increased density outside the livestock exclosure. Total grass cover and density of all perennial bunchgrasses, except *Poa sandbergii*, were higher inside the livestock exclosure. Forbs appeared to have a slightly higher cover and density within the livestock exclosures, although these changes appeared to be species-specific.

Robertson (1971) examined an eroded and grazed 20-acre tract 30 years after the initiation of rest. The plant community showed increased cover by all its life-forms and re-establishment by *Agropyron spicatum*. The highest recovery was exhibited by thurber needlegrass (a 7-fold increase). The only decreases were shown by annual forbs and locoweed.

Tueller and Tower (1979) emphasized the negative aspects of livestock exclosures – the stagnation effect arising from non-use of plants. As an example, they presented data showing an average 70% decline in the production of bitterbrush 10 years after fencing.

Pearson (1965) showed that above-ground production for sagebrush and several major bunchgrasses increased after 11 years of rest, in comparison to a site that had been grazed continuously for 70 years. An exception was *Phlox caespitosa*. This trend did not extend to below-ground production. The area being rested showed only 68% of the below-ground root mass of the grazed area.

Sanders and Voth (1983) found greater ground cover on grazed plots versus protected plots in the Boise National Forest after 46 years of periodic data collection. No clear trends could be found on a species basis.

Holecheck and Stephenson (1983) found that 22 years of rest from grazing in northwestern New Mexico had little influence on plant composition at either of 2 sagebrush semi-desert sites studied. Forbs had been eliminated from the study site prior to construction of the livestock exclosures by heavy sheep grazing.

Potter and Krenetsky (1967) showed a decrease in ground cover by both grass and forbs in protected and grazed plots occupied by sagebrush semi-desert in northwestern New Mexico.

Daddy et al. (1988) examined 3 sites with different grazing histories in northwestern New Mexico. Major phytomass contributors at the heavily grazed site were *Aristida sp.* and *Bromus tectorum*. *Brotclova gracilis* and *Hilaria jamesii* were more productive on grazed sites. The moderately grazed site had twice the herbaceous above-ground phytomass of the protected site.

Sneva et al. (1984) examined 10 livestock exclosures established in eastern Oregon during the drought years of the 1930s in big and low sagebrush-dominated vegetation. Frequency estimates were evaluated in 1937, 1960, and 1974. Frequency of all native grasses (*Agropyron spicatum, Festuca idahoensis, Sitanion hystrix, Stipa thurberiana, Poa sandbergii*) was shown to increase or remain stable both within and outside the livestock exclosures with one exception. *Poa sandbergii* decreased in 1 livestock exclosure located in low sagebrush-dominated vegetation. Several factors confounded the results: the switch from spring sheep to spring-through-fall cattle-grazing, higher precipitation following 1937, a decline in overall livestock grazing intensity, and the effects of the sagebrush defoliator moth during the early 1960s.

McLean and Tisdale (1972) noted dramatic changes in the range of plant communities within a set of livestock exclosures located in southern British Columbia.

Fescue Grassland Zone (McLean and Tisdale 1972): "Twenty nine years after fencing, there was five times the foliage cover of bluebunch wheatgrass, (*Agropyron spicatum*), Rough fescue, and Kentucky bluegrass (*Poa pratensis*) inside the livestock exclosure as compared with that outside. There was also a marked decrease in the amount of Sandberg bluegrass, low pussy toes, and dwarf fleabane." "The average herbage production during the period 1959 to 1966 showed a 98% greater yield inside the livestock exclosure compared with outside."

Fescue Grassland Zone (McLean and Tisdale 1972): "Twenty-nine years after fencing, there was a much greater cover of rough fescue, bluebunch wheatgrass, and junegrass inside the livestock exclosure, compared to an abundance of dwarf fleabane and Sandberg bluegrass outside. A review of earlier observations suggests that vegetation on the grazed area had not changed appreciably." "The 4-year average herbage yield shows 73% greater production inside the fence [no grazing] as compared with outside [grazed area] following 32 years of protection".
Text in brackets [ ] added for clarity.

Fescue Grassland Zone (McLean and Tisdale 1972): "Observations made in 1940 and 1950 suggest that considerable improvement took place in the first 10 years after fencing. There was a marked increase in bluebunch wheatgrass and decrease in sandberg bluegrass. Between 1950 and 1959, there was a striking increase in the proportion of rough fescue present. The data support these observations, for 21 years after fencing the foliage cover of rough fescue was 10 times greater inside the livestock exclosure than in the grazed area."

Ponderosa Pine Zone (McLean and Tisdale 1972): "Ten years after fencing, there was a considerably more bluebunch wheatgrass and rough fescue inside the livestock exclosure as compared with the grazed area and much less low pussy toes and Sandberg bluegrass. By the end of the next 9 years, there was still greater increase in the amount of bluebunch wheatgrass and rough fescue inside the livestock exclosure and a marked decrease in Sandberg bluegrass, needleandthread, and low pussy toes." "Average herbage production indicated a 60% greater yield inside the livestock exclosure as compared with that outside 15 years after fencing".

Ponderosa Pine Zone (McLean and Tisdale 1972): "Data recorded in 1959, 23 years after fencing, show that bluebunch wheatgrass plants inside the exclosure had over four times the foliage cover of those plants outside. Sandberg bluegrass on the other hand had much greater coverage on the outside as compared with inside. The poorer range condition outside was also reflected in the greater frequency of low pussy toes. In the 9 years following 1959 there was a marked increase in bluebunch wheatgrass both inside and outside the exclosure, and increase in pasture sage inside and a decrease in low pussy toes." "The average herbage yield indicated a 160% increase in production inside the exclosure over that outside after 23 years of protection."

Ponderosa Pine Zone (McLean and Tisdale 1972): "General observations and limited quadrat data obtained in 1949 and 1959 suggest that the greatest improvement took place in the 13 years following 1936, and continued to a lesser extent over the next ten years. During the initial period there was a marked increase in bluebunch wheatgrass. There was also a decrease in needleandthread, low pussy toes, and rabbitbrush." "The average herbage yield indicates a 124% increase in production inside the exclosure as compared with outside."

Ponderosa Pine Zone (McLean and Tisdale 1972): "Records taken in 1960 (23 years after fencing) indicate more bluebunch wheatgrass and silky lupine inside the exclosure as compared with the grazed area. There was also less western needlegrass (Stipa occidentalis), low pussy toes, shaggy fleabane, sixweeks fescue, and cheatgrass inside the exclosure. Ten years later the bluebunch wheatgrass had decreased and cheatgrass increased inside the exclosure because of gopher activity. Ground disturbance by gophers was

greater inside the exclosure presumably as a result of protective cover for the rodents provided by old plant growth."

In studies under Ponderosa pine forests of northern Arizona, Arnold (1950) noted grazing related shifts away from native bunchgrasses and towards weeds and undesirable annual grasses. The authors noted the following:

"Under protection from grazing the taller bunchgrass species dominated the herbaceous composition within the five exclosures. The species that escaped or withstood a high degree of repeated grazing [outside the exclosures] were less abundant [inside the exclosures]."

"...the bunchgrass were highly sensitive to grazing, particularly under the lighter [tree] canopy [closure] classes where grazing was intense."

"By repeated removal of the tall stems and leaves [by livestock] the bunchgrasses on the grazed areas were reduced to a small part of the total herbaceous cover. This result contrasts sharply with those obtained from the ungrazed exclosures, where bunchgrass species dominated the herbaceous composition."
Text in brackets [ ] added for clarity.

CHRONOSEQUENCE APPROACHES - UPLAND COMMUNITIES

Tueller and Platou (1991) determined a successional gradient in northern Nevada by examining plant community changes moving away from a watering point. The observed pattern was determined to be different from theoretical pathways. *Agropyron spicatum* was found to vary greatly between plots but was greatly reduced in the 2 plots closest to the watering points. *Bromus tectorum* cover was found to be highest closest to the watering points, while *Lupinus caudatus* and *Phlox longifolia* showed the opposite trend. *Poa secunda* generally showed a lack of trend. Cover values seem to correspond well with density data. *Sitanion hystrix* showed relatively high densities in low and high seral stage plots. Sagebrush density appears to vary considerably, being highest in the third and last plots, thus not yielding a clear pattern. In general, vegetation cover increased with decreasing condition, while litter cover and microphytic cover was highest in the plots furthest away from the water.

An examination of ten piospheres on the Snake River plains of Idaho yielded different results (Hosten 1995). While species level trends were apparent within individual piospheres, species trends were not replicated at the landscape level. This may be due to the diversity of environmental factors at larger spatial scales. Across the landscape, the least impacted transects (furthest from the watering points) were most similar to nearby relict (ungrazed) areas. The data stress the importance of basing management on site-specific plant community monitoring.

Studies of bitterbrush habitat types in north central Washington also suggest that moderately livestock impacted communities were more similar to reference communities than heavily impacted sites (Youtie et al. 1988). As with sagebrush steppe communities, areas of intense livestock impact showed higher shrub cover and lower bunchgrass cover (Youtie 1988, Hosten 1995). General landscape-level patterns of community change may be obscured by the interaction of other ecological processes such as fire.

Many of the above upland studies were conducted in the Great Basin, however, a generalized model of plant community dynamics within an oak woodland environment supports some of the common plant community changes identified in the above literature, especially regarding annual and perennial grass dynamics. George et al. (1992) associates annualization of grasslands in an oak woodland environment with poor livestock management and identifies the difficulty of restoring "Mediterranean" grasslands back to native perennial domination [see the weed management plan and literature review in Appendix GG of the CSNM DRMP (USDI 2001)].

RIPARIAN COMMUNITIES

The importance of riparian zone habitat to the maintenance of biological diversity at the landscape and local scales cannot be over emphasized. Riparian zones are one of the most limited, (Elmore 1987) and most sensitive (Kaufman and Krueger 1984) habitats in the western landscape. Riparian zones are the most productive and diverse habitats in much of the west (Thomas et al. 1979) and frequently produce 10 times the forage of adjacent upland forested sites (Elmore1987).

The link between riparian vegetation diversity, especially in the shrub and overstory layers, and riparian wildlife diversity is well documented (Kauffman and Krueger 1984, Taylor 1986, Szaro et al. 1985). Wildlife populations adjacent to riparian zones are affected by habitat conditions and resultant wildlife populations in the riparian zones (Kauffman and Krueger 1984). Healthy riparian habitat also usually supports species not found in the uplands and thus contributes to species diversity at larger landscape scales.

Plant compositional and structural changes in riparian communities are better understood. Poor livestock management can result in the loss of woody and herbaceous species critical for stabilizing streambanks.

In a study comparing riparian vegetation between grazed areas and ungrazed livestock exclosures northwest of Fort Collins (Colorado), Schultz and Leininger (1990) found significant differences in vegetation structure and composition. Total vascular vegetation and the abundance of shrubs and grasses were greater in livestock excluded areas, while forbs showed similar abundance to grazed areas. Livestock excluded areas showed higher litter and lower bare ground.

The recovery of woody riparian vegetation appears to occur rapidly following livestock exclusion. In south central Washington, Rickard and Cushing (1982) show the re-establishment of willow (*Salix amygdaloides*) in streamside riparian areas within 10 years of livestock exclusion.

APPENDIX E

RIPARIAN SURVEY FORMS AND PROCEDURES

RIPARIAN VEGETATION COMMUNITIES
HABITAT DIVERSITY INDEX SYSTEM
REMARKS BY QUARTER MILE
RIPARIAN ZONE CONDITION
OBSERVED APPARENT TREND
SPECIES LIST
HORIZONTAL – VERTICAL DISTRIBUTION
STEP-POINT TRANSECT
SKETCH OF STREAM SECTION
EXAMPLES OF FORMS

EXCERPT FROM:
RIPARIAN ZONES: CLASS I & II STREAMS
IN BUTTE FALLS AND KLAMATH RESOURCE AREAS
1980 – 1982

MONTGOMERY AND CULBERTSON, 1983
BUREAU OF LAND MANAGEMENT

To gather similar data from all sites and facilitate summarizing data, standard forms are utilized. The following contains samples of each form and a brief explanation of its use and, for some, a more detailed explanation of meaning and values.

1. Riparian Vegetative Community

   This is the basic form for obtaining stream vegetation data. It contains spaces for species and foliar cover, location, and various parameters pertinent to this community which set it apart from others. The spaces are self-explanatory.

2. Habitat Diversity Index System

   The Habitat Diversity Index (HDI) is one that incorporates most of the basic premises of wildlife habitat management. It can be used to measure the ability of a habitat site to provide food, cover, and reproductive requirements for a species or a group of species. It deals with the number of potential niches available for expected species richness and can be used graphically to predict the presence of a "feature" species or group of species on the site. The data used in calculating the Habitat Diversity Indices (HDI's) can be used in determining limiting factors for a species or group of species for a selected habitat site. The system employs data in such a manner that the loss or gain in species richness or relative abundance of a select species due to a management action (i.e. timber harvest) can be predicted.

   Most of the data required to calculate the HDI's can be obtained from the range management portion of the Soil-Vegetation Inventory Method (SVIM) effort. There need not be any duplication of effort. If SVIM data is not available, an HDI for a standard habitat site can be calculated with minimum field time (approximately 30-45 minutes). Additional sampling may require more time due to the complexity of the site or the severity of proposed action, but for the majority of cases it is not necessary. In certain western Oregon districts where no SVIM data is yet available, timber management systems such as the Operation Inventory (O.I.) or Timber Production Class Capability can be used in part.

   The HDI system is basically used to record the physical attributes of a standard habitat site and then calculate the potential use by wildlife species of that site. The greater the HDI, the more probable that a greater number of species (species richness) use that site for their life needs because of the greater "opportunities" available.

   The habitat diversity indices were calculated for each habitat site based on information on the following parameters: plant species present (plant forms i.e. grass, shrub, trees), vertical and horizontal spatial distribution of plant species present, presence of rocks greater than ten inches diameter and the presence of persistent litter.

   Sites were evaluated on the following criteria:

   a. Plant Forms

      A numerical value for plant forms is assigned based on the presence or absense of the various plant forms. A value of two points was assigned

for growth forms having greater than 2% foliar cover. An optional one point value could be assigned if the plant form was present along the site but comprised less than 2% folier cover.

The plant form categories are: Submergents/emergents, sedges/rushes, grasses, forbs, upright shrubs, hardwood trees, and conifers.

Example:

POPR		PEFR5		BENE2	(Species)
Grass		Forb		Upright Shrub	(Veg. Type)
2	+	2	+	2	= 6 Points

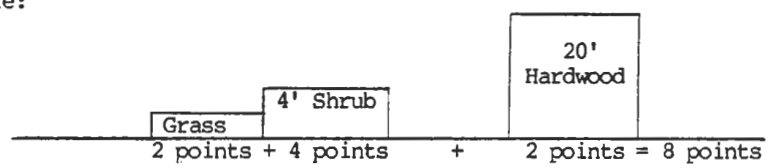
If all plant forms are present, a value of 14 points is assigned.

b. Edges

Edges are present spatially both vertically and horizontally, each is considered separately. Vertical edges are assigned a point value if the growth form (grass and/or forbs) or height group is present.

The vertical edge categories are: Grass/forb, four feet, four to fifteen feet, fifteen to forty-five feet, forty-five to ninety feet, and ninety feet and above. Each category is valued at two points except the four feet high which is four points. These are based on ocular observations.

Example:

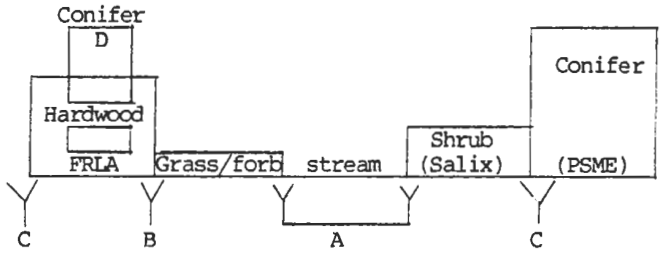


Fourteen points possible if all vertical layers represented.

Horizontal edges are present when different growth forms grow side by side. Each growth form abutting another growth form has a value of two points. The horizontal edge categories are:

streamside	shrub: hardwood
grass/forb: shrub	shrub: conifer
grass/forb: hardwood	hardwood: conifer
grass/forb: conifer	riparian: upland

Example:



Streamside = 2 points (A)
Riparian: upland = 2 points (C) = 8 points
Grass/forb: hardwood = 2 points (B)
Hardwood: conifer = 2 points (D)

Sixteen points possible if all potentials are present.

c. Water Availability

The water availability categories are based on seasonal or perennial surface flows. Point values are the perennial streams six points, intermittent streams four points, and seasonal streams two points. Since a stream is generally only one of the above, a maximum of six points is assigned.

d. Unique Habitats

Unique habitats are generally small in comparison to the overall habitat, but unique in nature. Each unique habitat was assigned a value of one point. Examples of unique habitats are:

cliffs	Gravelbar greater than 50' long
talus slope	beaver pond(s)
cave	thick streamside grass cover
spring	stable cutbank greater than 8' high
cattails	

e. Riparian Zone Condition

The value of the condition of the riparian zone is reflected in the points for each condition class. The condition classes and point values are:

Excellent	6 points
Good	4 points
Fair	2 points
Poor	0 points

Points from one category only will be assigned.

f. Width of Riparian Zone

The width of the combined sides of the riparian zone are assigned point values by width classes. The width classes and their point values are:

0-20 feet	2 points
20-40 feet	4 points
40 feet or wider	6 points

Only one category may be utilized, that which fits the average riparian zone width.

g. Snags

Snags are grouped by height and DBH into two groups: less than six feet tall and less than eleven inches DBH and greater than six feet tall and eleven inches DBH. Point values are assigned by the number of snags per acre in each size class. If both size classes are present, only the larger value is assigned. One additional point is assigned if both conifer and hardwood snags are present.

Point values for group of snags are:

Number of Snags Per Acre	Less than 6' tall & less than 11" DBH	Greater than 6' tall & greater than 11" DBH
1 - 3	1 point	2 points
3 or more	2 points	3 points

Estimates are by ocular calculation. A maximum of four points is allowed.

The Habitat Diversity Index equals the sum of the component sections, A through G, above. Low HDI values represent habitats with little diversity. High HDI's represent habitats with high diversity and complexities.

3. Remarks by Quarter Mile

This page explains itself well. It is for any notes not covered in the field forms. It may be utilized as a place for a narrative of the site. The items recorded may include any from the list above or any other pertinent information such as a special habitat feature.

Include: management of adjacent habitat, type of adjacent habitat; character of stream channel; continuity of habitat, bank conditions, layers, etc.; tributaries and springs, seepages and size; snags, number and size, location of clumped; cliffs, rock outcroppings, or any other special feature; any type of irregularity of difference in the type of habitat or expansion of points in main section.

4. Riparian Zone Condition

The evaluation of the condition includes five aspects (see Rating Form and Criteria Sheet). The two primary are vegetation age and composition, and bank condition. These two are rated for all streams. The secondary three; logging, grazing, and roads are rated only as they apply. The rating system is a sliding scale of 0-20 (15) points for each aspect considered. The closer to excellent condition, the higher the score or rating.

If an area has been logged and had a detrimental effect on the stream, then 20 points are added to the total possible points and the appropriate deductions made from that total possible. Depending on the activities affecting a stream, the points may or may not be added. For example, if a riparian zone had been previously logged and had recovered from that logging, yet was rated in fair condition due to other influences, then logging points would not be added. This is because the design of the rating system would ultimately increase the condition of the stream rather than decrease it.

Therefore, the rating may have 40, 60, 80, or 100 points possible depending on the riparian zone use. The assigned points are taken as a percentage of the total possible which equates to condition.

5. Observed Apparent Trend

The evaluation of the trend involves four primary observations and one secondary. The first four are plant, vigor, seedling establishment, vegetation composition, and surface litter (see rating and criteria forms). These are rated on all streams riparian zones. The secondary value of pedestalling is rated only if pedestalling is present. If present, the value of damage from fifteen possible points is subtracted from the total of the primary factors. This value gives a rating relative to the changing complexity of the area.

The vegetation composition is also examined under the condition rating. They are, however looking for different factors relating to composition and rated at different values.

6. The wildlife observed section is a space for recording the sighting of animals, tracks, scat or calls that indicate presence.

7. The Horizontal-Vertical Distribution (H/V Dist)

The horizontal-vertical distribution (H/V Dist) drawings graphically show a two-dimensional outline of existing woody vegetation. It is useful for defining layers and serves as a record for the future. Photographs were taken at many of the sites and in some cases served as the H/V distribution record.

8. The Step-Point Transect

The Step-Point Transect is a method of gathering data about species composition at the various canopy levels. Estimates of foliar cover may frequently exceed 100% due to overlapping forage layers. The step-point demonstrates that layering and provides raw data for percentages of each canopy, species or ground cover types. The step-point is a selection method with an imaginary line from your toe through all canopy layers. Any plant touching that line is registered on the step point form in its proper canopy layer. Generally, 50 one-meter steps were registered for each bank of the stream, and a perpendicular transect was run from the stream to the outer edge of the riparian zone, for each side.

9. Sketch of Stream

A sketch of the stream section surveyed was drawn during the 1981 and 1982 surveys. These are useful for recording features of the stream or riparian zone such as cutbanks, waterfalls, groups of snags, etc.

FORM # 1

RIPARIAN VEGETATIVE COMMUNITY

	% PRESENT
GRASSES & GRASSLIKE	
MOSS	
FORBS	
SHRUBS	
TREES	

STREAM _____ CLASS _____

T _____ R _____ S _____ MILE _____

Resource area _____ tenths _____

DATE _____ PHOTO _____

EXAMINERS _____ / _____

PLANT COMMUNITY _____

CANOPY COVER $\bar{X}$ _____ % (_____ TO _____)

CLUMPED _____ EVEN _____

STREAM GRADIENT $\bar{X}$ _____ % (_____ TO _____)

STREAM WIDTH $\bar{X}$ _____ (_____ TO _____)

STREAM DEPTH $\bar{X}$ _____ (_____ TO _____)

BANK SLOPE: RIGHT $\bar{X}$ _____ % (_____ TO _____)

LEFT $\bar{X}$ _____ % (_____ TO _____)

RIPARIAN ZONE WIDTH

RIGHT $\bar{X}$ _____ (_____ TO _____)

LEFT $\bar{X}$ _____ (_____ TO _____)

STREAMBED COMPOSITION silt sand gravel cobblestone boulder bedrock

ELEVATION _____

ACRES _____

SWA # _____

CHANNEL WIDTH $\bar{X}$ _____ (_____ TO _____)

Temperature: TIME _____ H_2O _____ AMB _____

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FORM # 2

HABITAT DIVERSITY INDEX

PLANT FORMS

emergents/submergents	2	___
sedges/rushes	2	___
grasses	2	___
forbs	2	___
upright shrubs	2	___
hardwood trees	2	___
conifers	2	___
Total Points		_____

UNIQUE HABITATS 1 point ea.

cliff	___
talus slope	___
cave	___
stable cut bank 8 ft high +	___
gravel bar 50 ft long +	___
beaver pond	___
thick grass cover at streamside	___
spring	___
cattails	___
other....	___
Total points	_____

EDGES

Vertical layers		
grasses/forbs	2	___
4 ft.	4	___
4 - 15 ft.	2	___
15 - 45 ft.	2	___
45 - 90 ft.	2	___
90 ft. and above	2	___
Total points		_____
Horizontal layers		
streamsiede	2	___
grass/forb:shrub	2	___
grass/forb:hardwood	2	___
grass/forb:conifer	2	___
shrubs:hardwood	2	___
shrubs:conifer	2	___
hardwood:conifer	2	___
riparian:upland	2	___
Total points		_____

WATER AVAILABILITY

perrennial	6	___
intermittent	4	___
seasonal	2	___
Total points		_____

RIPARIAN ZONE CONDITION

excellent	6	___
good	4	___
fair	2	___
poor	0	
Total points		_____

WIDTH OF RIPARIAN ZONE

0 - 20 ft.	2	___
20- 40 ft.	4	___
40 ft. or wider	6	___
Total points		_____

SNAGS

#/acre	6' tall 11" DBH	6' tall 11" DE
1-3	1 point	2 points
3+	2 points	3 points
both hardwood and conifer snags		1 point

Total points _____

HDI total _____

FORM #

4. RIPARIAN ZONE CONDITION

PARAMETER	POINTS POSSIBLE	POINTS ASSIGNED	
Vegetation age and composition	0-20	_____	80 - 100 excellent
Bank condition	0-20	_____	55 - 79 good
Grazing impacts	0-20 n/a	_____	30 - 54 fair
Logging impacts	0-20 n/a	_____	0 - 29 poor
Roads and/or crossings	0-20 n/a	_____	
TOTALS			

$$\frac{\text{points assigned } \_\_\_\_\_}{\text{points possible } \_\_\_\_\_} \times 100 = \_\_\_\_\_ \% \text{ of possible}$$

5. OBSERVED APPARENT TREND

	Points	
Plant vigor	_____	51 - 75 upward
Seedling establishment	_____	
Vegetative composition	_____	26 - 50 static
Surface litter	_____	
Pedestalling	_____	0 - 25 downward
TOTAL	_____	

6. WILDLIFE OBSERVED

AVIAN SPECIES	MAMMALIAN SPECIES	HERPTILES AND FISH

CRITERIA FOR FORM # 4

CRITERIA FORM

STREAM RIPARIAN ZONE CONDITION EVALUATION

80 - 100% excellent
55 - 79 good
30 - 54 fair
0 - 29 poor

VEGETATION AGE AND COMPOSITION

16 - 20 Desirable trees and shrubs numerous, mature and immature stages present. Grasses and forbs vigorous and common.

11 - 15 All age classes of trees and shrubs, fewer mature trees, seedlings common. Grasses and forbs present, minor disturbances revegetating well.

6 - 10 Moderate numbers of trees and shrubs, mostly single age class. Grasses and forbs present, including invader species.

0 - 5 Trees and shrubs few and/or decadent, single age class, few seedlings present. Many invader species present.

BANK CONDITIONS

16 - 20 Bank stable, failures rare; gullies, if present, in stable condition.

11 - 15 Bank failure and slumps uncommon and small, adequately revegetated; gullies, if present, with some active erosion.

6 - 10 Occasional bank failure, some severe; root mats disturbed; gullies well developed with moderate erosion.

0 - 5 Bank sloughing common, erosion and siltation evident; gullies deep, V-shaped, and activity eroding.

GRAZING IMPACTS (at date of evaluation)

16 - 20 Trails few, not eroding; minimal grazing, less than 10% new growth (current grazing season).

11 - 15 Trails not eroding; moderate grazing/browsing, less than 30% new growth.

6 - 10 Frequent cattle trails, compaction, trampling and erosion light to moderate; 30 to 50% browsing/grazing of new gorwth; moderate pedastaling.

0 - 5 Trails increasing runoff and erosion; heavy browsing/grazing, greater than 50% of new growth; moderate to heavy pedastaling.

LOGGING IMPACTS

16 - 20 None, logging greater than 100m from stream.

11 - 15 Logging to stream, hardwoods and shrubs remain, occasional siltation.

6 - 10 Some vegetation remains after logging, debris in stream, siltation present

0 - 5 Debris in stream, silt jams, no buffer eroding banks common.

PARALLEL ROADS AND/OR CROSSINGS

16 - 20 Minimal effect or limited to parallel roads some distance from stream, or a single crossing that is fully revegetated.

11 - 15 Occasional minor slough from road bank; areas previously impacted have recovered; crossings infrequent, mostly revegetated.

6 - 10 Light to moderate erosion of road cuts and crossings; some revegetation, limits riparian zone width, not directly adjacent to stream.

0 - 5 Moderate to severe erosion of road cuts; limits width of zone; little vegetative cover.

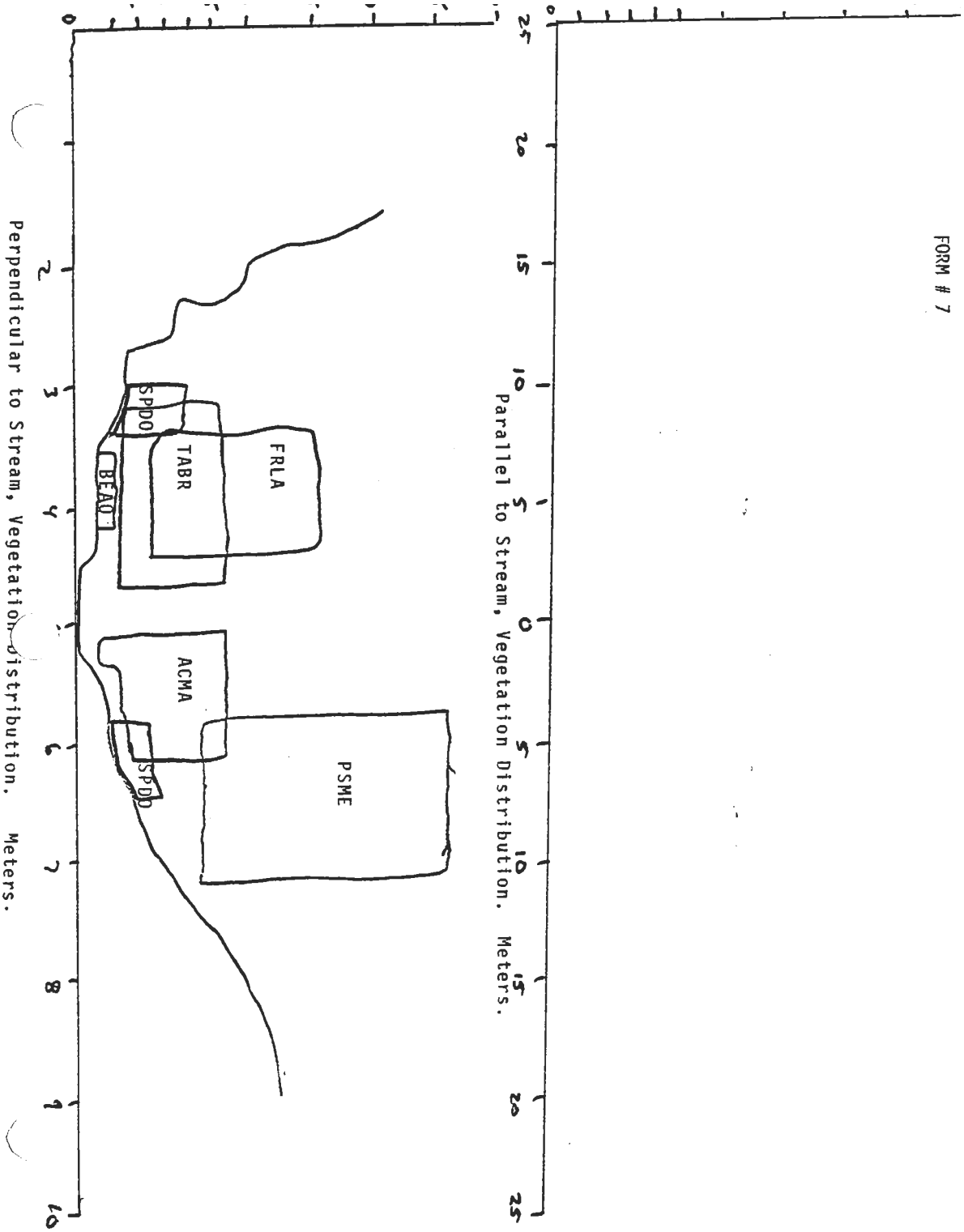
CRITERIA FOR FORM # 5

51 - 75 upward
26 - 50 static
0 - 25 downward

CRITERIA SHEET

OBSERVED APPARENT TREND

	POINTS	PLANT VIGOR
	16-20	Desirable grasses forbs and shrubs vigorous, showing good size and color and producing abundant herbage.
	11-15	Desirable grasses, forbs, and shrubs have moderate vigor. Medium size, fair color, and producing moderate amounts of herbage. Some seedstalks present.
A	6-10	Some increaser and invader species present. Desirable vegetation has low vigor, with small size and poor color. Some plants dead or partially dead. Few seedstalks or seedheads present.
	0- 5	Increaser and invader species abundant. Few desirables remain and many are dead or dying.
		SEEDLINGS
	16-20	Abundant seedling establishment of desirable vegetation. Most age classes represented by vegetation. Few seedlings or invaders or increasers.
	11-15	Moderate seedling establishment of desirable plants. Some age classes
B		represented. Some invader and increaser seedlings present.
	6-10	Few seedlings or desirable vegetation and few age classes represented. Many increaser and invader species present.
	0- 5	Mostly seedlings of invaders or increasers present. Mostly a single age class.
		VEGETATION COMPOSITION
	16-20	Riparian vegetation highly diverse with many vertical layers represented. Good woody plant development. 80-100% canopy cover.
	11-15	Vegetation moderately diverse with at least 3-4 vertical layers represented.
C		Woody vegetation common. 65-79% canopy cover.
	6-10	Fair diversity with at lease 2-3 vertical layers. Some woody vegetation 40-64% canopy cover.
	0- 5	Little diversity with only one or two levels. Woody vegetation scarce or absent. Less than 40% canopy cover.
		SURFACE LITTER
	11-15	Surface litter is plentiful and continuing to accumulate.
D	6-10	Moderate movement of surface litter is apparent and deposited against obstacles.
	0- 5	Very little surface litter remaining.
	Total A+B+C+D	Subtract points taken from E if E applicable
		PEDESTALS
	11-15	There is little visual evidence of pedestalling. Those pedestals present are sloping or rounded and accumulating litter; desirable forage grasses may be found along edges of pedestals.
E	6-10	Moderate plant pedestalling. No visual evidence of healing or deterioration. All rock and plant pedestals may be occuring in flow patterns.
	0- 5	Most rocks and plants are pedestalled. Pedestals are sharp, wide, and eroding often exposing grass roots.


FORM # 7
Parallel to Stream, Vegetation Distribution. Meters.
Perpendicular to Stream, Vegetation distribution. Meters.
FRLA
TABR
SPDO
BEAU
ACMA
SPDO
PSME

FORM # 8

STEP POINT DATA

Stream:
Mile:
T.____R.____Sec.____Date

Left Bank Aspect:

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
							ERLA													
							SPDO													
C1							POPR													
GRD							B													

	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
C3																				
C2																				
C1																				
GRD																				

	41	42	43	44	45	46	47	48	49	50
C3										
C2										
C1										
GRD										

Left Bank Aspect:

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
C3																				
C2																				
C1																				
GRD																				

	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
C3																				
C2																				
C1																				
GRD																				

	41	42	43	44	45	46	47	48	49	50
C3										
C2										
C1										
GRD										

Examiners_____

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