

## Areas of Critical Environmental Concern

Areas of Critical Environmental Concern (ACECs) are parcels of public land that require additional management attention to protect special features or values. ACECs may be established to protect important historic, cultural, scenic values; fish, wildlife, other natural resources; or human life and safety. Resource Natural Areas (RNAs) are a specific type of ACEC that always contain natural resource values of scientific interest. The management of RNAs is primarily for research and educational purposes. Outstanding Natural Areas are another specific type of ACEC that exhibit outstanding scenic splendor, natural wonder, or scientific importance.

Four designated ACECs, three of which are RNAs, are located in the project area. Designation of these ACECs is to provide special management and protection to areas with special characteristics, such as, diverse ecosystems, landforms, plant communities, and critical wildlife habitat.

Table 4-2. Areas of Critical Environment Concern

ACEC/RNA Name	Guano	Thousand Virgin
Guano Creek-Sink Lakes	X	
High Lakes	X	
Hawksie-Walksie	X	X
Long Draw		X

### Guano Creek/Sink Lakes RNA/ACEC

The area that surrounds Guano Creek, including the uplands (Sink Lakes), was declared a Research Natural Area /ACEC in November 2003 (USDI-BLM 2003a). (All RNAs in the BLM are managed as ACECs). The Guano Creek/Sink Lakes RNA/ACEC encompasses 11,199 acres and includes all of the Guano Creek WSA. HMNAR is adjacent to the northern boundary of the ACEC. Some of the reasons for designating this RNA/ACEC were to protect three sensitive plant species and Oregon Natural Heritage Program ecosystem “cells” of biological diversity (BLM 1988).

### Hawksie-Walksie ACEC/RNA

About 17,339 acres will be designated an ACEC and a RNA. New rights-of-way in the ACEC/RNA will be excluded, even if released from wilderness study.

### High Lakes ACEC

About, 38,985 acres will be designated as an ACEC. The southern boundary of the ACEC will be set back 100 feet from the northern edge of the State Highway 140 right-of-way. The northern boundary will extend to the southern boundary of HMNAR and Guano Creek WSA.

## **Long Draw RNA/ACEC**

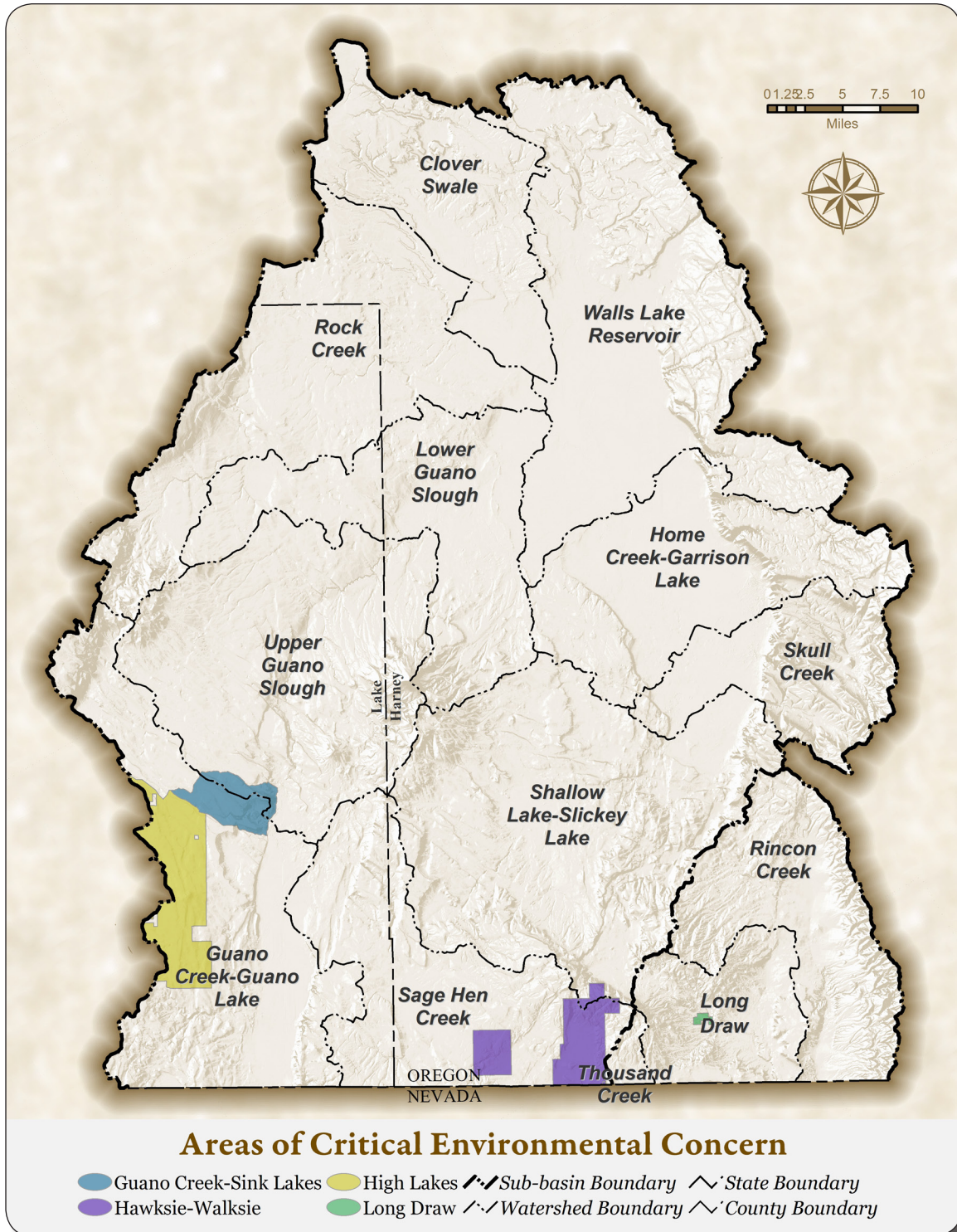
This 441-acre RNA/ACEC is located in southwest Harney County about four miles from the Nevada border. The site is about 2 miles south of Lone Mountain and about 3 miles east of Hawk Mountain. The elevation at the site is 5,000 feet. The relevant and important value for this area is a plant community type. Designation of this RNA/ACEC was for protecting a unique terrestrial ecosystem containing Indian ricegrass and needle and thread needlegrass in association with Wyoming big sagebrush. The drainages within the natural area contain the key elements or values of the RNA/ACEC, and the ridgetops are a Wyoming big sagebrush/bottlebrush squirreltail plant community.

## **Poker Jim Ridge RNA**

Poker Jim Ridge is a ridge and escarpment in the HMNAR with Western juniper, Little sagebrush, Bluebunch wheatgrass, and Big sagebrush. Established in 1972, the RNA is an example of a juniper savannah in the Basin and Range province. The area provides habitat for California bighorn sheep, mule deer, and pronghorn. No fire history of Poker Jim Ridge is available, but the age structure of the juniper stands indicates that the area has been free of stand replacing fires for the past 150 to 200 years (USDA Forest Service 1984).

## **Issues, concerns and action items.**

- Improve public awareness of ACECs, their resources, management, and values.



Map 4-2. Areas of Critical Environmental Concerns.



## Recreation

Federal agencies including the BLM, USFS, and USFWS, administer over 51% of the lands in Oregon, and 76% in the sub-basins making them the largest managers of outdoor recreation and land facilities in the state (Oregon Parks and Recreation 2000) and sub-basins. These agencies play a major role in providing dispersed recreation opportunities as well as resource protection of some of the state's most unique and important scenic, natural, and cultural resources. BLM recreation management objectives for the area include:

- Encourage a wide range of recreation activities in addition to hunting and fishing;
- Cooperate with development of High Desert Trail;
- Limit vehicle use in campgrounds to ingress and egress;
- Provide quality recreational opportunities for the public;
- Protect, preserve, and promote recreational resources;
- Provide facilities, information, and services to promote safety and a maximum recreational experience.

Dispersed recreation opportunities exist throughout the entire project area, and a State Scenic Byway/Tour Route runs through the area. Although the majority of visitors to the area are from Oregon, an increasing number are from out of state and abroad. Recent publications and broadcasts featuring BLM attractions have increased visitation to the area. Sightseeing, driving for pleasure, fishing, and hunting are among the most popular types of dispersed recreation, according to the Southeast Oregon Recreation Plan for Harney, Lake and Malheur Counties. Non motorized boating, horseback riding, camping, hiking, wildlife viewing, and Off Highway Vehicle (OHV) use are also popular activities in the area. The study area attracts hang gliders and para-sailers.

### Recreation Activities

**Hunting/Fishing.** Hunting and fishing information is not readily available; specifically, for the Guano and Thousand-Virgin sub-basins. However, information is available for the Andrews Management Unit/Steens Mountain Cooperative Management and Protection Area, which encompasses part of the Guano and Thousand-Virgin sub-basins and other areas to the west and north. That area includes all or portions of the Beatys Butte, Juniper, Steens Mountain, and Whitehorse ODFW Wildlife Management Units (WMUs). Deer, pronghorn, California bighorn sheep, and Rocky Mountain elk are hunted in this area. During the 2000 Hunting Season in the three WMUs combined, there were 8,323 hunter days spent hunting deer with a 47 percent success rate; Approximately 3,237 hunter days spent hunting elk with a success rate of 13 percent; and 923 hunter days spent hunting pronghorn with an 87% success rate (ODFW 2002). Upland bird hunting, primarily for chukar, is a popular late fall and winter activity. Fishing is a popular activity in the area with its variety of fish species including hybrid Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*), Redband trout, and several others.

**Hiking.** Several hiking trails are located in the area.

**Camping.** Camping occurs throughout the area, but primarily camping is primitive and dispersed.

**Winter Recreation.** The primary winter activities are cross-country skiing, snowshoeing, and snowmobiling.



## Special Recreation Permits

Special recreation permits (SRPs) are required for specific recreational uses of the public lands and related waters. They are issued to manage visitor use, protect natural and cultural resources, and provide a mechanism to accommodate commercial recreational uses. The types of permits are listed below:

- **Commercial:** Recreational use of public lands and related water for business or financial gain. Examples are scenic tours, outfitters and guides, trail rides, cattle drives, photography associated with recreational activity, and use by scientific, educational, and therapeutic or nonprofit organizations when certain criteria are met.
- **Competitive:** Any organized, sanctioned, or structured use, event, or activity on public lands in which two or more contestants compete and either 1) participants, register, enter or complete an application for the event, or 2) a predetermined course or area is designated. Examples are OHV races, horse endurance rides, or mountain bike races.
- **Organized Group:** Permits for noncommercial and noncompetitive group activities and recreation events. Examples include a scout campout, a large family reunion, or a school group activity.
- **Commercial Day Use:** Special commercial permit provided by the Burns BLM for use within limited locations in the area. It is a one-day permit available for commercial activities such as vehicle tours. Commercial Day Use permit stipulations are developed on a case-by-case basis.
- **Special Area:** Officially designated by statute or Secretarial order. Examples include camping in long-term visitor areas in California and Arizona or floating on many BLM managed rivers.
- **Vending:** Temporary, short-term, nonexclusive, revocable authorizations to sell goods or services on public land in conjunction with a recreation activity. Examples are T-shirt sales in conjunction with an OHV race, a hot dog stand at a motocross event, firewood sales in a BLM campground, and shuttle services.

## Issues, concerns and action items.

- HCWC supports the written BLM recreation management objectives for the sub-basins.

## Transportation

The area has private, state, county, and BLM roads. Some roads are maintained to a high standard while others receive limited maintenance. Road uses include rancher access for livestock management, access to private lands, the public seeking recreational opportunities, and agency administration. Many of the roads serve as important access routes to public lands.

Priorities for road maintenance in the area are: (1) safety of users, (2) high-use roads, (3) resource protection, and (4) all other roads and routes. Road construction has been limited to upgrading segments of existing routes to improve access or alleviate maintenance or environmental problems.

OHV use is frequently associated with hunting, fishing, and driving for pleasure and occurs for administrative purposes such as management of livestock and maintenance of range projects. In accordance with 43 CFR 8342.1, all public land in the area is designated as open, limited, or closed with regard to vehicle use. In an open area, all types of motorized and mechanized vehicle use are permitted at all times (43 CFR 8340.0-5(f)). The BLM designates areas as “open” for intensive OHV and mechanized vehicle use where no compelling resource protection needs, user conflicts, or public safety issues exist to warrant limiting cross-country travel. In a limited area, motorized and mechanized vehicle use is restricted at certain times, in certain areas, to designated routes, to existing routes, to certain vehicular uses, or seasonally (43 CFR 8340.0-5(g)). The BLM designates areas as “limited” in order to meet specific resource management objectives. In a closed area, motorized and mechanized vehicle use is prohibited (43 CFR 8340.0-5(h)).

### **Issues, concerns and action items.**

- Educate the public as to the potential effects of OHV use in non-permitted areas.
- Educate the public that different areas have various OHV use designations and that the public has access to areas of varying types of OHV use.





---

## Economic Activity

The BLM makes commodities available for use by the private sector. The BLM rangelands are available to private ranching concerns on a renewable permit basis. A fee is collected for each grazing head of livestock. Salable minerals sources are a small source of revenue where sand, gravel and rock aggregate are sold for use on private land and they contribute to the economy of the area where they are used on state, county, and BLM roads under a fee use permit. Since there are no commercial forestlands or operations, or no locatable or leasable energy or minerals facilities in this area, these resources are not a source of economic revenue.

### Wild Horses

The BLM conducts wild horse gathers approximately every three to four years. These animals are available for adoption through the Wild Horse Adoption Program. The contractors hired to conduct the gathers, are from out of the area and the money raised through the adoption fees is sent directly back to the national program. Harney County does not see a direct economic benefit from these activities; however, there are indirect benefits associated with the rare horse breeds and the adoption activities, which attract visitors, attention to the area, and lead to local spending that would not otherwise occur.

### Agriculture

Agricultural activities in Harney County consist primarily of the production of hay, forage and livestock. Harney County agriculture focuses on the following products: (1) beef, with sales of \$50,000,000 in 2005 and (2) hay and forage, with 2005 sales of \$15,659,000 (Oregon Agricultural Information Network 2005). The highest individual agricultural sales revenue in Harney County is derived from cattle ranching, which is inextricably linked to the commodity value of public rangelands. The BLM collected an average of approximately \$145,000 annually in livestock grazing fees over the past ten years. This number is based on 107,000 AUMs at \$1.35 per AUM. The 2004 AUM was valued at \$1.43. The average number of livestock grazing public land each year is 24,500. The BLM spent \$93,680 on range improvement projects in 2002, of which 84% went to local contractors.

The 1997 Census of Agriculture stated that there were 504 farms in Harney County and that families or individuals owned approximately 75 percent. Total gross farm sales in Harney County totaled \$68,399,000 in 2005. Crop sales were \$16,562,000 and animal product sales made up the rest (\$51,837,000). The United States Bureau of Economic Analysis estimated a net farm income of \$2,716,000 for Harney County in 2000, which had gross sales of \$50,418,000. According to Harney County web site the cattle industry is counted on to provide an average of \$28,000,000 per year to the economy of the county and nearly half of the county taxes come from the ranching community (www.harneycounty.com 2003).

## **Fire Fighting**

Approximately 55 to 60 temporary firefighters are employed each year during the fire season. In addition, local contractors are hired to assist with fire suppression and prescribed fire activities. Depending on the severity of the fire season, between \$250,000 and \$275,000 is spent each year on local contracts for fire management.

## **Land Management**

Management of the lands, realty authorizations, and Right-of-Ways (ROWs) in the area has economic implications for the county and local economy. Land sales and retention and purchases can affect property tax revenues and potential commodity production; Payments in Lieu of Taxes (PILT) are paid directly to the county. The average annual fees collected for land use authorizations and ROWs are \$15,000. Property taxes collected in Harney County in 2002 totaled \$4.9 million. Harney County also received \$518,880 in PILT in 2002.

## **OHV Use**

OHV and mechanized vehicle use is a form of recreation and is often associated with hunting and fishing. No data are available on OHV and mechanized vehicle use in the area or expenditures by OHV, and mechanized vehicle enthusiasts in the local economy. However, these recreationists contribute to the economy through the purchase of goods and services such as gas, food, equipment, and lodging.

## **Hunting and Fishing**

Hunting and other types of recreation also provide income to the county and local communities. According to data obtained from ODFW hunter surveys, Oregon's Mule Deer and Elk plans, and the 2001 National Survey of Fishing, Hunting and Wildlife-Associated Recreation (published by the USFWS), annual hunting trip-related expenditures were estimated at approximately \$3,905,312 and \$530,987 for Harney County and Steens Mountain, respectively. These expenditures include such things as transportation, food, and lodging based on 13,924 hunters in Harney County and 2,607 hunters in the Steens Mountain area spending 74,743 and 11,386 recreation days in Harney County and the Steens Mountain area, respectively.

## **Wildlife Viewing**

Numbers for wildlife viewing were not available for the county; however, estimates indicate that 1,680,000 participants spent \$304,990 on trip-related expenses in 2001 in the State of Oregon.

## Tourism

The tourism industry in this area is small compared to other Oregon regions; however, tourism in Harney County provides a critical monetary inflow to the economy. For people seeking outdoor recreation and solitude, public lands in Harney County have much to offer. A 2001 report prepared for the Oregon Tourism Commission, *Oregon Travel Impacts, 1991-2000*, estimated that travel-related spending in Harney County totaled \$18,000,000 with \$2,500,000 attributed to travelers staying in public campgrounds during 2000 (Dean Runyan and Associates 2001). Travel is responsible for 6.5 percent of the employment in Harney County. Updated estimates show that travel-related spending in Harney County in 2001 was \$18,300,000 and was responsible for 7.4 percent of employment. Travel-related spending in Harney County increased 5.2 percent between 1991 and 2001. Revenues from travel accounted for \$3,900,000 in earnings and 340 jobs in Harney County for 2001 (Oregon Tourism Commission 2003).

The 1994 Oregon High Desert Interpretive Center Economic Feasibility and Impact Analysis for Harney County and Burns, Oregon (Dean Runyan and Associates et al. 1994) stated that approximately 50,000 people visited both the Steens Mountain area and the Malheur NWR in 1993. Assuming visitation has remained similar between the two destinations and based on numbers determined in the *Regional Economic Benefits of Ecotourism and Operations Associated with the Malheur NWR* (Northwest Economic Associates [NEA] 2002), visitation to the CMPA may have been as high as 62,700 between October 1, 1999 and September 30, 2000. The NEA analysis found that visitor expenditures in Harney County amounted to over \$1,900,000; this equated to \$1,200,000 of direct spending within the county (NEA 2002).

It is likely that tourism and visitation to the area will continue to increase in the long term due to (1) population growth within a day's driving time of the area, (2) the increased publicity the Steens Mountain area is receiving, and (3) the recent designation of the Oregon High Desert Discovery Scenic Byway and Tour Routes.

### Issues, concerns and action items.

- Assist in the promotion of visitor information regarding the area



# Appendix A - Glossary

---

**ACEC:** Area of Critical Environmental Concern

**Allotment Management Plan (AMP):** A plan for managing livestock grazing on specified public land.

**Allotment:** Specific portion of public land allocated for livestock grazing, typically with identifiable or fenced boundaries and permitted for a specified number of livestock for a prescribed period of time.

**Alluvial/Alluvium:** Sand, clay, etc. deposited by flowing water, especially in a stream bed.

**AMP:** Allotment Management Plan

**Andesite:** A fine-grained igneous rock of intermediate composition composed of about equal amounts of iron and magnesium minerals and plagioclase feldspars.

**Andrews FEIS:** Andrews Management Unit/Steens Mountain Cooperative Management and Protection Area Proposed Resource Management Plan and Final Environmental Impact Statement, Burns District BLM, 2004.

**Animal Unit Month (AUM):** The forage needed to support one cow, one cow/calf pair, one horse, or five sheep for one month. Approximately 800 pounds of forage.

**Animal Unit:** One cow, one cow/calf pair, one horse, or five sheep.

**APHIS:** Agricultural Plant and Animal Health Inspection Service

**Aquifer:** Rock or rock formations (often sand, gravel, sandstone, or limestone) that contain or carry groundwater and act as water reservoirs.

**Area of Critical Environmental Concern (ACEC):** Area where special management attention is required to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect humans from natural hazards.

**ARS:** Agriculture Research Service

**AUM:** Animal Unit Month

**Basalt:** A dark, heavy, fine-grained silica-poor igneous rock composed largely of iron and magnesium minerals and calcium-rich plagioclase feldspars.

**Basin (River):** In general, the area of land that drains water, sediment, and dissolved materials to a common point along a stream channel. River basins are composed of large river systems.

**Best Management Practices (BMPs):** A set of practices which, when applied during implementation of management actions, ensures that negative impacts to natural resources are minimized. BMPs are applied based on site-specific evaluation and represent the most effective and practical means to achieve management goals for a given site.

**BLM Assessment Species:** Plant and animal species on List 2 of the Oregon Natural Heritage Data Base, or those species on the Oregon List of Sensitive Wildlife Species (OAR 635-100-040) that are identified in BLM Instruction Memo OR-91-57 and are not included as federal candidate, state listed, or BLM sensitive species.

**BLM Sensitive Species:** Plant or animal species eligible for federal listed, federal candidate, state listed, or state candidate (plant) status, or on List 1 in the Oregon Natural Heritage Data Base, or approved for this category by the BLM State Director.

**BLM Tracking Species:** Plant and animal species on List 3 and 4 of the Oregon Natural Heritage Data Base, or those species on the Oregon List of Sensitive Wildlife Species (OAR 635-100-040) that are identified in BLM Instruction Memo OR-91-57 and are not included as federal candidate, state Listed, BLM sensitive, or BLM assessment species.

**BLM:** Bureau of Land Management

**Borax:** An evaporite mineral ( $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$ ). It is the major source of boron and is generally found in alkali lake deposits. It has a variety of uses (e.g., glass and ceramics manufacturing, agricultural chemicals, chemical fluxes, fire retardant and preservative).

**Bureau of Land Management (BLM):** Government agency with the mandate to manage federal lands under its jurisdiction for multiple uses.

**Candidate Species:** Any species included in the Federal Register Notice of Review that are being considered for listing as threatened or endangered by the US Fish and Wildlife Service.

**CFR:** Code of Federal Regulations

**cfs:** cubic feet per second – a measure of the amount of flowing water

**Chalcedony:** A cryptocrystalline variety of quartz ( $\text{SiO}_2$ ) consisting of microscopic fibers. It exhibits a myriad of colors and patterns and is used primarily as an ornamental or gemstone. Agate, jasper and thunder eggs are varieties.

**CHT:** Channel Habitat Type

**Clay (Geology):** A rock or mineral fragment of any composition finer than 0.00016 inches in diameter. (mineral) A hydrous aluminum-silicate that occurs as microscopic plates, and commonly has the ability to absorb substantial quantities of water on the surface of the plates.

**Clay:** As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.



**Climax Vegetation:** The stabilized plant community on a particular site. The plant cover reproduces itself and does not change as long as the environment remains the same.

**CMPA:** Steens Mountain Cooperative Management and Protection Area

**Colluvium:** Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

**Community:** A group of species of plants and/or animals living and interacting at a particular time and place; a group of people residing in the same place and under the same government.

**Corridor (Landscape):** Landscape elements that connect similar patches of habitat through an area with different characteristics. For example, streamside vegetation may create a corridor of willows and hardwoods between meadows or through a forest.

**CWA:** Clean Water Act

**Deep Soil:** A soil that is 40 to 60 inches deep over bedrock or to other material that restricts the penetration of plant roots.

**DEQ:** Department of Environmental Quality

**Developed Recreation:** Recreation that requires facilities which in turn result in concentrated use of an area; for example, a campground.

**Diatomite:** A soft, crumbly, lightweight, highly porous sedimentary rock consisting mainly of microscopic siliceous skeletons of diatoms (single-celled aquatic plants related to algae). It is used for filter aids, paint filler, abrasives, anti-caking agents, insecticide carriers, and insulation.

**Dispersed Recreation:** Recreation that does not occur in a developed recreation life; for example, hunting or backpacking.

**Disturbance:** Refers to events that alter the structure, composition, or function of terrestrial or aquatic habitats. Natural disturbances include, among others, drought, floods, wind, fires, wildlife grazing, insects, and pathogens. Human-caused disturbances include actions such as timber harvest, livestock grazing, roads, and the introduction of exotic species.

**DO:** Dissolved oxygen, oxygen dissolved in water.

**Drainage Surface:** Runoff, or surface flow of water, from an area.

**Duff:** A generally firm organic layer on the surface of mineral soils consisting of fallen decaying plant material including everything from the litter on the surface to underlying pure humus.

**Ecological Site Inventory (ESI):** The basic inventory of present and potential vegetation on BLM rangelands. Ecological sites are differentiated on the basis of the kind, proportion, or amount of plant species.

**Ecological Status:** The present state of vegetation of a range site in relation to the potential natural community for that site. Four classes are used to express the degree to which the production or composition of the present plant community reflects that of the potential natural community (climax):

**Ecosystem:** A complete, interacting system of living organisms and the land and water that make up their environment; the home places of all living things, including humans.

**EIS:** Environmental Impact Statement

**Endangered Species:** Any species defined under the ESA as being in danger of extinction throughout all or a significant portion of its range. Listings are published in the Federal Register.

**Environmental Assessment (EA):** One type of document prepared by federal agencies in compliance with the National Environmental Policy Act (NEPA) which portrays the environmental consequences of proposed federal actions which are not expected to have significant impacts on the human environment.

**Environmental Impact Statement (EIS):** One type of document prepared by federal agencies in compliance with the National Environmental Policy Act (NEPA) which portrays the environmental consequences of proposed major federal actions expected to have significant impacts on the human environment.

**EOARC:** Eastern Oregon Agriculture Research Center

**EPA:** Environmental Protection Agency

**Ephemeral Stream:** A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no continuous supply from melting snow or other source, and its channel is above the water table at all times.

**Erosion (Accelerated):** Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, e.g., fire that exposes the surface.

**Erosion (Geologic):** Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the buildup of such landscape features as flood plains and coastal plains. Erosion is synonymous with natural erosion.

**Erosion:** The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

**ES:** Ecological Systems

**ESA:** Endangered Species Act

**ESI:** Ecological Site Inventory

**Evapotranspiration:** The release and movement of moisture through evaporation from water and soil surfaces, and loss from living vegetation.

**F-AR:** Functional – at Risk

**Fauna:** The vertebrate and invertebrate animals of an area or region.

**Federal Land Policy Management Act of 1976 (FLPMA):** Law mandating that the BLM manage lands under its jurisdiction for multiple uses. Establishes guidelines for its administration; and provides for the management, protection, development, and enhancement of the public lands, among other provisions.

**FEIS:** Final Environmental Impact Statement

**Feldspar:** Common rock-forming minerals composed of silicate of aluminum, combined with sodium and either potassium or calcium.

**FGDC:** Federal Geographic Data Committee

**Fine Textured Soil:** Sandy clay, silty clay, or clay.

**Fire Effects:** The physical, biological, and ecological impact of fire on the environment.

**Fire Intensity:** The product of the available heat of combustion per unit area of ground and the rate of spread of the fire.

**Fire Management Plan (FMP):** A strategic plan that defines a program to manage wildland and prescribed fires and documents the Fire Management Program in the approved land use plan. The plan is supplemented by operational procedures such as preparedness plans, preplanned dispatch plans, prescribed fire plans and prevention plans.

**Fire Regime:** The characteristics of fire in a given ecosystem, such as the frequency, predictability, intensity, and seasonality of fire.

**Fire Return Interval:** The number of years between two successive fires documented in a designated area (i.e., the interval between two successive fire occurrences).

**Fire Suppression:** All the work activities connected with fire-extinguishing operations, beginning with the discovery and continuing until the fire is completely extinguished.

**Flood Plain:** A nearly level alluvial plain that borders a stream and is subject to inundation under flood-stage conditions unless protected artificially. It is usually a constructional landform build of sediment deposited during overflow and lateral migration of the stream.

**FLPMA:** Federal Land Policy and Management Act

**Forage:** Vegetation (both woody and non-woody) eaten by animals, especially grazing and browsing animals.

**Fluvial:** 1. Of, relating to, or inhabiting a river or stream.  
2. Produced by the action of a river or stream.

**Forb:** Any herbaceous plant not a grass or a grasslike species. Broad-leafed plants; includes plants that commonly are called weeds or wildflowers.

**Fuel (Fire):** Dry, dead parts of trees, shrubs, and other vegetation that can burn readily.

**Functional - At Risk (FAR):** Riparian/wetland areas that are in functioning condition but an existing soil, water, or vegetation attribute makes them susceptible to degradation.

**Geographic Information System (GIS):** An information processing technology to input, store, manipulate, analyze, and display data; a system of computer maps with corresponding site-specific information that can be combined electronically to provide reports and maps.

**GIS:** Geographic Information System

**Graben:** A fault-bounded down-dropped portion of the earth's crust.

**Gravel:** Unconsolidated, rounded or angular fragments of rock. Usually defined as being larger than sands and smaller than cobbles, so about two millimeters to 2.5 inches.

**Ground Water:** Water that sinks into the soil and is stored in slowly flowing and slowly renewed underground reservoirs called aquifers.

**Gully:** A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

**Habitat:** A place that provides seasonal or year-round food, water, shelter, and other environmental conditions for an organism, community, or population of plants or animals.

**HCCWMA:** Harney County Cooperative Weed Management Area

**HCWB:** Harney County Weed Board

**HCWC:** Harney County Watershed Council

**Herd Management Area (HMA):** A geographic area identified in a Management Framework Plan or Resource Management Plan for the long-term management of a wild horse herd.

**Herd Management Area Plan:** A plan that prescribes measures for the protection, management, and control of wild horses and their habitat on one or more HMAs, in conformance with decisions made in approved Management Framework or Resource Management Plans.

**Herd:** One or more wild horse bands using the same general area.

**HMA:** Herd Management Area

**HMNAR:** Hart Mountain National Antelope Refuge

**Horizon (Soil):** A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes.

**HSWCD:** Harney Soil and Water Conservation District.

**HUC:** Hydrologic Unit Code

**Hydrologic Unit Code (HUC):** A coding system developed by the U.S. Geological Service to map geographic boundaries of watersheds of various sizes.

**Hydrologic:** Refers to the properties, distribution, and effects of water. “Hydrology” refers to the broad science of the waters of the earth; their occurrence, circulation, distribution, chemical and physical properties, and their reaction with the environment.

**Hydrothermal Deposit:** A mineral deposit formed by hot mineral-laden fluids.

**Igneous Rock:** Rock that solidified from a molten or semi-molten state. The major varieties include intrusive (solidified beneath the surface of the earth) and volcanic (solidified on or very near the surface of the earth).

**Interior Drainage:** Streams with no outlet to the sea.

**Intermittent Stream:** A stream, or reach of a stream, that flows for prolonged periods only when it receives groundwater discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

**IPM:** Integrated Plant Management

**IPM:** Invasive Plant Management

**IVM:** Integrated Vegetation Management

**IVM:** Invasive Vegetation Management

**Lacustrine:** Of or found in or on lakes.

**LCCWMA:** Lake County Cooperative Weed Management Area

**Leasable Minerals:** Minerals that may be leased to private interests by the federal government including oil, gas, geothermal, coal, and sodium compounds.

**Limestone:** A sedimentary rock consisting chiefly of calcium carbonate.

**Loam:** Soil material that is seven to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

**Locatable Minerals:** Minerals subject to exploration, development, and disposal by staking mining claims as authorized by the Mining Law of 1872, as amended. This includes deposits of gold, silver, and other uncommon minerals not subject to lease or sale.

**Map Unit:** The basic system of description in a soil survey and delineation on a soil map. Can vary in level of detail.

**Mechanical Treatment:** Use of mechanical equipment for seeding, brush management, and other management practices.

**Microbiotic Crust:** Lichens, mosses, green algae, fungi, cyanobacteria, and bacteria growing on or just below the surface of soils.

**Mineral Estate:** Refers to the ownership of minerals at or beneath the surface of the land.

**Mitigation:** Measures designed to counteract environmental impacts or to make impacts less severe.

**Monitoring and Evaluation:** The collection and analysis of data to evaluate the progress and effectiveness of on-the-ground actions in meeting resource management goals and objectives.

**Monitoring:** The periodic and systematic collection of resource data to measure progress toward achieving objectives.

**Multiple Use:** Management of public land and its resources to best meet various present and future needs of the American people. This means coordinated management of resources and uses to assure the long-term health of the ecosystem.

**National Environmental Policy Act of 1969 (NEPA):** Law requiring all federal agencies to evaluate the impacts of proposed major federal actions with respect to their significance on the human environment.

**National Wildlife Refuge (NWR):** An area administered by the U.S. Fish and Wildlife Service for the purpose of managing certain fish or wildlife species.

**Naturalness (a primary wilderness value):** An area that generally appears to have been affected primarily by the forces of nature with the imprint of people's work substantially unnoticeable.

**NCBA:** National Cattleman's Beef Association

**NEPA:** National Environmental Policy Act

**NF:** Nonfunctioning

**NHD:** National Hydrography Dataset

**NOAA:** National Oceanographic and Atmospheric Administration

**Nonfunctioning:** PFC classification of riparian-wetland areas that clearly are not providing adequate vegetation, landform, or large woody debris to dissipate stream energy associated with high flows and thus are not reducing erosion, improving water quality, etc.

**Noxious Weed:** A plant specified by law as being especially undesirable, troublesome, and difficult to control. A plant species designated by federal or state law as generally possessing one or more of the following characteristics: aggressive and difficult to manage; parasitic; a carrier or host of serious insects or disease; or non-native, new, or not common to the United States. According to the Federal Noxious Weed Act (PL 93-639), a noxious weed is one that causes disease or has other adverse effects on man or his environment and therefore is detrimental to the agriculture and commerce of the United States and to the public health.

**NRCS:** Natural Resource Conservation Service

**NSDI:** National Spatial Data Infrastructure



**Nutrient (Plant):** Any element taken in by a plant that is essential to its growth. Plant nutrients are mainly nitrogen, phosphorous, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil, and carbon, hydrogen, and oxygen obtained from the air and water.

**NVC:** National Vegetation Classification

**NWGAP:** Northwest Regional Gap Analysis Project

**NWI:** National Wetland Inventory

**ODA:** Oregon Department of Agriculture

**ODEQ:** Oregon Department of Environmental Quality

**ODFW:** Oregon Department of Fish and Wildlife

**ODOT:** Oregon Department of Transportation

**ODSL:** Oregon Department of State Lands

**OHV:** Off-highway vehicle

**ONDA:** Oregon Natural Desert Association

**ONHP:** Oregon Natural Heritage Program

**Oregon TMDL:** Total Maximum Daily Load & Water Quality Management Plan, Oregon DEQ, 2003.

**Organic Matter:** Plant and animal residue in the soil in various stages of decomposition.

**OSU:** Oregon State University

**Overstory:** The plants in a plant community which form the upper canopy.

**OWEB:** Oregon Watershed Enhancement Board

**OWRD:** Oregon Water Resources Department

**Perennial Stream:** A stream in which water is present during all seasons of the year.

**Perennial:** A plant that lives for three or more years.

**Permeability:** The quality of the soil that enables water to move downward through the profile, measured as the number of inches per hour that water moves downward through the saturated soil.

**PFC:** Proper functioning condition

**pH Value:** A numerical designation of acidity and alkalinity in soil. (See Reaction, soil)

**PILT:** Payments In Lieu of Taxes

**PL:** Public Law

**Playa Lake:** A shallow lake that is seasonally dry. Soils on the lake bottom are usually quite alkaline.

**Pleistocene:** Geologic time period characterized by the rise and receding of continental ice sheets; appearance of early man, epoch of time is 50,000 to 1,000,000 years ago.

**Pluvial Lake:** A lake formed during a period of exceptionally high rainfall (e.g., a time of glacial advance during the Pleistocene epoch) and now either extinct or existing as a remnant, such as Lake Bonneville.

**Pluvial:** Referring to a period of greater rainfall.

**PNC:** Potential Natural Community

**Point Source Pollution:** Pollution that comes from a single identifiable source such as a smokestack, a sewer, or a pipe.

**Prescribed Burning:** Controlled application of fire to wildland fuels in either their natural or modified state, under specified environmental conditions which allow the fire to be confined to a predetermined area and at the same time to produce the fire line intensity and rate of spread required to attain planned resource management objectives.

**Prescribed Fire:** Any fire ignited by management actions to meet specific objectives. A written, approved prescribed fire plan must exist, and NEPA requirements must be met prior to ignition. The introduction of fire to an area under regulated conditions for specific management purposes (usually vegetation manipulation).

**PRIA:** Public Rangeland Improvement Act of 1978

**Primary Wilderness Values:** The primary or key wilderness values described in the Wilderness Act by which WSAs and wildernesses are managed to protect and enhance the wilderness resource. Values include roadlessness, naturalness, solitude, primitive and unconfined recreation, and size.

**Productivity:** (1) Soil productivity: the capacity of a soil to produce plant growth, due to the soil's chemical, physical, and biological properties (such as depth, temperature, water-holding capacity, and mineral, nutrient, and organic matter content). (2) Vegetative productivity: the rate of production of vegetation within a given period. (3) General: the innate capacity of an environment to support plant and animal life over time.

**Proper Functioning Condition (PFC):** Riparian-wetland areas achieve Proper Functioning Condition when adequate vegetation, landform, or large woody debris is present to dissipate stream energy associated with high water flows. This thereby reduces erosion and improves water quality; filters sediment, captures bedload, and aids floodplain development; improves floodwater retention and groundwater recharge; develops root masses that stabilize streambanks against cutting action; develops diverse ponding and channel characteristics to provide habitat and water depth, duration, and temperature necessary for fish production, waterfowl breeding, and other uses; and supports greater biodiversity. The functioning condition of riparian-wetland areas is a result of the interaction among geology, soil, water, and vegetation.

**Public Land:** Any land or interest in land owned by city, county, state or federal government.

**Pumice:** A glassy, rhyolitic rock exhibiting a vesicular, or frothy texture. It is generally used as a light weight aggregate and an abrasive.

**RAC:** Resource Advisory Council

**Range Site:** An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other range sites in kind or proportion of species or total production.

**Rangeland:** Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

**Reaction, Soil:** A measure of acidity or alkalinity of a soil, expressed in pH values. Soils with pH values less than 7 are acidic and those with pH greater than 7 are alkaline.

**Regeneration:** The new growth of a natural plant community, developing from seed.

**Research Natural Area (RNA):** An area where natural processes predominate and which is preserved for research and education. Under current BLM policy, these areas must meet the relevance and importance criteria of ACECs and are designated as ACECs. An area of significant scientific interest that is designated to protect its resource values for scientific research and study.

**Resource Area:** The “on-the-ground” management unit of the BLM comprised of BLM administered land within a specific geographic area.

**Resource Management Plan (RMP):** Current generation of land use plans developed by the BLM under the Federal Land Policy and Management Act. Replaces the older generation Management Framework Plans. Provides long-term (up to 20 years) direction for the management of a particular area of land and its resources, usually corresponding to a BLM resource area.

**Revegetation:** Establishing or re-establishing desirable plants on areas where desirable plants are absent or of inadequate density, by management alone (natural revegetation) or by seeding or transplanting (artificial revegetation).

**RFP:** Request for Proposal

**Rhyolite:** A fine-grained light-colored silica-rich igneous rock composed largely of potash feldspars and quartz.

**Right-of-Way (ROW):** A permit or an easement which authorizes the use of public land for certain specified purposes, commonly for pipelines, roads, telephone lines, electric lines, reservoirs, etc; also, the reference to the land covered by such an easement or permit.

**Rill:** A steep-sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

**Riparian Area:** Area with distinctive soil and vegetation between a stream or other body of water and the adjacent upland; includes wetlands and those portions of floodplains and valley bottoms that support riparian vegetation.

**RMP:** Resource Management Plan

**RNA:** Research Natural Area

**Rock Fragments:** Rock or mineral fragments having a diameter of two millimeters or more, e.g., pebbles, cobbles, stones, and boulders.

**ROW:** Right-of-way

**Runoff:** The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground water runoff or seepage flow from ground water.

**S&Gs:** Standards for Rangeland Health and Guidelines for Livestock Grazing Management for Public Lands in Oregon and Washington

**Saleable Minerals:** High volume, low value mineral resources including common varieties of rock, clay, decorative stone, sand, gravel, and cinder.

**Sand (Geology):** A rock fragment or detrital particle between 0.0025 and 0.08 inches in diameter.

**Scenic River:** A river or section of a river that is free of impoundments and whose shorelines are largely undeveloped but accessible in places by roads.

**Sediment:** Soil, rock particles and organic or other debris carried from one place to another by wind, water or gravity.

**Sedimentary:** Any rock or mass deposited by wind or water.

**Sensitive Species:** Species identified by a Forest Service regional forester or BLM state director for which population viability is a concern either (a) because of significant current or predicted downward trends in population numbers or density, or (b) because of significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.

**SEORMP:** Southeastern Oregon Resource Management Plan

**Seral Stage:** The developmental phase of a forest stand or rangeland with characteristic structure and plant species composition. The rated departure of a plant community from a described potential natural community (PNC) for a specific ecological site. Low-seral stage is an existing plant community which is defined as 0-25 percent comparability to the defined PNC; Mid-seral stage is an existing plant community which has 26-50 percent comparability to the PNC; Late seral stage is 51-75 percent comparable to the PNC; PNC is an existing plant community with 76-100 percent comparability to the defined PNC.

**Seral:** Refers to the sequence of transitional plant communities during succession. Early-seral refers to plants that are present soon after a disturbance or at the beginning of a new successional process (such as seedling or sapling growth stages in a forest); mid-seral in a forest would refer to pole or medium saw timber growth stages; late- or old-seral refers to plants present during a later stage of plant community succession (such as mature and old forest stages).

**Shallow Soil:** A soil that is ten to 20 inches deep over bedrock or to other material that restricts the penetration of plant roots.

**Slope:** The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

**SMAC:** Steens Mountain Advisory Council

**Soil Association:** A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single soil map unit.

**Soil Classification:** The systematic arrangement of soils into groups or categories on the basis of their characteristics.

**Soil Compaction:** An increase in soil bulk density of 15 percent or more from the undisturbed level.

**Soil Productivity:** The capacity of a soil to produce a specified plant or sequence of plants under specific management.

**Soil Profile:** A vertical section of the soil extending through all its horizons and into the parent material.

**Soil Survey:** A field investigation resulting in a soil map showing the geographic distribution of various kinds of soil and an accompanying report that describes the soil types and interprets the findings.

**Soil Texture:** The relative proportions of sand, silt, and clay particles in a mass of soil.

**Soil:** A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

**Special Recreation Management Area (SRMA):** An area where recreation is the principal management objective, where intensive recreation management is needed, and where more than minimal recreation-related investments are required.

**Special Status Species:** Plant or animal species known or suspected to be limited in distribution, rare or uncommon within a specific area, and/or vulnerable to activities which may affect their survival.

**SRMA:** Special Recreation Management Area

**SRP:** Special Recreation Permit

**Stand:** A community of trees occupying a specific area and sufficiently uniform in species, age, spatial arrangement and condition as to be distinguishable from trees on surrounding lands.

**State Listed Species:** Any plant or animal species listed by the State of Oregon as threatened or endangered within the state under ORS 496.004, ORS 498.026, or ORS 564.040.

**Steens Act:** Steens Mountain Cooperative Management and Protection Act (2000)

**Stream Channel:** The hollow bed where a natural stream of surface water flows or may flow; the deepest or central part of the bed, formed by the main current and covered more or less continuously by water.

**Structure (Soil):** The arrangement of primary soil particles into compound particles or aggregates.

**Sub-watershed:** A drainage area of approximately 20,000 acres, equivalent to a 6th-field Hydrologic Unit Code (HUC). Hierarchically, sub-watersheds (6th-field HUC) are contained within a watershed (5th-field HUC), which in turn is contained within a sub-basin (4th-field HUC).

**Succession:** A predictable process of changes in structure and composition of plant and animal communities over time. Conditions of the prior plant community or successional stage create conditions that are favorable for the establishment of the next stage. The different stages in succession are often referred to as “seral stages.” (See Seral.)

**Sunstone:** A calcium-rich variety of plagioclase feldspar that exhibits a pink to red metallic shimmer when viewed perpendicular to the surface. The shimmer is caused by light reflecting off the surface of minute parallel platelets of native copper suspended in the stone.

**Sustained Yield:** Maintenance of an annual or regular periodic output of a renewable resource from public land consistent with the principles of multiple use.

**Talus:** Rock fragments of any size or shape, commonly coarse and angular, derived from and lying at the base of a cliff or very steep rock slope. The accumulated mass of such loose, broken rock formed chiefly by falling, rolling, or sliding.

**Terrace (Geologic):** An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

**Terrestrial:** Of the land, in comparison to ‘aquatic’ which refers to objects or species which are found in water. In zoology, terrestrial is also often used to describe species that live on or in the ground, in comparison to those that fly or live in trees.

**Threatened Species:** Any plant or animal species defined under the ESA as likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

**Thunderegg:** An agate, opal, or chalcedony-filled nodule deposit formed in rhyolitic lavas or tuffs.

**TMDL:** Total Maximum Daily Load

**TNC:** The Nature Conservancy

**TNR:** Temporary Nonrenewable



**Trend:** The direction of change in ecological status observed over time. Trend is described as toward or away from the potential natural community, or as not apparent.

**Tuff:** Volcanic ash or rock composed of compacted ash.

**Upland:** Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

**USACE:** Army Corps of Engineers

**USDA:** United States Department of Agriculture

**USDI:** United States Department of the Interior

**USFS:** United States Forest Service

**USFWS:** United States Fish and Wildlife Service

**USGS:** United States Geological Survey

**Vale FEIS:** Proposed Southeastern Oregon Resource Management Plan and Final Environmental Impact Statement, Vale District BLM, 2001.

**Visual Resource Management Classifications (VRM) Class I:** The objective of this classification is to preserve the existing character of the landscape. This class provides for natural ecological changes and limited management activity. The level of change should be very low and must not attract attention. Class I is assigned to those areas where a management decision has been made to preserve a natural landscape.

**VRM Class II:** The objective of this classification is to retain the existing character of the landscape. The level of change to landscape characteristics should be low. Management activities may be seen but should not attract the attention of a casual observer. Any changes must conform to the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape. This class represents the minimum level of VRM for WSAs.

**VRM Class III:** The objective of Class III is to partially retain the existing character of the landscape. Moderate levels of change are acceptable. Management activities may attract attention but should not dominate the view of a casual observer. Changes should conform to the basic elements of the predominant natural features of the characteristic landscape.

**VRM Class IV:** The objective of Class IV is to provide for management activities that require major modification of the landscape. These management activities may dominate the view and become the focus of viewer attention; however, every effort should be made to minimize the impact of these projects by carefully locating activities, minimizing disturbance, and designing the projects to conform to the characteristic landscape.

**Welded Tuff:** A glass-rich volcanic rock that has been solidified by the welding of its glass shards through an action of heat and hot gas.

**Wild River:** A river or section of a river that is free of impoundments and generally inaccessible except by trail, with watersheds and shorelines essentially primitive and waters unpolluted.

**Withdrawal:** Withholding an area of federal land from settlement, sale, location, or entry, under some or all of the general land laws, for the purpose of limiting activities under those laws in order to maintain other public values in the area or reserving the area for a particular public purpose or program; or transferring jurisdiction over an area of federal land, other than “property” governed by the Federal Property and Administrative Services Act, as amended (40U.S.C.472) from one department, bureau, or agency to another department, bureau, or agency.

**WMU:** Wildlife Management Unit

**WQMP:** Water Quality Management Plan

**WSA:** Wilderness Study Area

# Appendix B - Index

---

## A

- Achillea millefolium* L.. See common yarrow  
*Achnatherum hymenoides* (Roem. & Schult.)  
Barkworth. See Indian ricegrass  
*Achnatherum speciosum* (Trin. & Rupr.)  
Barkworth. See desert needlegrass  
*Achnatherum thurberianum* (Piper) Barkworth.  
See Thurber's needlegrass  
*Actitis macularius* L.. See spotted sandpiper  
*Alectoris chukar* (J. E. Gray). See chukars  
American avocet 3-28  
*Anas cynoptera*. See cinnamon teal  
*Anas platyrhynchos*. See mallard  
*Anas strepera*. See gadwall  
antelope bitterbrush 3-17, 3-18, 3-27  
*Antilocapra americana*. See pronghorn  
*Ardea herodias*. See great blue heron  
*Artemisia arbuscula* Nutt.. See low sagebrush  
*Artemisia cana* Pursh. See silver sagebrush  
*Artemisia cana* Pursh ssp. *bolanderi* (A.  
Gray) G.H. Ward. See Bolander's silver  
sagebrush  
*Artemisia cana* Pursh ssp. *viscidula* (Osterh.)  
Beetle. See mountain silver sagebrush  
*Artemisia frigida* Willd.. See fringed sagebrush  
*Artemisia nova* A. Nels.. See black sagebrush  
*Artemisia tridentata* Nutt. ssp. *tridentata*.  
See basin big sagebrush  
*Artemisia tridentata* Nutt. ssp. *vaseyana* (Rydb.)  
Beetle. See mountain big sagebrush  
*Artemisia tridentata* Nutt. ssp. *wyomingensis*  
Beetle & Young. See Wyoming big  
sagebrush  
*Artemisia tridentata* Nutt. ssp. *xericensis*  
Winward ex R. Rosentreter & R. Kelsey.  
See big sagebrush  
*Artemisia tripartita* Rydb. ssp. *tripartita*.  
See threetip sagebrush

- Astragalus convallarius* Greene. See lesser rushy  
milkvetch  
*Atriplex canescens* (Pursh) Nutt.. See fourwing  
saltbrush  
*Atriplex confertifolia* (Torr. & Frém.) S. Watson.  
See shadscale saltbush  
*Atriplex gardneri* (Moq.) D. Dietr..  
See Gardner's saltbush

## B

- Baltic rush 2-22, 3-16  
basin big sagebrush 3-15, 3-16, 3-17  
basin wildrye 3-14, 3-15, 3-16, 3-18  
beardless wildrye 3-15, 3-16  
big sagebrush 3-29, 4-9, 4-16  
black greasewood 3-14, 3-16  
black sagebrush 4-9  
bluebunch wheatgrass 3-15, 3-16, 3-17, 3-18,  
4-16  
*Brachylagus idahoensis*. See pygmy rabbit  
*Branta canadensis*. See Canada goose  
broadfruit bur-reed 3-16  
*Bromus japonicus* Thunb.. See Japanese brome  
*Bromus tectorum* L.. See cheatgrass  
brown trout 2-32  
bud sagebrush 3-15, 3-16, 3-18

## C

- Calamagrostis montanensis* Scribn. ex Vasey.  
See plains reedgrass  
*Calamovilfa longifolia* (Hook.) Scribn..  
See prairie sandreed  
California bighorn sheep 3-27, 4-6, 4-16, 4-19  
Canada goose 3-28  
*Carex duriuscula* C.A. Mey.. See needleleaf  
sedge  
*Carex filifolia* Nutt.. See threadleaf sedge  
Catlow tui chub 2-30, 2-32  
*Centrocercus urophasianus*. See sage grouse

*Cercocarpus ledifolius* Nutt. var. *ledifolius*.

See curl-leaf mountain mahogany

*Cervus elaphus nelsoni*. See Rocky Mountain elk

Cheatgrass 2-40, 2-41, 2-42, 4-10

*Chrysothamnus viscidiflorus* (Hook.) Nutt..

See yellow rabbitbrush

chukars 3-28, 4-19

cinnamon teal 3-28

common dandelion 3-31

common pepperweed 3-31

common spikerush 3-16

common yarrow 3-32

cougars 3-27

*Crepis acuminata*. See tapertip hawksbeard

curl-leaf mountain mahogany 3-18, 3-27

## D

*Dalea purpurea* Vent.. See purple prairie clover

*Danthonia unispicata* (Thurb.) Munro ex

Macoun. See onespikes oatgrass

*Dasiphora fruticosa* (L.) Rydb. ssp. *floribunda*

(Pursh) Kartesz. See shrubby cinquefoil

*Deschampsia cespitosa* (L.) P. Beauv.. See tufted

hairgrass

desert needlegrass 3-16

*Distichlis spicata* (L.) Greene. See inland

saltgrass

drought 2-24, 2-30, 2-32, 3-1, 3-2, 3-27, 3-28,

3-29, 3-31, 4-1

## E

*Eleocharis palustris* (L.) Roem. & Schult..

See common spikerush

*Elymus lanceolatus* (Scribn. & J.G. Sm.) Gould.

See thickspike wheatgrass

*Ericameria nauseosa* (Pall. ex Pursh) G.L.

Nesom & Baird. See rubber rabbitbrush

## F

*Falco mexicanus* Schlegel. See prairie falcon

*Festuca campestris* Rydb.. See rough fescue

*Festuca idahoensis* Elmer ssp. *idahoensis*.

See Idaho fescue

*Festuca ovina* L.. See sheep fescue

## G

gadwall 3-28

*Gila bicolor eurysoma*. See Catlow tui chub

Great Basin redband trout 1-8, 2-29, 2-30,  
2-32

great blue heron 3-28

greater sandhill crane 3-28

*Grus canadensis*. See greater sandhill crane

## H

hardstem bulrush 3-16

Harkness' flaxflower 3-31

*Hesperostipa comata* (Trin. & Rupr.) Barkworth.

See needle and thread

## I

Idaho fescue 3-17, 3-18

Indian ricegrass 3-15, 3-16, 3-17, 3-18, 4-16

inland saltgrass 3-14, 3-16

## J

*Juncus balticus* Willd.. See Baltic rush

## K

*Koeleria macrantha* (Ledeb.) Schult.. See prairie

Junegrass

*Krascheninnikovia lanata* (Pursh) A. Meeuse &

Smit. See winterfat

## L

*Lactuca serriola* L.. See prickly lettuce

Lahontan cutthroat trout 2-32, 4-19

Lake Catlow 2-30, 3-19

largemouth bass 2-32

*Lepidium densiflorum* Schrad.. See common

pepperweed

*Leptosiphon harknessii* (Curran) J.M. Porter &

L.A. Johnson. See Harkness' flaxflower

lesser rushy milkvetch 3-31

*Leymus cinereus* (Scribn. & Merr.) A. Löve.

See basin wildrye

*Leymus triticoides* (Buckley) Pilg.. See beardless  
wildrye

*Liatrix punctata* Hook.. See dotted blazing star  
low sagebrush 2-35, 3-14, 3-17, 3-18, 4-9

## M

mallard 3-28

medusahead 2-42, 2-45, 2-46, 2-47

*Micropterus salmoides* (Lacepède).

See largemouth bass

mountain big sagebrush 3-17, 3-18, 4-9

*Muhlenbergia filiformis* (Thurb. ex S. Watson)

Rydb.. See pullup muhly

*Muhlenbergia richardsonis* (Trin.) Rydb..

See mat muhly

mule deer 3-27, 4-6, 4-16

## N

narrowleaf cottonwood 2-37

*Nassella viridula* (Trin.) Barkworth. See green  
needlegrass

National Wetland Inventory 2-9

Nebraska sedge 2-22, 3-16

needle and thread 3-15, 3-17, 4-16

## O

*Odocoileus hemionus* Rafinesque. See mule deer

*Oncorhynchus mykiss* 2-29

*Oncorhynchus mykiss* newberrii. See Great Basin  
redband trout

onespike oatgrass 3-18

*Ovis canadensis californiana*. See California  
bighorn sheep

## P

*Pascopyrum smithii* (Rydb.) A. Löve. See western  
wheatgrass

pepperweed 3-31

*Phalaropus tricolor* Vieillot. See Wilson's

phalarope

*Phlox hoodii* Richardson ssp. *hoodii*. See spiny

phlox

*Picrothamnus desertorum* Nutt.. See bud

sagebrush

*Pinus ponderosa* C. Lawson. See ponderosa pine

*Plegadis chihi* Vieillot. See white-faced ibis

*Pleuraphis jamesii* Torr.. See James' galleta

*Poa cusickii* Vasey ssp. *cusickii*. See Cusick's  
bluegrass

*Poa pratensis* L.. See Kentucky bluegrass

*Poa secunda* J. Presl. See Sandberg bluegrass

*Pomoxis annularis* Rafinesque. See white crappie  
ponderosa pine 2-36, 2-40

*Populus angustifolia* James. See narrowleaf  
cottonwood

prairie falcon 3-32

prickly lettuce 3-31

pronghorn 3-27, 3-28, 3-29, 4-6, 4-16, 4-19

*Pseudoroegneria spicata* (Pursh) A. Löve ssp.  
*spicata*. See bluebunch wheatgrass

*Puccinellia nuttalliana* (Schult.) Hitchc..

See Nuttall's alkaligrass

*Puma concolor* 3-27

*Puma concolor* L.. See cougars

*Purshia tridentata* (Pursh) DC.. See antelope  
bitterbrush

pygmy rabbit 3-29, 3-30

## Q

## R

rainbow trout 2-29, 2-32

*Recurvirostra americana*. See American avocet

Rocky Mountain elk 3-27, 4-19

rough fescue 3-17

## S

sagebrush density 4-11

sage grouse 3-29, 3-30

*Salmo trutta* L.. See brown trout

Sandberg bluegrass 3-16, 3-17

*Sarcobatus vermiculatus* (Hook.) Torr.. See black  
greasewood

*Schoenoplectus acutus* (Muhl. ex Bigelow) A.

Löve & D. Löve. See hardstem bulrush

shadscale saltbush 3-15, 3-16, 3-18

sheep fescue 3-17

silver sagebrush 3-16, 4-9

*Sparganium eurycarpum* Engelm..

See broadfruit bur-reed

*Sphaeralcea coccinea* (Nutt.) Rydb.. *See* scarlet  
globemallow  
*Sporobolus airoides* (Torr.) Torr.. *See* alkali  
sacaton grass  
spotted sandpiper 3-28  
*Symphoricarpos oreophilus* A. Gray.  
*See* mountain snowberry

## T

*Taeniatherum caput-medusae* (L.) Nevski.  
*See* medusahead  
tapertip hawksbeard 3-31  
*Taraxacum officinale* F.H. Wigg.. *See* common  
dandelion  
*Tetradymia* DC.. *See* horsebrush  
Thurber's needlegrass 3-15, 3-16, 3-17, 3-18  
*Tragopogon dubius* Scop.. *See* yellow salsify  
tufted hairgrass 3-17  
Tui Chub 1-8  
tussock grass. *See* tufted hairgrass

## U

## V

*Vulpia octoflora* (Walter) Rydb.. *See* sixweeks  
fescue

## W

western juniper 2-22, 2-35, 2-36, 2-37, 2-38,  
2-39, 2-42, 3-18, 3-27, 4-9, 4-11  
white crappie 2-32  
white-faced ibis 3-28  
Wilson's phalarope 3-28  
Wyoming big sagebrush 3-15, 3-16, 3-17, 3-18,  
4-16

## X

## Y

## Z

# Appendix C - References

---

- Behnke, R.J. 2002.** Trout and salmon of North America. The Free Press, New York.
- Behnke, R.J. 2007.** Redband trout of the northern Great Basin. Pages 1-9 in R.K. Shroeder and J.D. Hall, eds. Redband Trout: Resilience and Challenge in a Changing Landscape. Oregon Chapter, American Fisheries Society, Corvallis.
- BLM. 1988.** 1613 -Areas of Critical Environmental Concern. Washington (DC): Resource Management Planning Guidance.
- BLM. 2003a.** Draft Lakeview Resource Management Plan/Environmental Impact Statement, Lakeview Resource Area, Lakeview District, Lakeview, OR. 3 volumes.
- Bowers, W., Smith, R., Messmer, R., Edwards, C., and Perkins, R. 1999.** Conservation status of Oregon Basin Redband Trout, Oregon Dept. of Fish and Wildlife, Hines, OR.
- Cressman, L.S. 1942.** Archaeological Researches in the Northern Great Basin. Carnegie Institution of Washington Publication 538. Washington D.C.
- Dambacher J.M. and K.K. Jones. 2007.** Benchmarks and patterns of abundance of redband trout in Oregon streams: A compilation of studies. Redband Trout: Pages 47-55, in R.K. Shroeder and J.D. Hall, eds. Redband Trout: Resilience and Challenge in a Changing Landscape. Oregon Chapter, American Fisheries Society, Corvallis.
- Dambacher J.M., and J.L. Burke.1997.** Catlow tui chub investigations. Fish Research Progress Report. Oregon Department of Fish and Wildlife, Portland.
- Dambacher, J.M., K.K. Jones, and H.W. Li. 2001.** The distribution and abundance of Great Basin redband trout: an application of variable probability sampling in a 1999 status review. Oregon Department of Fish and Wildlife, Information Reports 2001-08, Portland.
- Davies, K.W. 2008.** Medusahead establishment and dispersal in sagebrush-bunchgrass communities. Extension Reports. Range Field Day 2008 Progress Report. Oregon State University Agricultural Experiment Station, Special Report 1085. Burns, OR. pp. 31-34.
- Davies, K.W., Johnson, D. 2008.** Managing Medusahead in the Intermountain West is at a Critical Threshold. Rangelands. 30:13-15.
- Davies, K.W., Sheley, R.L., 2007** A Conceptual Framework for Preventing the Spatial Dispersal of Invasive Plants. Weed Science: March 2007, Vol. 55, No. 2
- Davies, K.W., Svejcar, A.J. 2008.** Comparison of medusahead invaded and non-invaded wyoming big sagebrush steppe in southeastern oregon. Rangeland Ecol Manage 61:623-629



- Gilbert, J.G., 2006.** Habitat parameters associated with the distribution of seven willow species on a stream in southeastern Oregon. Oregon State University M.S. thesis. 112 p.
- Gray, S.T., S.T. Jackson, and J.L. Betancourt. 2004.** Tree-ring based reconstructions of interannual to decadal-scale precipitation variability for northeastern Utah since 1226 A.D. *Journal of the American Water Resources Association* 40:947-960.
- Hironaka, M. 1961.** The relative rate of root development of cheatgrass and medusahead. *Journal of Range Management* 14(5):463-267.
- Hubbs, C.L. and R.R. Miller. 1942.** Fish of Catlow Valley. Page 152, Appendix G., in Cressman, L.S. ed., *Archaeological Researches in the Northern Great Basin*. Carnegie Institute, Washington, D.C.
- Janson, R.C., 2002.** The pygmy rabbit from Utah to Montana. University of Montana, Cooperative Wildlife Research Unit, Missoula, MT.
- Jenny H., 1941.** Factors of Soil Formation. A System of Quantitative Pedology. McGraw Hill Book Company, New York, NY, USA.
- Katzner T E. 1994.** Winter ecology of the pygmy rabbit (*Brachylagus idahoensis*) in Wyoming [thesis]. Laramie, WY: University of Wyoming, 125 p.
- Katzner, T.E. and Parker, K.L. 1998,** Long-Distance Movements From Established Burrow Sites By Pygmy Rabbits (*Brachylagus Idahoensis*) In Southwestern Wyoming, *Northwestern Naturalist* No. 77 Pages 72-74
- Klebenow, D.A. 1982.** Livestock grazing interactions with sage grouse. In: J.M. Peek and P.D. Dalke (eds.). *Proc. Wildl. Livestock Relationships Symposium*, Univ. Idaho, For., Wildl., and Range Exp. Stn., Moscow.
- Kunkel, C.M. 1976.** Biology and production of the red-band trout (*Salmo* sp.) in four southeastern Oregon streams. Master's thesis, Oregon State University, Corvallis.
- Miller, H.C., Clausnitzer, D., and Borman, M.M., 1999.** Medusahead. In: R. L. Sheley and J. K. Petroff [EDS.]. *Biology and management of noxious weeds*. Corvallis, OR, USA: Oregon State University Press.
- Miller, R.F., J.D. Bates, T.J. Svejcar, F.B. Pierson, and L.E. Eddleman. 2005.** Biology, Ecology, and Management of Western Juniper (*Juniperus occidentalis*). Technical Bulletin 152, Oregon State University Agricultural Experiment Station. 77 pp.
- Montgomery, D.R. 2008.** Dreams of Natural Streams. *Science* 319 (5861): 291-292
- Reheis, M.C., A.M. Sarna-Wojcicki, R.L. Reynolds, C.A. Repenning, and M.D. Mifflin. 2002.** Pliocene to middle Pleistocene lakes in the western Great Basin: Ages and connections. In, Hershler, R., Currey, D. and Madsen, D., eds., *Great Basin Aquatic Systems History*. Smithsonian Contributions to the Earth Sciences, No. 33. Smithsonian Institution Press, Washington D.C.

- Rosgen, D.L. 1996.** Applied River Morphology. Pagosa Springs, Colorado, Wildland Hydrology.
- Smith, B.S., Bingham, B.S. 2010.** A Working Ranch With An Effective Medusahead Program. Eastern Oregon Agricultural Research Center.
- Thorgaard, G.H., B.D. Robison, P.A. Wheeler, and W.P. Young. 2007.** Possible approaches for genetic analysis of temperature adaptations in redband trout. In, Redband Trout: Resilience and Challenge in a Changing Landscape. Oregon Chapter, American Fisheries Society, 19-24.
- Trainer, C.E., M.J. Willis, G.P. Keister Jr., and D.P. Sheely. 1984.** Fawn mortality and habitat use among pronghorn during spring and summer in southeastern Oregon, 1981-82. Wildlife Resources Report 12. Oregon Department Fish and Game, Portland, Oregon, USA.
- Trimble, S. T. 1989.** The Sagebrush Ocean. University of Nevada Press. Reno, NV.
- U.S. Department of Interior. 1991.** Riparian-Wetland Initiative for the 1990's. Bureau of Land Management, BLM/WO/GI-91/001+4340, Washington, DC. 50 p.
- Walker, G.W. and C. A. Repenning, 1965.** Reconnaissance geologic map of the Adel Quadrangle: Lake, Harney and Malheur Counties, Oregon. USGS Misc. Geologic Investigations Map I-446.
- Walter, R.C. and D.J. Merritts. 2008.** Natural streams and the legacy of water-powered mills. *Science* 319 (5861): 299-304.
- Williams, J. E. and Bond, C.E., 1981.** The Southwestern Naturalist, Vol. 26, No. 3 (Aug. 21, 1981), pp. 223-230
- Young D. and R. Rhew. 1999.** Fish conservation on Roaring Springs Ranch. *Endangered Species Bulletin* (September/October). 5 pp.
- Vavra, M. and Forrest Sneva, F., 1978.** Seasonal diets of five ungulates grazing the cold desert biome. *Proc. of the First International Rangeland Congress*



# Appendix D - Watershed boundary system

---

## Hydrologic Unit Codes

The USGS developed the Hydrologic Unit Code (HUC) system in the 1970s. That USGS system has evolved and is the national interagency standard. Its use is mandated by the FGDC. FGDC implements the NSDI (established by Executive Order 12906 in 1994) in cooperation with state, local and tribal governments, the academic community and the private sector.

Basically, the United States was divided and sub-divided into successively smaller hydrologic units, which were classified into six levels, as shown in Table D-1. The hydrologic units are arranged within each other, from the smallest (sub-watersheds) to the largest (regions). Each hydrologic unit is identified by a unique numeric hydrologic unit code consisting of two to twelve digits based on the six levels of classification in the hydrologic unit system.

Table D-1. HUC code equivalencies

Region	HUC02	1 <sup>st</sup> Field
Sub-region	HUC04	2 <sup>nd</sup> Field
Basin	HUC06	3 <sup>rd</sup> Field
Sub-basin	HUC08	4 <sup>th</sup> Field
Watershed	HUC10	5 <sup>th</sup> Field
Sub-watershed	HUC12	6 <sup>th</sup> Field

Figure D-1 is a graphical example of the HUC hierarchy. The figure displays the sub-divisions from The Oregon Closed Basin to The Lower Skull Creek Sub-watershed.

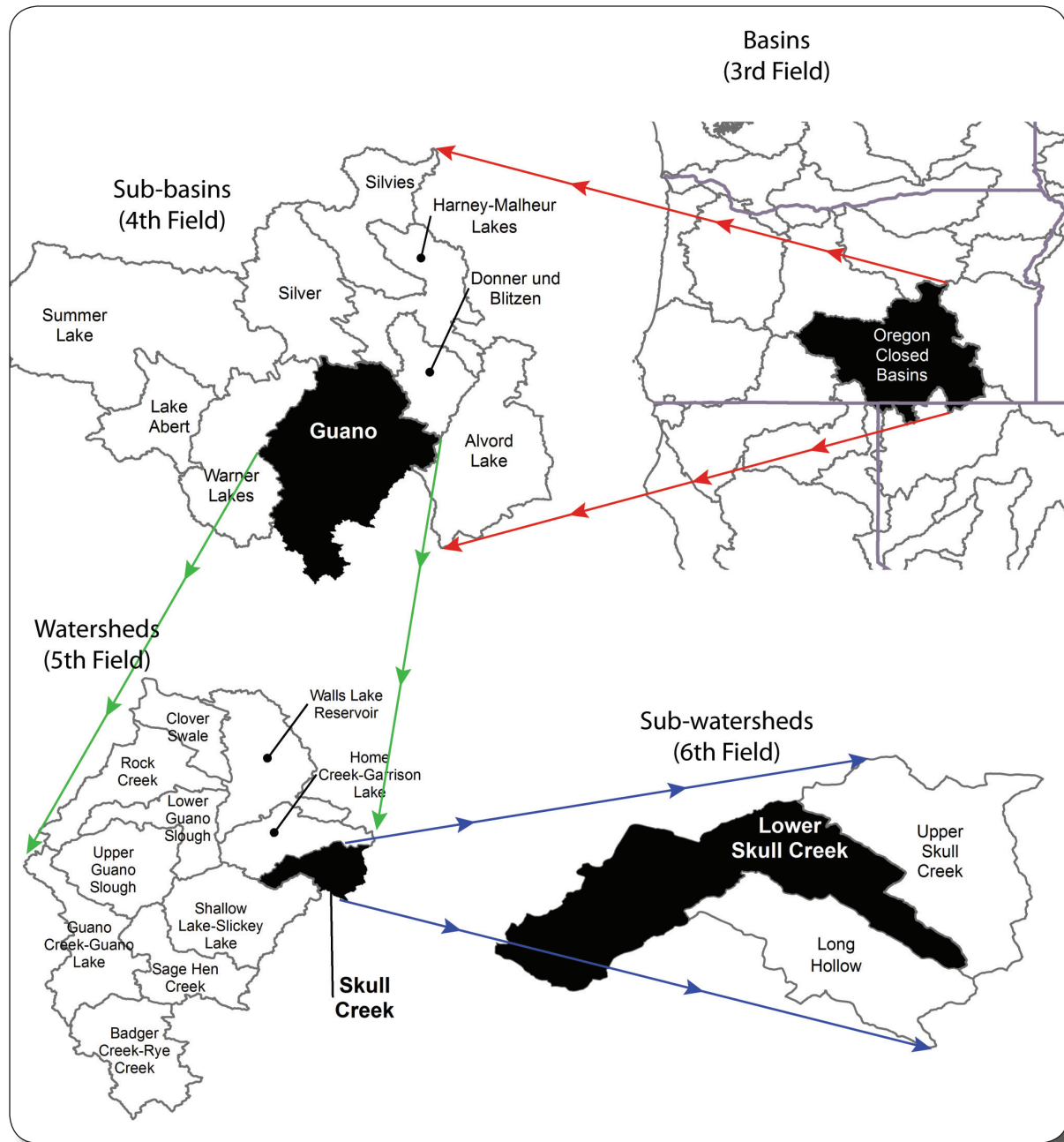


Figure D-1. HUC Hierarchy.

# Appendix E - Water Rights Data

Water rights in the Guano and Thousand Virgin sub-basins reflect changing patterns of land use and ownership. Table E-1 is a water rights summary for streams in those portions of Harney and Lake counties within the Guano and Thousand Virgin sub-basins (OWRD 2009) showing number of rights, points of diversion (PODs), rate sum (streamflow), and area sum (reservoirs).

Table E-1. Water rights summary.

Stream	Water Rights	PODs	Rate Sum (cfs)	Area Sum (acre ft)
BLACK CAN > CATLOW VALLEY	3	11	17.645	5
BOX CAN CR > RINCON CR	7	7	0	20.74
CANYON CR > FUNNEL CAN	1	1	0.48	0
CARROL CR > CATLOW VALLEY	1	1	1.41	0
CLOVER CR > CATLOW VALLEY	3	3	1.29	3.32
COTTONWOOD CR > SKULL CR	3	3	0.75	0.43
DEADMAN CAN > CATLOW VALLEY	1	1	0	2
DIP CR > RINCON CR	3	10	0.067	0.7
DRY CR > CATLOW VALLEY	10	12	3.64	607.36
DRY CR > SKULL CR	1	1	0	0
DRY G > SKULL CR	1	1	0	0.9
EAST CR > RINCON CR	2	5	3.1127	0
ECHART CR > SKULL CR	3	3	5.91	130
FUNNEL CAN > CATLOW VALLEY	1	1	0	0.7
GUANO SL > CATLOW VALLEY	4	7	0.47	584.6
HOME CR > CATLOW VALLEY	2	12	102.2463	0
KUENY CAN > CATLOW VALLEY	3	3	1.64	49.8
JUNIPER CR > KEG SPRINGS VALLEY	2	2	0	7.4
LITTLE SKULL CR > SKULL CR	2	3	5.39	820
LOGGERHEAD CAN > CLOVER CR	2	2	0	1.8
LONG HOL > CATLOW VALLEY	3	3	0.01	6.8
MTN LAKE CR > BOX CAN CR	1	1	0	0
ROAD CAN > SKULL CR	3	3	0	2.7
ROARING SPRINGS CAN > CATLOW VALLEY	4	5	2.11	5.18
ROCK CR > CATLOW VALLEY	10	19	30.45	3707.7
SAGE HEN CR > GUANO VALLEY	2	2	0	4
SIXMILE CR > SIXMILE L	3	3	0.06	0.1
SKULL CR > CATLOW VALLEY	3	3	9.075	0.6
SLICKEAR CR > SKULL CR	4	4	0.1	10.6
SQUARE MOUNTAIN CR > CATLOW VALLEY	4	4	0	0.8

Stream	Water Rights	PODs	Rate Sum (cfs)	Area Sum (acre ft)
THREEMILE CR > CATLOW VALLEY	4	4	19.63	1600
UNN STR > SKULL CR	8	8	4.758	109.9
UNN STR > KUENY CAN	3	3	0	5.42
UNN STR > LITTLE SKULL CR	1	1	0	0
UNN STR > DRY CR	29	38	11.9825	10.716
UNN STR > SMYTH CR	21	25	0	17.14
UNN STR > SOLOMON CAN	4	4	0	2.42
UNN STR > CATLOW VALLEY	60	64	21.9317	422.38
ROCK CR > CATLOW VALLEY	6	16	6.0238	0.36
UNN STR > ROCK CR	6	12	0.045	3.05
WILLOW CR > ROCK CR	1	1	0.37065	0
UNN STR > ROCK CR	6	17	1.79	4.95
PIUTE CR > ROCK CR	3	8	0	17.97
RATTLESNAKE DRAW > ROCK CR	1	3	0	0.37
SNYDER CAN > ROCK CR	1	2	0	0.79
UNN STR > CLOVER CR	20	21	0.0111	147.17
UNN STR > LOGGERHEAD CAN	1	1	0	2.05
UNN STR > KEG SPRINGS VALLEY	3	3	0	2.73
UNN STR > FUNNEL CAN	2	2	0.0089	2
STONEHOUSE CR > RINCON CR	2	3	0.37	0
UNN STR > RINCON CR	17	18	2.5422	333.03
UNN STR > BOX CAN CR	8	8	0.0028	4.7
UNN STR > DRY G	4	4	0	5.83
UNN STR > GUANO SL	21	26	1.3588	36
UNN STR > GUANO SL	17	18	12.3499	14.85
BLACK CAN > GUANO SL	3	4	0	600.88
UNN STR > BLACK CAN	2	3	0	0.66
W ROAD G > GUANO SL	1	1	0	1.5
W ROAD G > GUANO SL	2	2	0.0334	1
UNN STR > W ROAD G	1	1	0	2
UNN STR > GUANO CR	3	4	0.1	2.73
BOX CR > GUANO CR	1	2	1.206	0
GOAT CR > BOX CR	1	1	0.603	0
CLOVER SWALE > GUANO CR	2	2	0	4
GUANO CR > GUANO L	3	5	0	720
GUANO CR > SHIRK L	6	6	0	292.3
UNN STR > SHIRK L	1	1	0	1
JACK CR > GUANO VALLEY	9	9	8	1258.26
UNN STR > JACK CR	5	5	0	34.12
PIUTE CR > GUANO VALLEY	6	10	2.99	1070.5



Stream	Water Rights	PODs	Rate Sum (cfs)	Area Sum (acre ft)
UNN STR > PIUTE CR	25	25	2.01	1284.35
SAGE HEN CR > GUANO VALLEY	3	3	6	186.28
UNN STR > SAGE HEN CR	1	1	0	2
UNN STR > GUANO VALLEY	3	3	0	5.8
SOUTH CR > EAST CR	2	2	0	0.95
UNN STR > SOUTH CR	5	7	0.05	4.24
UNN STR > FLOOK L	1	2	0	0.54



# Appendix F - Special Status Species

The Special Status Species data is a product of the Oregon Biodiversity Information Center, previously known as the Oregon Natural Heritage Information Center. Species are only include if the have a Federal or State Status.

## Fish and Wildlife

Category	Scientific Name	Common Name	Federal Status	State Status
Amphibians	Anaxyrus boreas	Western toad		SV
Amphibians	Rana luteiventris	Columbia spotted frog	C	SC/SV
Birds	Accipiter gentilis	Northern goshawk	SOC	SV
Birds	Ammodramus savannarum	Grasshopper sparrow		SV
Birds	Amphispiza belli	Sage sparrow		SC
Birds	Athene cucularia hypugaea	Western burrowing owl	SOC	SC/SV
Birds	Buteo regalis	Ferruginous hawk	SOC	SC/SV
Birds	Buteo swainsoni	Swainson's hawk		SV
Birds	Centrocercus urophasianus	Greater sage-grouse	C	SV
Birds	Charadrius alexandrinus nivosus	Western snowy plover	PS:LT	LT
Birds	Chlidonias niger	Black tern	SOC	
Birds	Chordeiles minor	Common nighthawk		SC
Birds	Coccyzus americanus	Yellow-billed cuckoo	C	SC
Birds	Dolichonyx oryzivorus	Bobolink		SV
Birds	Egretta thula	Snowy egret		SV
Birds	Empidonax traillii adastus	Willow flycatcher	SOC	SV
Birds	Falco peregrinus anatum	American peregrine falcon		SV
Birds	Falco peregrinus tundrius	Arctic peregrine falcon		SV
Birds	Grus canadensis tabida	Greater sandhill crane		SV
Birds	Haliaeetus leucocephalus	Bald eagle		LT
Birds	Icteria virens	Yellow-breasted chat	SOC	SC
Birds	Ixobrychus exilis hesperis	Western least bittern	SOC	

### Status Codes

LE Listed as an Endangered Species; LT Listed as a Threatened Species; PE Proposed as an Endangered Species; PT Proposed as a Threatened Species; C Candidate for Listing as Threatened or Endangered; SOC Species of Concern - Taxa for which additional information is needed to support a proposal to list under the ESA; SC Sensitive - Critical; SV Sensitive - Vulnerable

Category	Scientific Name	Common Name	Federal Status	State Status
Birds	<i>Lanius ludovicianus</i>	Loggerhead shrike		SV
Birds	<i>Larus pipixcan</i>	Franklin's gull		SV
Birds	<i>Melanerpes lewis</i>	Lewis's woodpecker	SOC	SC
Birds	<i>Numenius americanus</i>	Long-billed curlew		SV
Birds	<i>Oreortyx pictus</i>	Mountain quail	SOC	SV
Birds	<i>Otus flammeolus</i>	Flammulated owl		SV
Birds	<i>Pelecanus erythrorhynchos</i>	American white pelican		SV
Birds	<i>Plegadis chihi</i>	White-faced ibis	SOC	
Birds	<i>Sialia mexicana</i>	Western bluebird		SV
Birds	<i>Sturnella neglecta</i>	Western meadowlark		SC
Birds	<i>Tympanuchus phasianellus columbianus</i>	Columbian sharp-tailed grouse	SOC	SC
Clams, Oysters and Mussels	<i>Anodonta californiensis</i>	California floater (mussel)	SOC	
Fish	<i>Gila bicolor ssp.</i>	Catlow tui chub	SOC	
Fish	<i>Oncorhynchus clarkii henshawi</i>	Lahontan cutthroat trout	LT	LT
Fish	<i>Oncorhynchus mykiss</i>	Catlow Valley redband trout	SOC	SC
Flatworms	<i>Kenkia rhynchida</i>	A flatworm (planarian)	SOC	
Mammals	<i>Antrozous pallidus</i>	Pallid bat	SOC	SV
Mammals	<i>Brachylagus idahoensis</i>	Pygmy rabbit	SOC	SV
Mammals	<i>Canis lupus</i>	Gray wolf	LE	LE
Mammals	<i>Corynorhinus townsendii</i>	Townsend's big-eared bat	SOC	SC
Mammals	<i>Euderma maculatum</i>	Spotted bat	SOC	SV
Mammals	<i>Gulo gulo</i>	Wolverine	SOC	LT
Mammals	<i>Lasionycteris noctivagans</i>	Silver-haired bat	SOC	SV
Mammals	<i>Lasiurus cinereus</i>	Hoary bat		SV
Mammals	<i>Lepus californicus</i>	Black-tailed jack rabbit		SV
Mammals	<i>Lepus townsendii</i>	White-tailed jackrabbit		SV
Mammals	<i>Lynx canadensis</i>	Canada lynx	LT	
Mammals	<i>Myotis californicus</i>	California myotis		SV
Mammals	<i>Myotis ciliolabrum</i>	Western small-footed myotis	SOC	
Mammals	<i>Myotis evotis</i>	Long-eared myotis	SOC	
Mammals	<i>Myotis thysanodes</i>	Fringed myotis	SOC	SV
Status Codes LE Listed as an Endangered Species; LT Listed as a Threatened Species; PE Proposed as an Endangered Species; PT Proposed as a Threatened Species; C Candidate for Listing as Threatened or Endangered; SOC Species of Concern - Taxa for which additional information is needed to support a proposal to list under the ESA; SC Sensitive - Critical; SV Sensitive - Vulnerable				

Category	Scientific Name	Common Name	Federal Status	State Status
Mammals	<i>Myotis volans</i>	Long-legged myotis	SOC	SV
Mammals	<i>Myotis yumanensis</i>	Yuma myotis	SOC	
Mammals	<i>Sorex preblei</i>	Preble's shrew	SOC	
Mammals	<i>Ursus arctos horribilis</i>	Grizzly bear	LT	
Mammals	<i>Vulpes macrotis</i>	Kit fox		LT
Reptiles	<i>Crotalus oreganus</i>	Western rattlesnake		SC
Reptiles	<i>Sceloporus graciosus graciosus</i>	Northern sagebrush lizard	SOC	SV
<p>Status Codes                      LE Listed as an Endangered Species; LT Listed as a Threatened Species; PE Proposed as an Endangered Species; PT Proposed as a Threatened Species; C Candidate for Listing as Threatened or Endangered; SOC Species of Concern - Taxa for which additional information is needed to support a proposal to list under the ESA; SC Sensitive - Critical; SV Sensitive - Vulnerable</p>				

## Plants

Category	Scientific Name	Common Name	Federal Status	State Rank
Vascular	<i>Astragalus tegetarioides</i>	Bastard kentrophyta	SOC	C
Vascular	<i>Botrychium crenulatum</i>	Crenulate grape-fern	SOC	C
Vascular	<i>Camissonia pygmaea</i>	Dwarf evening-primrose	SOC	C
Vascular	<i>Caulanthus major</i> var. <i>nevadensis</i>	Slender wild cabbage	SOC	C
Vascular	<i>Eriogonum chrysops</i>	Golden buckwheat	SOC	LT
Vascular	<i>Eriogonum crosbyae</i>	Crosby's buckwheat	SOC	LT
Vascular	<i>Eriogonum cusickii</i>	Cusick's eriogonum	SOC	C
Vascular	<i>Eriogonum prociduum</i>	Prostrate buckwheat	SOC	C
Vascular	<i>Galium serpticum</i> ssp. <i>warnerense</i>	Warner Mountain bedstraw	SOC	
Vascular	<i>Gratiola heterosepala</i>	Boggs Lake hedge-hyssop	SOC	LT
Vascular	<i>Hymenoxys lemmonii</i>	Cooper's goldflower	SOC	
Vascular	<i>Ivesia rhypara</i> var. <i>rhypara</i>	Grimy ivesia	SOC	LE
Vascular	<i>Ivesia rhypara</i> var. <i>shellyi</i>	Shelly's ivesia	SOC	
Vascular	<i>Mimulus evanescens</i>	Disappearing monkeyflower	SOC	C
Vascular	<i>Phacelia inundata</i>	Playa phacelia	SOC	
<p>Status Codes                      LE Listed as an Endangered Species; LT Listed as a Threatened Species; PE Proposed as an Endangered Species; PT Proposed as a Threatened Species; C Candidate for Listing as Threatened or Endangered; SOC Species of Concern - Taxa for which additional information is needed to support a proposal to list under the ESA; SC Sensitive - Critical; SV Sensitive - Vulnerable</p>				

Category	Scientific Name	Common Name	Federal Status	State Rank
Vascular	<i>Plagiobothrys salsus</i>	Desert allocarya	SOC	
Vascular	<i>Pleuropogon oregonus</i>	Oregon semaphore grass	SOC	LT
Vascular	<i>Pogogyne floribunda</i>	Profuse-flowered pogogyne	SOC	
Vascular	<i>Polyctenium williamsiae</i>	Williams combleaf	SOC	
Vascular	<i>Rorippa columbiae</i>	Columbia cress		C
Vascular	<i>Stanleya confertiflora</i>	Biennial stanleya	SOC	
Vascular	<i>Stephanomeria malheurensis</i>	Malheur wire-lettuce	LE	LE
Vascular	<i>Thelypodium brachycarpum</i>	Short-podded thelypody	SOC	
Vascular	<i>Thelypodium howellii</i> ssp. <i>howellii</i>	Howell's thelypody	SOC	
Vascular	<i>Trifolium leibergii</i>	Leiberg's clover	SOC	C
<p>Status Codes                      LE Listed as an Endangered Species; LT Listed as a Threatened Species; PE Proposed as an Endangered Species; PT Proposed as a Threatened Species; C Candidate for Listing as Threatened or Endangered; SOC Species of Concern - Taxa for which additional information is needed to support a proposal to list under the ESA; SC Sensitive - Critical; SV Sensitive - Vulnerable</p>				

# Appendix G - Weeds on Public Lands

---

For each named species in this appendix there is a generalized description (none, low, moderate, abundant) of current known abundance in the sub-basins. There are also subjective predictions of the potentials for introduction and spread in the area. These predictions were made by Lesley Richman and Brennan Hauk, weed specialists for the Burns and Lakeview BLM Districts respectively, and Marla Bennett, Wildlife Refuge Specialist for HMNAR. There are short comments on most species. In general, most of the comments concern the weed situation on public lands in the sub-basins.

Readers should understand that the last two columns of the table below are subjective predictions on the potential of the species to establish and spread in the project area. These are point-in-time predictions that are based on the knowledge of the three agency predictors named above, and the recent behavior of each species in or near the sub-basins. However, the history of weed management is that the spread of weeds is often not predictable. Short term weather and longer term climate changes can alter weed spread, as can:

- The changing biology of the plants themselves
- Legal and social changes of control methods (e.g. chemical controls are periodically banned or allowed), and
- Various other factors.

All of the listed species should be considered as threats to the project area lands. Neither the public nor the land managers should assume that the current situation will be stable into the future.



Table G-2. Identified weeds on public lands.

Species – Comments	Current Abundance	Potential for Introduction or Further Introduction	Potential for Spread or Further Spread
diffuse knapweed ( <i>Centaurea diffusa</i> )			
Diffuse knapweed is common in many areas just outside of the project area but is not common within. There are known private land infestations within the Guano Sub-basin.			
spotted knapweed ( <i>Centaurea maculosa</i> )	Low	High	High
Like diffuse knapweed, spotted knapweed is not common in the project area, but it can spread rapidly.			
yellow starthistle ( <i>Centaurea solstitialis</i> )	None	Moderate	Moderate
This distinctive plant is often introduced along roads and other high profile locations due to seeds being carried on vehicles. There is a significant potential for introduction, but due to the plant being quite distinct, there is a good chance that it would be recognized and controlled, thus lessening the chance for spread.			
squarrose knapweed ( <i>Centaurea virgata</i> )	Low	Low	Low
There is one known site of this plant within the project area.			
tansy ragwort ( <i>Senecio jacobaea</i> )	None	Low	Low
Tansy ragwort is often a contaminant in hay from western Oregon. Limiting the hay brought in from there will limit the potential for introductions.			
rush skeletonweed ( <i>Chondrilla juncea</i> )	None	Moderate	Moderate
There are no known infestations of this weed in the project area at this time.			
purple loosestrife ( <i>Lythrum salicaria</i> )	None	Low	Low
There are no known infestations of this weed in the project area at this time. It grows in moist areas—usually in or adjacent to standing water.			
leafy spurge ( <i>Euphorbia esula</i> )	Low	Moderate	Moderate
A few plants have been treated on Hart Mountain Refuge and are actively controlled; however, further introductions by vehicle traffic are likely			
Scotch broom ( <i>Cytisus scoparius</i> )	None	Low	Low
tamarisk, salt cedar ( <i>Tamarix ramosissima</i> )	Low	High	Moderate
There is one known tamarisk plant on the Hart Mountain Refuge within the project area. It will be treated in 2010. This species is a very serious problem in the American southwest. It is becoming more common in northern latitudes. The potential for introduction is high in the project area as there are large infestations in nearby watersheds, and the climate and habitat in these two sub-basins would easily support tamarisk			
musk thistle ( <i>Cardus nutans</i> )	Low	Low	Low
yellow toadflax ( <i>Linaria vulgaris</i> )	None	Moderate	Moderate
black henbane ( <i>Hyoscyamus niger</i> )	Low	Moderate	Low
This species is only known on Lakeview BLM District lands in the project area. It is a poisonous plant and can be quite problematic			

Species – Comments	Current Abundance	Potential for Introduction or Further Introduction	Potential for Spread or Further Spread
Scotch thistle ( <i>Onopordum acanthium</i> )	Moderate	High	High
Scotch thistle is reported as abundant on Burns BLM lands, moderate on Hart Mountain lands, and low on Lakeview BLM lands. Its potential for further spread and introduction is high. Sites of this species have to be monitored for many years even when no plants are being observed, as seeds can stay viable in the soil for long periods of time.			
dalmation toadflax ( <i>Linaria dalmatica</i> )	Low	Moderate	High
Dalmation toadflax is very common in the northern part of Harney County, but currently it is not common in the project area. The possibility of further spread is high			
perennial pepperweed ( <i>Lepidium latifolium</i> )	Moderate	High	High
This species is usually found in lower elevation riparian zones. It is common just outside the project area, but is only moderately common now within it. Land managers and private landowners are actively working to keep this plant out of riparian areas, meadows and fields			
medusahead ( <i>Taeniatherum caput-medusae</i> )	Low	High	High
Medusahead is most commonly found on heavy, clay soils which are abundant in the project area. Given enough time on a site, this annual will crowd out almost all other herbaceous vegetation. It presents a grave danger to the ecological health of any area it invades.			
Mediterranean sage ( <i>Salvia aethiopsis</i> )	Moderate	High	High
Mediterranean sage was abundant on Hart Mountain Refuge until active treatment began eight years ago. As far as is known it is only moderately common now in the project area. The long-lived seeds are spread by tumbleweed-like movement of the dead plants in the fall			
puncture vine ( <i>Tribulus terrestris</i> )	Low	Moderate	Moderate
This low-growing annual is very common in places to the east of the project area, but there are only scattered known locations of it in the project area at this time.			
Russian knapweed ( <i>Centaurea/Acroptilon repens</i> )	Low	Moderate	High
Russian knapweed is common on both public and private lands in the Warner Valley, just west of the project area. It forms dense stands and spreads locally by pervasive underground roots. Private and public entities are treating it there. As of now, it is not common in the Guano and Thousand-Virgin Sub-basins.			
St. Johnswort/Klamath weed ( <i>Hypericum perforatum</i> )	Low	Low	Low
St. Johnswort is known to occur in the sub-basin, but it is not common			
Canada thistle ( <i>Cirsium arvense</i> )	Moderate	Moderate	Moderate
Canada thistle usually inhabits riparian zones and other moist areas. It is relatively common in the project area, but does not appear to be highly aggressive or spreading rapidly, especially in healthy riparian zones. Bio-control agents are used with this species and are quite widespread in the sub-basin. Herbicides are also used to control the species. (See also the discussion of whitetop immediately below.)			
whitetop/hoary cress ( <i>Cardaria draba</i> )	Moderate	Moderate	High

Species – Comments	Current Abundance	Potential for Introduction or Further Introduction	Potential for Spread or Further Spread
<p>Whitetop is very common immediately to the west of the project area in the Warner Valley. Hart Mountain Refuge reports that it and Canada thistle are increasingly found after controlled burns possibly brought in on vehicles used in the fire, or by vehicles immediately thereafter. Alternatively, those species could have already been where they are now found, but were just not known to be there. Whitetop is also common to the east of the sub-basin in various areas of southeast Oregon and southwest Idaho, and is spreading around Burns to the north.</p>			
halogeton ( <i>Halogeton spp.</i> )	Moderate	High	High
<p>This annual plant is a poisonous weed. It is particularly problematic if the associated vegetation is depleted, as then it can establish readily. While quite poisonous to sheep it is not as dangerous to cattle, however it should not be allowed to proliferate.</p>			
morning glory ( <i>Convolvulus arvensis</i> )	Low	Moderate	Moderate
<p>Morning glory is not common in the two sub-basins. However, due to it often growing along roads, it can easily be carried into the project area, and spread within it. This plant is often ignored, allowing it to become problematic even when its presence is known.</p>			
bull thistle ( <i>Cirsium vulgare</i> )	Low	Low	Low
<p>Bull thistle is relatively common in the sub-basin. It often invades disturbed areas, including those burned by wildfire or prescribed fire. This species does not usually invade aggressively into healthy plant communities but can show up in even small disturbances.</p>			

# Appendix H - Channel Habitat Types

---

## Descriptions of Channel Habitat Types

### Low Gradient Moderately Confined Channel (LM)

These channels consist of low-gradient reaches that display variable confinement by low terraces or hill slopes. A narrow floodplain approximately two to four times the width of the active channel is common, although it may not run continuously along the channel. Often low terraces accessible by flood flows occupy one or both sides of the channel. The channels tend to be of medium to large size, with substrate varying from bedrock to gravel and sand. They tend to be slightly to moderately sinuous, and will occasionally possess islands and side-channels. Because of the difficulty in assessing the degree of confinement and the height of stream-bank terraces from maps or air photos, these channels are often misidentified as LC channels unless field-checked.

#### Channel attributes

- Stream gradient: <2%
- Valley shape: Broad, generally much wider than channel
- Channel pattern: Single with occasional multiple channels
- Channel confinement: Variable
- Oregon stream size: Variable, usually medium to large
- Position in drainage: Variable, often main-stem and lower end of main tributaries
- Dominant substrate: Fine gravel to bedrock

#### Channel responsiveness

The unique combination of an active floodplain and hillslope or terrace controls acts to produce channels that can be among the most responsive in the basin. Multiple roughness elements are common, with bedrock or large boulders generating a variety of aquatic habitats within the stream network.

#### Fine Sediment: Moderate to High

The location of these channels often dictates a high sediment input to the stream. These channels can be sediment deposition zones for larger particles, although a significant portion of the fine sediment may be transported, particularly in bedrock channels. Increases in fine-sediment supply will likely result in filling of margin pool and bed-fining of side-channels and low-velocity areas. Decreases in sediment supply may induce scour in non-bedrock channels or localized bank erosion.

#### Coarse Sediment: Moderate to High

These channels are depositional areas for coarse sediment. When the supply of coarse sediment surpasses the transport capabilities of the stream, pools are filled, and the influence of large boulders, wood, and bedrock control structures is lessened. If significant amounts of large sediment are added, the channel is particularly vulnerable to widening, lateral movement, side-channel development, and localized scour.

### **Peak Flows: Moderate**

These channels are capable of passing most high flows without adjustments to the overall dimensions of the channel. Development of point or **medial bars** is likely in basins with high sediment loads, as is side-channel development. Localized bed or bank scour is possible on bends in the main channel.

### **Riparian enhancement opportunities**

Like floodplain channels, these channels can be among the most responsive of channel types. Unlike floodplain channels, however, the presence of confining landform features often improves the accuracy of predicting channel response to activities that may affect channel form. Additionally, these controls help limit the destruction of enhancement efforts common to floodplain channels. Because of this, LM channels are often good candidates for enhancement efforts. Channels of this type in non-forested basins are often responsive to bank stabilization efforts such as riparian planting and fencing.

### **Low Gradient Confined Channel (LC)**

LC channels are incised or contained within adjacent, gentle landforms or incised in volcanic flows or uplifted coastal landforms. Lateral channel migration is controlled by frequent bedrock outcrops, high terraces, or hillslopes along stream banks. They may be bound on one bank by hill slopes and lowlands on the other, and may have a narrow floodplain in places, particularly on the inside of meander bends. Stream-bank terraces are often present, but they are generally above the current floodplain. The channels are often stable, with those confined by hill slopes or bedrock less likely to display bank erosion or scour than confined by alluvial terraces. High-flow events are well-contained by the upper banks. High flows in these well-contained channels tend to move all but debris downstream or push it to the channel margins. Stream banks can be susceptible to landslides in areas where steep hillslopes of weathered bedrock, glacial till, or volcanic-ash parent materials abut the channel. Some degree of caution should be exercised in evaluating channels that have downcut into alluvial material set in a wide flat valley. If the stream banks are high enough to allow a floodplain width less than two times the bankfull width, then the stream meets the definition of confined. However, some streams meeting this definition may have recently downcut, effectively reducing floodplain width as the channel deepens. It is beyond the scope of the OWEB manual to deal with technical issues such as rate of channel incision. The analyst, however, should note channels that display evidence of recent downcutting, low channel banks, and evidence of abandoned floodplain. For whatever reason, these channels may be transitioning from LM to LC channels, and should receive additional scrutiny before assigning the proper CHT.

### **Channel attributes**

- Stream gradient: <2%

- Valley shape: Low- to moderate-gradient hill slopes with limited floodplain
- Channel pattern: Single channel, variable sinuosity
- Channel confinement: Confined by hill slopes or high terraces
- Oregon stream size: Variable, usually medium to large
- Position in drainage: Variable, generally mid to lower in the larger drainage basin
- Dominant substrate: Boulder, cobble, bedrock with pockets of sand/gravel/cobble

### **Channel responsiveness**

The presence of confining terraces or hill slopes and control elements such as bedrock limit the type and magnitude of channel response to changes in input factors. Adjustment of channel features is usually localized and of a modest magnitude.

### **Fine Sediment: Low**

The confining nature of the landforms that define this channel type tends to focus enough stream energy to route most introduced fine sediment downstream.

### **Coarse Sediment: Moderate**

These channels can be depositional areas for coarse sediment. When the supply of coarse sediment surpasses the transport capabilities of the stream, pools are filled, and the influence of large boulders and bedrock control structures is lessened. If significant amounts of large sediment are added, the channel is particularly vulnerable to widening, lateral movement, side channel development, or scour.

### **Peak Flows: Low to Moderate**

These channels have limited floodplain, and are capable of passing most high flows without adjustments to the overall dimensions of the channel. Development of point or medial bars is likely in basins with high sediment loads. Localized bed or bank scour is possible on bends in the main channel.

### **Riparian enhancement opportunities**

These channels are not highly responsive, and in channel enhancements may not yield intended results. In basins where water-temperature problems exist, the confined nature of these channels lends itself to establishment of riparian vegetation. In non-forested land, these channels may be deeply incised and prone to bank erosion from livestock. As such, these channels may benefit from livestock access control measures.

## **Moderate Gradient Moderately Confined Channel (MM)**

This group includes channels with variable controls on channel confinement. Alternating valley terraces and/or adjacent mountain-slope, foot-slope, and hill-slope landforms limit channel migration and floodplain development. Similar to the LM channels, a narrow floodplain is usually present, and may alternate from bank to bank. Bedrock steps with cascades may be present.

### **Channel attributes**

- Stream gradient: Generally 2-4%

- Valley shape: Narrow valley with floodplain or narrow terrace development
- Channel pattern: Usually single channel, low to moderate sinuosity
- Channel confinement: Variable
- Oregon stream size: Variable, usually medium to large
- Position in drainage: Mid to lower portion of drainage basins
- Dominant substrate: Gravel to small boulder

### **Channel responsiveness**

The unique combination of a narrow floodplain and hill-slope or terrace controls acts to produce channels that are often the most responsive in the basin. The combination of higher gradients and the presence of a floodplain set the stage for a dynamic channel system. Multiple roughness elements such as bedrock, large boulders, or wood may be common, resulting in a variety of aquatic habitats within the stream network.

### **Fine Sediment: Moderate**

The location of these channels often dictates a high sediment input to the stream. These channels can be sediment deposition zones for larger particles, although the moderate gradient produces enough energy to route most of the fine sediment downstream. Increases in fine-sediment supply will likely result in filling of margin pool and bed fining of side-channels and low-velocity areas. Decreases in sediment supply may induce scour in non-bedrock channels or localized bank erosion.

### **Coarse Sediment: Moderate to High**

Unless the channel is quite large, these channels may be temporary storage areas for coarse sediment. When the supply of coarse sediment surpasses the transport capabilities of the stream, pools are filled, and the influence of large boulders, wood, and bedrock control structures is lessened. If significant amounts of large sediment are added, the channel is particularly vulnerable to widening, lateral movement, side-channel development, or scour. Steeper channels within this CHT would likely transport a greater portion of the load and not be as responsive as lower-gradient reaches.

### **Peak Flows: Moderate**

These channels have limited floodplain, and are capable of passing most high flows without adjustments to the overall dimensions of the channel. The higher energy induced by steeper gradients can result in development of point or medial bars in basins with high sediment loads, as well as side channel development. Localized bed or bank scour is possible on bends in the main channel.

### **Riparian enhancement opportunities**

Like floodplain channels, these channels are among the most responsive of channel types. Unlike floodplain channels, however, the presence of confining landform features improves the accuracy of predicting channel response to activities that may affect channel form. Additionally, these controls help limit the destruction of enhancement efforts, a common problem in floodplain channels. The slightly higher gradients impart a bit more uncertainty as to the outcome of enhancement efforts when compared to LM channels. MM channels, however, are often good candidates for enhancement efforts. Channels of this type in non-forested basins are often responsive to bank stabilization efforts such as riparian planting and fencing.



## **Moderate Gradient Headwater Channel (MH)**

These moderate-gradient headwater channels are common to plateaus in Columbia River basalts, young volcanic surfaces, or broad drainage divides. They may be sites of headwater beaver ponds. These channels are similar to LC channels, but occur exclusively in headwater regions. They are potentially above the anadromous fish zone. These gentle to moderate headwater streams generally have low streamflow volumes and, therefore, low stream power. The confined channels provide limited sediment storage in low-gradient reaches. Channels have a small upslope drainage area and limited sediment supply. Sediment sources are limited to upland surface erosion.

### **Channel attributes**

- Stream gradient: 1-6%
- Valley shape: Open, gentle V-shape valley
- Channel pattern: Low sinuosity to straight
- Channel confinement: Confined
- Oregon stream size: Small
- Position in drainage: Upper, headwater
- Dominant substrate: Sand to cobble, bedrock; boulders may be present from erosion of surrounding slopes and soils

### **Channel responsiveness**

The low stream power and presence of confining terraces or hill slopes and control elements such as bedrock substrates limit the type and magnitude of channel response to changes in input factors. Adjustment of channel features is usually localized and of a moderate magnitude.

### **Fine Sediment: Moderate**

The confining nature of the landforms that define this channel type tends to focus enough stream energy to route much of the introduced fine sediment downstream. Localized pool filling and bed fining can occur in lower-gradient reaches.

### **Coarse Sediment: Moderate to High**

The low energy in these small channels is incapable of transporting larger sediment. Increases in the sediment load can easily overwhelm the channel and result in widening, lateral movement, or scour. In some basins, the location of these channels makes them vulnerable to inputs of sediment from slides.

### **Peak Flows: Moderate**

These channels have limited floodplain, and are capable of passing most high flows without adjustments to the overall dimensions of the channel. Localized bed or bank scour is possible on bends in the main channel.

### **Riparian enhancement opportunities**

These channels are moderately responsive. In basins where water-temperature problems exist, the stable banks generally found in these channels lend themselves to establishment of riparian vegetation. In non-forested land, these channels may be deeply incised and prone to bank erosion from livestock. As such, these channels may benefit from livestock access control measures.

# Appendix I - Ecological System Descriptions

---

Begun in the 1990s, the U.S. National Vegetation Classification (NVC), a component of the International Classification, was developed by The Nature Conservancy and NatureServe in collaboration with partners from the academic, conservation, and government sectors. The classification continues to grow as more and more community types are found and analyzed. Key points include:

- The first such consistent classification on a scale fine enough to be useful for the conservation of specific sites.
- Can be used to classify all types of communities, from verdant wetlands to arid deserts, from pristine old-growth forests to human-disturbed habitats.
- Includes more than 4,500 vegetation types.
- Adopted by the Federal Geographic Data Committee for use by all U.S. federal agencies.

In 2008 the State of Oregon refined the NVC. The refined classification focused on Oregon specific descriptions and vegetation while maintaining the link with the NVC.

The following descriptions utilize the 2008 State of Oregon classification and are only for the ecological systems found in the Guano and Thousand-Virgin sub-basins.

## Alkali and Desert Grasslands

**Oregon Habitat:** Alkali and Desert Grasslands

**Oregon Name/OR Code:** Semi-Desert Grassland/7107

**GAP Name/ESLF Code:** Inter-Mountain Basins Semi-Desert Grassland/7107

**Range:** Found throughout the intermountain west.

**Min Elev:** 4,500 feet

**Max Elev:** 7,500 feet

**Spatial Pattern:** Large patch

**Vegetation:** Vegetated (>10% vasc.)

**Upland:** Yes

**Wetland:**

**Description:** Dry grasslands, almost always dominated by perennial bunchgrasses, usually in valley bottoms, flats or margins, in desert areas. Needle-and-thread, Indian ricegrass, needlegrass and dropseed. These typically integrate into salt-desert shrubs or sagebrush, and support grasslands due to unusual soils (sand, gravel or alluvium).

## Alpine and Subalpine Habitats

**Oregon Habitat:** Alpine and Subalpine Habitats

**Oregon Name/OR Code:** Alpine Bedrock and Scree/3135

**GAP Name/ESLF Code:** Rocky Mountain Alpine Bedrock and Scree/3135

**Range:** Restricted to the highest elevations of the Rocky Mountains, from Alberta and inland British Columbia south into New Mexico, west into the highest mountain ranges of the Great Basin, eastern Oregon and Washington.

**Min Elev:** 8,500 feet

**Max Elev:** 15,000 feet

**Spatial Pattern:** Large patch

**Vegetation:** Unvegetated (<10% vasc.)

**Upland:** Yes

**Wetland:** No

**Description:** This system is the barren rocks and scree found above treeline. It is composed of barren and barely vegetated alpine rock and scree. The harsh dry winds, rocky and sometimes unstable substrates, and a short growing season limit plant growth. There can be sparse cover of forbs, grasses, lichens and low shrubs.

**Oregon Habitat:** Alpine and Subalpine Habitats

**Oregon Name/OR Code:** Alpine Turf - Dwarf Shrub/7116

**GAP Name/ESLF Code:** Rocky Mountain Alpine Fell-Field/7116

**Range:** This system is found in small patches at alpine elevations throughout the Rocky Mountains, west into the mountainous areas of the Great Basin. Outlier sites occur in the northeastern Cascades and on Mount Rainier in Washington.

**Min Elev:** 8,000 feet

**Max Elev:** 15,000 feet

**Spatial Pattern:** Large patch

**Vegetation:** Vegetated (>10% vasc.)

**Upland:** Yes

**Wetland:** No

**Description:** These are wind-scoured fell-fields that are often free of snow in the winter, such as ridgetops and exposed saddles, exposing the plants to severe environmental stress. Soils on these windy unproductive sites are shallow, stony, low in organic matter, and poorly developed. Most fell-field plants are cushioned or matted, frequently with traits to prevent water loss (succulent stems or leaves, flat to the ground in rosettes, or densely hairy). Plant cover is low (15-50%) while exposed rocks make up the rest. Fell-fields are usually within or adjacent to alpine tundra dry meadows

**Oregon Habitat:** Alpine and Subalpine Habitats

**Oregon Name/OR Code:** Eastside Subalpine Shrubland/5326

**GAP Name/ESLF Code:** Northern Rocky Mountain Subalpine Deciduous Shrubland/5326

**Range:** This system is found at high elevations in the northern Rockies of British Columbia, Alberta and Montana, south and west around the Columbia Basin of Oregon, Washington and Idaho.

**Min Elev:** 6,000 feet

**Max Elev:** 12,000 feet

**Spatial Pattern:** Large patch, Small patch

**Vegetation:** Vegetated (>10% vasc.)

**Upland:** Yes

**Wetland:** No

**Description:** Subalpine and high montane shrublands, usually dominated by various deciduous shrubs. These occur on moist soils, persisting on sites that would become forested due to repeated burns. Fools huckleberry, huckleberry, thimbleberry, mountain ash, and Cascade azalea are common shrubs, which occur with forbs such as iris, braken fern and fireweed. These occur in the zone of "grizzly bears not rattlesnakes."

**Oregon Habitat:** Alpine and Subalpine Habitats

**Oregon Name/OR Code:** Montane - Alpine Meadow/9265

**GAP Name/ESLF Code:** Rocky Mountain Subalpine-Montane Mesic Meadow/7118

**Range:** Found at mid to high elevations throughout the Rocky Mountains, west to Nevada, Oregon and Washington. It occurs at lower elevations in Alaska and Canada, higher elevations in the south, mostly above 6000 feet in the lower 48 states.

**Min Elev:** 3,000 feet

**Max Elev:** 15,000 feet

**Spatial Pattern:** Large patch

**Vegetation:** Vegetated (>10% vasc.)

**Upland:** Yes

**Wetland:** No

**Description:** These are high elevation (montane to subalpine) moist meadows found in openings and valleys in the conifer forests. They occur in a matrix with supalpine parklands and woodlands, just below the alpine communities in the landscape. Mostly they are relatively small, but some of the larger river valleys support some very large examples of this system.

**Oregon Habitat:** Alpine and Subalpine Habitats

**Oregon Name/OR Code:** Montane - Alpine Meadow/9265

**GAP Name/ESLF Code:** Rocky Mountain Alpine-Montane Wet Meadow/9217

**Range:** Found throughout the inter-mountain west of the US, and adjacent Canada.

**Min Elev:** 4,000 feet

**Max Elev:** 12,000 feet

**Spatial Pattern:** Small patch

**Vegetation:** Vegetated (>10% vasc.)

**Upland:** No

**Wetland:** Yes

**Description:** High elevation wet meadows found throughout the montane and alpine areas of the Rocky Mountains. They occur in flat, wet areas, either in openings in montane forests or mixed with alpine parklands. They often are found in a matrix with montane to alpine riparian systems, or alpine dwarf shrublands.

**Oregon Habitat:** Alpine and Subalpine Habitats

**Oregon Name/OR Code:** Montane - Alpine Meadow/9265

**GAP Name/ESLF Code:** Temperate Pacific Subalpine-Montane Wet Meadow/9265

**Range:** Found from central California (Transverse Range) north to Alaskan coastal forests. Elevations vary, although tend to occur lower further north.

**Min Elev:** 1,000 feet

**Max Elev:** 14,000 feet

**Spatial Pattern:** Small patch

**Vegetation:** Vegetated (>10% vasc.)

**Upland:** No

**Wetland:** Yes

**Description:** These are wet meadows found in the mountains of the Pacific coast. Usually dominated by sedges, grasses, and rushes, often with showy forbs such as camas, shooting star and hellebore. These are flat, almost always found in forest openings, and often small.

## Aspen Forests and Woodlands

**Oregon Habitat:** Aspen Forests and Woodlands

**Oregon Name/OR Code:** Quaking Aspen/4104

**GAP Name/ESLF Code:** Rocky Mountain Aspen Forest and Woodland/4104

**Range:** Found in the mountains throughout the western US, north into Canada, west to the Pacific coastal states.

**Min Elev:** 5,000 feet

**Max Elev:** 10,000 feet

**Spatial Pattern:** Large patch

**Vegetation:** Vegetated (>10% vasc.)

**Upland:** Yes

**Wetland:** No

**Description:** These are the forests and woodlands dominated by quaking aspen found throughout the Rocky Mountains. They are generally upland, but moist forests lacking significant cover (<25%) of conifer. Grasses, forbs and deciduous shrubs are the most common species in the understory, but this is a very widespread and diverse system.

**Oregon Habitat:** Aspen Forests and Woodlands

**Oregon Name/OR Code:** Quaking Aspen - Conifer/4302

**GAP Name/ESLF Code:** Inter-Mountain Basins Aspen-Mixed Conifer Forest and Woodland/4302

**Range:** Found throughout Utah, eastern Nevada, southern Idaho and western Montana, extending south occasionally to Colorado and west to northwestern California and Oregon.

**Min Elev:** 5,500 feet

**Max Elev:** 9,500 feet

**Spatial Pattern:** Matrix

**Vegetation:** Vegetated (>10% vasc.)

**Upland:** Yes

**Wetland:** No

**Description:** These are woodlands and forests codominated by quaking aspen and one or more conifer species, most commonly a pine, true fir, or spruce. They are found on moist soils on slopes in the mountains. These vary from areas with aspen dominating, to sites where the conifer overtop the aspen, which persists in small patches in the understory. Many of these mixed forests are believed to have replaced pure aspen stands due to fire suppression and grazing.

## Big Sagebrush Shrublands and Steppe

**Oregon Habitat:** Big Sagebrush Shrublands and Steppe

**Oregon Name/OR Code:** Big Sagebrush - Bunchgrass Steppe/5454

**GAP Name/ESLF Code:** Inter-Mountain Basins Big Sagebrush Steppe/5454

**Range:** This type occurs throughout the western U.S., and is dominant in the Columbia Plateau and the northern Great Basin and Wyoming. It occurs at lower elevations in Oregon, Washington and Idaho, and higher elevations in Wyoming and the south.

**Min Elev:** 1,000 feet

**Max Elev:** 7,000 feet

**Spatial Pattern:** Large patch

**Vegetation:** Vegetated (>10% vasc.)

**Upland:** Yes

**Wetland:** No

**Description:** Open sagebrush steppe, which are mixed grassland shrubland habitats containing Wyoming or basin big sagebrush, bitterbrush or other intermountain sage-like shrubs usually between 10% and 25% cover, and with bunchgrasses or native grasses making up more than 25% of the cover, distinguishing this from Big Sagebrush Shrublands. With overgrazing, some sagebrush steppe can be converted to sagebrush shrublands. This is a very widespread type occurring on all landforms, soils, slopes and aspects.

**Oregon Habitat:** Big Sagebrush Shrublands and Steppe

**Oregon Name/OR Code:** Big Sagebrush Shrubland/5257

**GAP Name/ESLF Code:** Inter-Mountain Basins Big Sagebrush Shrubland/5257

**Range:** This type occurs throughout the western U.S., typically in basins between mountain ranges. It occurs at lower elevations in Oregon, Washington and Idaho, and higher elevations elsewhere, and is more common in the south, replaced by steppe further north.

**Min Elev:** 1,000 feet

**Max Elev:** 7,000 feet

**Spatial Pattern:** Matrix

**Vegetation:** Vegetated (>10% vasc.)

**Upland:** Yes

**Wetland:** No

**Description:** Sagebrush shrublands with Wyoming or basin big sagebrush, bitterbrush or other intermountain sage-like shrubs dominating a shrubland. Shrubs are the dominant vegetation, with grasses making up less than 25% of the cover, distinguishing this from Big Sagebrush Steppe. This widespread type occurs on all landforms, soils, slopes and aspects.

**Oregon Habitat:** Big Sagebrush Shrublands and Steppe

**Oregon Name/OR Code:** Great Basin Dry Mixed Sagebrush/5256

**GAP Name/ESLF Code:** Inter-Mountain Basins Semi-Desert Shrub-Steppe/5456

**Range:** Found throughout the intermountain west.

**Min Elev:** 2,000 feet

**Max Elev:** 6,000 feet

**Spatial Pattern:** Large patch

**Vegetation:** Vegetated (>10% vasc.)

**Upland:** Yes

**Wetland:** No

**Description:** Dry, open grasslands with a mix of low to medium tall shrubs, found on flats and gentle lower slopes, on well drained, usually deep soils. Steppe and desert bunchgrasses or shortgrass prairie grasses dominate areas with various shrubs. Sagebrush can be present, but not dominant, with rabbitbrush, horsebrush, winterfat or mormon tea the most common shrubs..

**Oregon Habitat:** Big Sagebrush Shrublands and Steppe

**Oregon Name/OR Code:** Mountain Big Sagebrush/5455

**GAP Name/ESLF Code:** Inter-Mountain Basins Montane Sagebrush Steppe/5455

**Range:** Found in the mountains throughout western US, at lower elevations in Washington and British Columbia to very high elevations in the Great Basin.

**Min Elev:** 4,000 feet

**Max Elev:** 10,000 feet

**Spatial Pattern:** Matrix

**Vegetation:** Vegetated (>10% vasc.)

**Upland:** Yes

**Wetland:** No

**Description:** These are mountain sagebrush habitats always dominated by mountain big sagebrush, but often with other shrubs. Varied native bunchgrasses are almost always co-dominant. Found on mountain foothills and slopes, in areas ranging from deep soils to shallow stoney flats and ridgetops. Higher in the mountains, they become very forb rich, and often occur in a matrix with montane and subalpine woodlands.

**Oregon Habitat:** Big Sagebrush Shrublands and Steppe

**Oregon Name/OR Code:** Silver Sagebrush/9321

**GAP Name/ESLF Code:** Columbia Plateau Silver Sagebrush Seasonally Flooded Shrub-Steppe/9321

**Range:** Found throughout the intermountain sagebrush areas in the Columbia Plateau, northern Great Basin and east almost to the Great Plains.

**Min Elev:** 3,000 feet

**Max Elev:** 8,000 feet

**Spatial Pattern:** Small patch

**Vegetation:** Vegetated (>10% vasc.)

**Upland:** Yes

**Wetland:** Yes

**Description:** These are seasonally flooded shrublands and steppe, found in seasonal basins or in vernal pools found in a matrix of sagebrush steppe. Always dominated by silver sagebrush, they vary from having fairly high cover of native grasses (bluegrass, muhly and wildrye) to being composed of silver sage with exposed white soils and seasonal forbs. They can be smallish pools of less than 20 square feet, or giant non-alkaline playas covering more than 5,000 acres, occasionally with Wyoming or basin big sagebrush mixed in.

## Canyon and Montane Shrublands

**Oregon Habitat:** Canyon and Montane Shrublands

**Oregon Name/OR Code:** Eastside Foothill - Canyon Shrubland/5312

**GAP Name/ESLF Code:** Northern Rocky Mountain Montane-Foothill Deciduous Shrubland/5312

**Range:** Found in the mountains and canyons of the Pacific Northwest, from British Columbia east to Alberta, south to central Montana and west through Idaho to eastern Oregon and Washington.

**Min Elev:** 500

**Max Elev:** 6,000 feet

**Spatial Pattern:** Large patch

**Vegetation:** Vegetated (>10% vasc.)



**Upland:** Yes

**Wetland:** No

**Description:** These are shrublands typically found on foothill, lower mountain and canyon slopes, which vary from dense shrubs to open shrub - bunchgrass habitats. Tall deciduous shrubs such as ninebark, chokecherry, hawthorn, mock-orange, smooth sumac, oceanspray and serviceberry are found in many combinations, usually with grasses such as fescue, bluebunch wheatgrass, junegrass, pinegrass and elk sedge. They sometimes occur near open Ponderosa pine and Douglas-fir woodlands, sometimes higher in the mountains near larch or true fir. While found on all aspects, they are usually on fairly steep slopes or toeslopes. These occur in the zone of “rattlesnakes not grizzly bears.”

**Oregon Habitat:** Canyon and Montane Shrublands

**Oregon Name/OR Code:** Mountain Mahogany/4303

**GAP Name/ESLF Code:** Inter-Mountain Basins Curl-leaf Mountain Mahogany Woodland and Shrubland/4303

**Range:** Found in canyons, hills and mountain ranges throughout the western US, from the eastern foothills of the Sierra Nevada north to Oregon, east to the foothills of the Big Horn Mountains of Wyoming, and south through Colorado, Utah, and Nevada.

**Min Elev:** 1,500 feet

**Max Elev:** 9,000 feet

**Spatial Pattern:** Large patch

**Vegetation:** Vegetated (>10% vasc.)

**Upland:** Yes

**Wetland:** No

**Description:** Mountain mahogany dominated shrublands or woodlands, usually found on rocky outcrops from canyons and foothills to mountain ridge tops. Most areas have exposed rock and bunchgrasses in the understory, with these areas integrating into mountain sagebrush or areas with scattered juniper or pine.

## Cliff and Canyon

**Oregon Habitat:** Cliff and Canyon

**Oregon Name/OR Code:** Blue Mountain Cliff and Canyons/3129

**GAP Name/ESLF Code:** Rocky Mountain Cliff, Canyon and Massive Bedrock/3129

**Range:** This system is located throughout the Rocky Mountain and northeastern Cascade Ranges in North America. It occurs at low elevations in Hells Canyon up to very high elevations in the high Rocky Mountains.

**Min Elev:** 1,000 feet

**Max Elev:** 11,000 feet

**Spatial Pattern:** Large patch

**Vegetation:** Unvegetated (<10% vasc.)

**Upland:** Yes

**Wetland:** No

**Description:** These are the representative cliffs, canyons and large bedrock outcrops found throughout the Rocky Mountains. They are generally barren, rocky systems with more rock than vegetation, although as seen from above, many can be quite narrow. They include the steep cliffs, and unstable scree and talus slopes often found below the cliffs. This system usually has isolated patches of trees, shrubs and grasses from the adjacent landscape, as well as some species, such as mock-orange, sumac, and serviceberry which are characteristic of these cliffs.

**Oregon Habitat:** Cliff and Canyon

**Oregon Name/OR Code:** Intermountain Basin Cliff and Canyon/3173

**GAP Name/ESLF Code:** Inter-Mountain Basins Cliff and Canyon/3173

**Range:** Found along river canyons at moderately low elevations up to steep cliff faces in the Great Basin mountain ranges, throughout the western U.S., although usually in non-forested landscapes.

**Min Elev:** 600

**Max Elev:** 9,000 feet

**Spatial Pattern:** Large patch

**Vegetation:** Unvegetated (<10% vasc.)

**Upland:** Yes

**Wetland:** No

**Description:** Cliffs and canyons in the Inter-mountain basins of western North America. The cliffs are barren or dominated by shrubs or grasses, or occasionally widely scattered conifers. Also included are adjacent areas of scree or talus often found below or between cliff faces. Usually occurs in non-forested landscapes.

## Columbia Basin Grasslands and Prairie

**Oregon Habitat:** Columbia Basin Grasslands and Prairie

**Oregon Name/OR Code:** Eastside Foothill - Canyon Dry Grassland/7106

**GAP Name/ESLF Code:** Columbia Basin Foothill and Canyon Dry Grassland/7106

**Range:** Found in the canyons of the Columbia Basin, along the Columbia River, Snake River and their major tributaries, in Idaho, Oregon, and Washington.

**Min Elev:** 300

**Max Elev:** 6,000 feet

**Spatial Pattern:** Large patch

**Vegetation:** Vegetated (>10% vasc.)

**Upland:** Yes

**Wetland:** No

**Description:** Dry bunchgrass dominated habitats from the inland Pacific Northwest. These are found on steep canyon slopes or the foothill slopes of the mountains. Because of the steep slopes these are open, patchy grasslands, often rocky or stony, with occasional deciduous shrubs or trees (ie. sumac, mock-orange or serviceberry).

**Oregon Habitat:** Columbia Basin Grasslands and Prairie

**Oregon Name/OR Code:** Eastside Plateau and Mountain Valley Grassland/7112

**GAP Name/ESLF Code:** Northern Rocky Mountain Lower Montane, Foothill and Valley Grassland/7112

**Range:** Found in northeastern Wyoming and western Montana, west through Idaho into the Blue Mountains of Oregon, and north into the Okanagan and Fraser plateaus of British Columbia and the Canadian Rockies.

**Min Elev:** 1,000 feet

**Max Elev:** 5,500 feet

**Spatial Pattern:** Large patch

**Vegetation:** Vegetated (>10% vasc.)

**Upland:** Yes

**Wetland:** No

**Description:** These are low to mid elevation grasslands found in the mountains and valleys of the northwest. They are dominated by large bunchgrasses (bluebunch wheatgrass, Idaho fescue, junegrass, or rough fescue) often with scattered (usually deciduous) shrubs and a diverse range of forbs. It also includes moist valley meadows dominated by Cusick bluegrass, slender wheatgrass, and introduced pasture grasses such as meadow foxtail or timothy. They sometimes occur in a matrix with forests or shrub steppe habitats.

**Oregon Habitat:** Columbia Basin Grasslands and Prairie

**Oregon Name/OR Code:** Grassland Steppe/5452

**GAP Name/ESLF Code:** Columbia Plateau Steppe and Grassland/5452

**Range:** Found throughout the Columbia Plateau region from north-central Idaho, south and west into eastern Oregon and Washington, southern Idaho and northern Nevada.

**Min Elev:** 100

**Max Elev:** 8,000 feet

**Spatial Pattern:** Large patch

**Vegetation:** Vegetated (>10% vasc.)

**Upland:** Yes

**Wetland:** No

**Description:** Grasslands occurring in basins, foothills and lower mountains in the sagebrush regions where sagebrush does not occur, usually due to removal from past fires. These are grasslands dominated by bluebunch wheatgrass, Idaho fescue or Sandberg bluegrass, often with cheatgrass present. Low cover of rabbitbrush, horsebrush or sagebrush is common, but these areas never have more than 5% cover of any shrubs.

## Deserts, Playas and Ash Beds

**Oregon Habitat:** Deserts, Playas and Ash Beds

**Oregon Name/OR Code:** Ash Bed/3174

**GAP Name/ESLF Code:** Columbia Plateau Ash and Tuff Badland/3174

**Range:** Found throughout eastern Oregon, southern Idaho, northern Nevada and extreme northeastern California.

**Min Elev:** 500

**Max Elev:** 6,000 feet

**Spatial Pattern:** Large patch

**Vegetation:** Unvegetated (<10% vasc.)

**Upland:** Yes

**Wetland:** No

**Description:** Barren ash beds found throughout the drier portions of the Pacific Northwest, they vary by geography. These include the John Day basin “painted hills”, the diverse ash beds from the Owyhee uplands of southwestern Idaho and southeastern Oregon, and isolated badlands found throughout the intermountain west. They are typically rounded hills and plains, or barren slopes in canyons. Vegetation is sparse and made up of typical salt-desert shrubs, annual forbs and perennial bunchgrasses. Forbs are often endemic to the particular ash deposits.

**Oregon Habitat:** Deserts, Playas and Ash Beds

**Oregon Name/OR Code:** Playa/3179

**GAP Name/ESLF Code:** Inter-Mountain Basins Playa/3179

**Range:** Found throughout the western U.S. with most sites in the Great Basin between 4000-7000 feet, but widespread. Found at lower elevations in the Columbia Basin of Oregon and in the southwestern Great Plains.

**Min Elev:** 1,500 feet

**Max Elev:** 8,000 feet

**Spatial Pattern:** Large patch

**Vegetation:** Unvegetated (<10% vasc.)

**Upland:** Yes

**Wetland:** Yes

**Description:** Barren, usually alkaline desert playas, usually found in closed basins. While exposed alkaline soils with or without salt crusts characterize these areas, with occasional patches of salt-desert shrubs or black greasewood, always found on flats, usually valley bottoms. These sites are usually seasonally flooded, and grade into salt-desert scrub and sagebrush habitats.

## Dunes

**Oregon Habitat:** Dunes

**Oregon Name/OR Code:** Inland Sand Dune/3160

**GAP Name/ESLF Code:** Inter-Mountain Basins Active and Stabilized Dune/3160

**Range:** It occurs throughout the intermountain west. It is found at low elevations along the Columbia and Snake Rivers, and higher elevations in the intermountain basins of southeastern Oregon and northeastern California east to Wyoming and Colorado.

**Min Elev:** 200

**Max Elev:** 7,000 feet

**Spatial Pattern:** Large patch

**Vegetation:** Unvegetated (<10% vasc.)

**Upland:** Yes

**Wetland:** No

**Description:** These are active or partially stabilized sand dunes in the arid regions of the western U.S. Shifting sand, patches of shrubs and sand adapted bunchgrasses make up the usually sparse vegetation. This system includes dry areas near major rivers, such as Bruneau Dunes and Boardman dunes, where the river-sand based habitats support sagebrush and bitterbrush. It also includes closed basin, or lakes basin dunes, with finer, alkaline sands supporting salt-bush, greasewood and other salt desert dune shrubs.

## Interior Lowland and Foothill Riparian Woodlands and Shrublands

**Oregon Habitat:** Interior Lowland and Foothill Riparian Woodlands and Shrublands

**Oregon Name/OR Code:** Blue Mountain Foothill and Lower Montane Riparian/9155

**GAP Name/ESLF Code:** Northern Rocky Mountain Lower Montane Riparian Woodland and Shrubland/9155

**Range:** Found in the Northern Rocky Mountains of Idaho and Montana north to Alberta and British Columbia, and west to central Washington and Oregon.

**Min Elev:** 2,500 feet

**Max Elev:** 5,000 feet

**Spatial Pattern:** Linear

**Vegetation:** Vegetated (>10% vasc.)

**Upland:** No

**Wetland:** Yes

**Description:** These are the riparian forests, woodlands, shrublands and wetlands found along the streams in the Northern Rocky Mountains. They usually occur within a forested landscape, and are dominated by cottonwood, with some conifers (spruce, pine or grand fir usually) or riparian tall shrubs such as mountain alder, red-osier dogwood, or birch). Low shrubs (snowberry and rose) and forbs (lady fern, male fern and meadow senecio) are often important.

**Oregon Habitat:** Interior Lowland and Foothill Riparian Woodlands and Shrublands

**Oregon Name/OR Code:** Blue Mountain Low Elevation Riparian/9156

**GAP Name/ESLF Code:** Rocky Mountain Lower Montane Riparian Woodland and Shrubland/9156

**Range:** Found throughout the montane areas of the Inter-Mountain west, from eastern Oregon, Nevada and Arizona east to Montana, Wyoming, Colorado, and New Mexico.

**Min Elev:** 3,000 feet

**Max Elev:** 9,000 feet

**Spatial Pattern:** Linear

**Vegetation:** Vegetated (>10% vasc.)

**Upland:** No

**Wetland:** Yes

**Description:** Occurrences of this system are found within the flood zone of rivers and streams at lower elevations in the mountains. It is found on islands, sand or cobble bars, and immediate streambanks. It can form large, wide occurrences on mid-channel islands in larger rivers or narrow bands on small, rocky canyon tributaries and well-drained benches. It is also typically found in backwater channels and other perennially wet but less scoured sites, such as floodplains swales and irrigation ditches. Hardwood trees and tall shrubs (cottonwood, maple, alder, western birch, creek dogwood and willow species), conifers (Douglas-fir, spruce or Ponderosa pine) dominate most sites, with a diverse understory of low shrubs (rose, snowberry), forbs and grasses.

**Oregon Habitat:** Interior Lowland and Foothill Riparian Woodlands and Shrublands

**Oregon Name/OR Code:** Columbia Basin Lowland and Foothill Riparian/9170

**GAP Name/ESLF Code:** Columbia Basin Foothill Riparian Woodland and Shrubland/9170

**Range:** Found in the Columbia River basin of eastern Oregon, Washington, Idaho and British Columbia at relatively low elevations.

**Min Elev:** 100

**Max Elev:** 2,500 feet

**Spatial Pattern:** Linear

**Vegetation:** Vegetated (>10% vasc.)

**Upland:** No

**Wetland:** Yes

**Description:** Bottomland and foothill riparian woodlands, forests shrublands and wetlands from the interior of the Columbia Basin. Found along major rivers to small streams, they range from large bottomland gallery riparian forests, to a small shrubland lining a stream in a narrow valley, but are characterized by location and low elevations. Isolated cottonwoods and Ponderosa pine are often present, with western birch, willows, hawthorn, or white alder dominant. Patches of sedge meadows or wet grasslands sometimes occur within these streamside habitats.

**Oregon Habitat:** Interior Lowland and Foothill Riparian Woodlands and Shrublands

**Oregon Name/OR Code:** Great Basin Lowland - Montane Riparian/9168

**GAP Name/ESLF Code:** Great Basin Foothill and Lower Montane Riparian Woodland and Shrubland/9168

**Range:** Found in the mountains in the Great Basin from southeastern Oregon through Utah, and along eastern Sierra Nevada.

**Min Elev:** 4,000 feet

**Max Elev:** 7,000 feet

**Spatial Pattern:** Linear

**Vegetation:** Vegetated (>10% vasc.)

**Upland:** No

**Wetland:** Yes

**Description:** These are riparian woodlands and shrublands found in the lower foothills to the mountains of the Great Basin. They are usually narrow wet habitats along the streams, with a patchy mosaic of open woodlands or forests, willows, sedges and grasses. The habitats are often altered by livestock overuse, causing them to be open, with fewer shrubs and trees, but some trees, shrubs, or native meadow plants are always present.

## Juniper Woodlands and Savanna

**Oregon Habitat:** Juniper Woodlands and Savanna

**Oregon Name/OR Code:** Western Juniper/4204

**GAP Name/ESLF Code:** Columbia Plateau Western Juniper Woodland and Savanna/4204

**Range:** Found along the northern and western margins of the Great Basin, from southwestern Idaho, along the eastern foothills of the Cascades, south to the Modoc Plateau of northeastern California. It also occurs in scattered localities of northern Nevada and south-central Washington.

**Min Elev:** 100

**Max Elev:** 6,000 feet

**Spatial Pattern:** Large patch

**Vegetation:** Vegetated (>10% vasc.)

**Upland:** Yes

**Wetland:**No

**Description:** Open woodlands and savannas dominated by western juniper, usually with an understory of sagebrush, bitterbrush and bunchgrasses. Juniper is usually the only tree, although these habitats often intergrade into Ponderosa pine savannas and woodlands with more moisture, or sagebrush steppe where there is less. These woodlands are composed of two very different types of habitats. There are old-growth *Juniperus occidentalis* woodlands with trees and stands often over 500 years old, with fairly well-spaced trees with rounded crowns. There are also large areas where juniper has expanded into sagebrush steppe and bunchgrass-dominated areas, with young, pointed-crowned trees growing closely together. Both of these are considered to be this system, in spite of how different they can look.

## Lava Flows

**Oregon Habitat:** Lava Flows

**Oregon Name/OR Code:** Volcanic Rock, Lava Flow or Cinder Land/3128

**GAP Name/ESLF Code:** Inter-Mountain Basins Volcanic Rock and Cinder Land/3128

**Range:** Found throughout the intermountain west, in Montana along the Rocky Mountain Front south through western Colorado, Utah, Nevada, eastern California and extensively in southeastern Oregon and southern Idaho.

**Min Elev:** 1,000 feet

**Max Elev:** 10,000 feet

**Spatial Pattern:** Large patch

**Vegetation:** Unvegetated (<10% vasc.)

**Upland:** Yes

**Wetland:** No

**Description:** These are recent, usually barren, lava flows found throughout the arid areas of the west. The flows sometimes have inclusions of uncovered natural vegetation (kapukas), and often include basalt dikes ridges. Most sites have clear lines marking the edge of the lava flows, although in a few areas, older lava flows slowly are colonized by shrub species. They are usually unvegetated, but at lower elevations scattered trees or shrubs from the adjacent vegetation types can be found.

## Pine Forests and Woodlands

**Oregon Habitat:** Lodgepole Pine Forests and Woodlands

**Oregon Name/OR Code:** Lodgepole Pine on Normal Soil/4237

**GAP Name/ESLF Code:** Rocky Mountain Lodgepole Pine Forest/4237

**Range:** This systems occurs at upper montane to subalpine elevations of the Rocky Mountains, Intermountain region, and north into the Canadian Rockies. In the Oregon and Washington, they are found mostly in the Blue and Selkirk Mountains.

**Min Elev:** 5,000 feet

**Max Elev:** 10,000 feet

**Spatial Pattern:** Matrix

**Vegetation:** Vegetated (>10% vasc.)

**Upland:** Yes

**Wetland:** No

**Description:** These are upper montane to subalpine forest dominated by Lodgepole pine found throughout the Rocky Mountains. They are usually open forests or dense woodlands dominated almost entirely by lodgepole pine, often even aged, having established following a fire. While persisting for up to 100 years, they can eventually succeed to spruce-fir forests.

## Lodgepole Pine Forests and Woodlands

**Oregon Habitat:** Lodgepole Pine Forests and Woodlands

**Oregon Name/OR Code:** Lodgepole Pine on Pumice, Ash or Barren Soil/4267

**GAP Name/ESLF Code:** Rocky Mountain Poor Site Lodgepole Pine Forest/4267

**Range:** This type is most widespread in the pumice zone of the east Cascades of Oregon, but also found in Washington east through Idaho to Montana and Wyoming, and into Colorado and Utah, perhaps also in Nevada and California.

**Min Elev:** 3,000 feet

**Max Elev:** 10,000 feet

**Spatial Pattern:** Large patch

**Vegetation:** Vegetated (>10% vasc.)

**Upland:** Yes

**Wetland:** No

**Description:** These are lodgepole pine forests where lodgepole is generally the only conifer found. In these stands the dry or nutrient-poor soils prevent invasion of the spruce or fir trees that often dominate the more productive sites. They are usually found on flat plains or ridges, with barren or grass dominated understories, with occasional deciduous shrubs.

## Low Sagebrush Scablands and Steppe

**Oregon Habitat:** Low Sagebrush Scablands and Steppe

**Oregon Name/OR Code:** Low Sagebrush/5453

**GAP Name/ESLF Code:** Columbia Plateau Low Sagebrush Steppe/5453

**Range:** Found throughout the intermountain west, but mostly in eastern Oregon, southern Idaho and northern Nevada, extending into northeastern California and northwestern Utah.



**Min Elev:** 1,000 feet

**Max Elev:** 9,000 feet

**Spatial Pattern:** Large patch

**Vegetation:** Vegetated (>10% vasc.)

**Upland:** Yes

**Wetland:** No

**Description:** Low sagebrush shrublands or steppe found on mountain ridges, terraces or gentle slopes. Usually flat or gentle sloping areas, either very shallow-soiled or poorly drained clay soils, almost always stoney or rocky. Often occurs in large, uniform stands, but can occur mixed with wyoming big sagebrush, mountain big sagebrush, bitterbrush, western juniper or mountain mahogany. Most habitats have significant cover of native bunchgrasses and forbs.

**Oregon Habitat:** Low Sagebrush Scablands and Steppe

**Oregon Name/OR Code:** Rigid Sagebrush, Buckwheat or Bluegrass Scabland/5202

**GAP Name/ESLF Code:** Columbia Plateau Scabland Shrubland/5202

**Range:** Found mostly in the Columbia Plateau of eastern Oregon and eastern Washington, and in northern Nevada and southern Idaho. Possibly found in adjacent Utah and California.

**Min Elev:** 100

**Max Elev:** 7,000 feet

**Spatial Pattern:** Matrix

**Vegetation:** Vegetated (>10% vasc.)

**Upland:** Yes

**Wetland:** No

**Description:** Barren, dry rocky scablands either dominated by low to medium sized shrubs (buckwheat (*Eriogonum*) or rigid sagebrush), or by Sandberg bluegrass. They most commonly occur on shallow soiled ridgetops, from low elevations to fairly high in the mountains. These green up early in the spring, but appear to be barren volcanic rock throughout most of the year. Even the shrub dominated sites have Sandberg bluegrass making up most of the cover, but it is only visible early in the spring. Bulbus forbs (onions, balsamroot, bitterroot, biscuit-root), and drought tolerant species such as sedum and phlox are important in early spring.

## Marshes, Bogs and Emergent Wetlands

**Oregon Habitat:** Marshes, Bogs and Emergent Wetlands

**Oregon Name/OR Code:** Alkaline Wetland/9297

**GAP Name/ESLF Code:** Inter-Mountain Basins Alkaline Closed Depression/9297

**Range:** Found in basins and on flats throughout the Columbia Plateau and the northern Great Basin but is most common in eastern Oregon and northern Nevada.

**Min Elev:** 1,000 feet

**Max Elev:** 7,000 feet

**Spatial Pattern:** Small patch

**Vegetation:** Vegetated (>10% vasc.)

**Upland:** No

**Wetland:** Yes

**Description:** Permanent and seasonal wetlands, found in the closed basins of the intermountain west, or in other dry areas where water evaporates before it can run off. These wetlands are often associated with seasonal or playa lakes, or occur on permanent lakes in closed basins. They are flat, sometime large, sometimes small, usually dominated by sedges, rushes, and alkaline tolerant grasses. Shrubs or trees are rarely found in these wetlands, except for occasional willows on lake or stream margins, and greasewood when these are found in poorly drained floodplains.

**Oregon Habitat:** Marshes, Bogs and Emergent Wetlands

**Oregon Name/OR Code:** Arid Land Marsh (Freshwater)/9222

**GAP Name/ESLF Code:** North American Arid West Emergent Marsh/9222

**Range:** Occurs throughout the arid and semi-arid regions of western North America.

**Min Elev:** 1,000 feet

**Max Elev:** 8,000 feet



**Spatial Pattern:** Small patch

**Vegetation:** Vegetated (>10% vasc.)

**Upland:** No

**Wetland:** Yes

**Description:** These are natural marshes that occur in depressions (ponds, kettle ponds), as fringes around lakes, and along slow-flowing streams and rivers (such riparian marshes are also referred to as sloughs). They are frequently or continually flooded with water depths up to six feet deep, but have rooted, mostly grass-like plants. They usually have peat or muck in the bottom, and this system occurs in dry environments, typically surrounded by savanna, shrub steppe, steppe, or desert vegetation.

## Mixed Conifer Forests

**Oregon Habitat:** Mixed Conifer Forests

**Oregon Name/OR Code:** Eastside Douglas-fir - Ponderosa Pine Mixed Conifer/4232

**GAP Name/ESLF Code:** Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest/4232

**Range:** Found in the interior of the Pacific Northwest, from southern British Columbia south through eastern Washington into eastern Oregon, Idaho and western Montana.

**Min Elev:** 1,000 feet

**Max Elev:** 7,000 feet

**Spatial Pattern:** Matrix

**Vegetation:** Vegetated (>10% vasc.)

**Upland:** Yes

**Wetland:** No

**Description:** These are variable mixed conifer forests, usually with Douglas fir present with some Ponderosa pine, often with some lodgepole pine, larch, or western white pine. This system also includes the driest Douglas-fir - grand fir forests. The understory of these forests are variable but often open, with grasses or deciduous shrubs. Fire suppression is changing these forests, leading to greater dominance of grand fir, and reduced cover of Ponderosa pine.

## Montane Grasslands and Meadows

**Oregon Habitat:** Montane Grasslands and Meadows

**Oregon Name/OR Code:** Eastside Subalpine Grassland/7113

**GAP Name/ESLF Code:** Northern Rocky Mountain Subalpine-Upper Montane Grassland/7113

**Range:** Most common in the Canadian Rockies, but extending south through eastern Washington and Oregon and east into western Montana and Wyoming.

**Min Elev:** 6,000 feet

**Max Elev:** 9,000 feet

**Spatial Pattern:** Large patch

**Vegetation:** Vegetated (>10% vasc.)

**Upland:** Yes

**Wetland:** No

**Description:** Upper montane to subalpine grasslands, usually composed of dense bunchgrasses, found on ridges and mountain slopes, most commonly south facing areas. They occur as small isolated grasslands in open montane conifer woodlands or subalpine parklands, or more extensive dry grasslands.

**Oregon Habitat:** Montane Riparian Forests and Shrublands

**Oregon Name/OR Code:** Eastside Montane - Subalpine Shrub Riparian/9187

**GAP Name/ESLF Code:** Rocky Mountain Subalpine-Montane Riparian Shrubland/9187

**Range:** Found throughout the Rocky Mountains from New Mexico north to Montana, west to the Pacific coastal states.

**Min Elev:** 5,500 feet

**Max Elev:** 12,000 feet

**Spatial Pattern:** Linear

**Vegetation:** Vegetated (>10% vasc.)

**Upland:** No

**Wetland:** Yes

**Description:** These are tall to mid-sized shrublands found along rivers and streams from mid elevations to the upper limit of tree line in the Rocky mountains. It includes deciduous shrublands, dominated by different willow species (which vary by area and elevation), mountain alder, western birch, with diverse low shrubs and forbs in the understory. This system includes riparian shrublands found in the entire array of riparian types ranging from narrow stream boarders in steep, V-shaped valleys and canyons, to broader floodplains in wide valley bottoms.

## Ponderosa Pine Forests and Woodlands

**Oregon Habitat:** Ponderosa Pine Forests and Woodlands

**Oregon Name/OR Code:** Ponderosa Pine/4240

**GAP Name/ESLF Code:** Northern Rocky Mountain Ponderosa Pine Woodland and Savanna/4240

**Range:** Found in the Pacific Northwest from southern, interior British Columbia east to Alberta, south to Oregon and east through Idaho to western Montana. At low elevations in the Columbia River gorge to fairly high elevations on south slopes in the mountains, but mostly found between 2000 and 5000 feet.

**Min Elev:** 100

**Max Elev:** 7,000 feet

**Spatial Pattern:** Matrix

**Vegetation:** Vegetated (>10% vasc.)

**Upland:** Yes

**Wetland:** No

**Description:** This system includes the Ponderosa pine forests, woodlands and savannas found in the northwestern US and western Canada. Ponderosa pine is usually the only tree found in these woodlands and savannas, although occasionally Douglas fir, western larch or western Juniper can be found. These woodlands and savannas were widespread in the northwest, although they are declining as the fires that maintained them are suppressed. It occurs on all slopes and aspects, and characteristically had a grass understory of pinegrass or Idaho fescue, historically characterized by widely spaced, very large, yellow-belly pines. Shrubs such as bitterbrush, sagebrush, snowberry and manzanita are common, and increase with lack of fire.

## Salt Desert Scrub

**Oregon Habitat:** Salt Desert Scrub

**Oregon Name/OR Code:** Black Greasewood/9103

**GAP Name/ESLF Code:** Inter-Mountain Basins Greasewood Flat/9103

**Range:** Found throughout the the western U.S. in the intermountain basins, at lower elevations in Washington, east through the western Great Plains south to Texas and west to California.

**Min Elev:** 1,000 feet

**Max Elev:** 8,000 feet

**Spatial Pattern:** Large patch

**Vegetation:** Vegetated (>10% vasc.)

**Upland:** Yes

**Wetland:** Yes

**Description:** Flats, usually found on the margins of playas and desert lakes, with open tall shrublands dominated by black greasewood, sometimes alone, sometimes with other shrubs. These are usually near salt-desert scrub communities, or big sagebrush shrublands or steppe. While many of these can be very sparse, seasonal moisture can support grasses, sometimes with fairly high cover, ranging from 6 foot basin wildrye to very low saltgrass.

**Oregon Habitat:** Salt Desert Scrub

**Oregon Name/OR Code:** Salt Desert Scrub/5258

**GAP Name/ESLF Code:** Inter-Mountain Basins Mixed Salt Desert Scrub/5258

**Range:** Found throughout the Intermountain basins of the western US, from Oregon to Wyoming south to New Mexico and California.

**Min Elev:** 3,000 feet

**Max Elev:** 7,000 feet

**Spatial Pattern:** Large patch

**Vegetation:** Vegetated (>10% vasc.)

**Upland:** Yes

**Wetland:** No

**Description:** Dry, open usually spiny desert shrubland, usually in closed basins that are alkaline or salty. They are characterized by widely spaced to somewhat dense, low to medium shrubs, usually species of saltbrush or hopsage (although many other shrubs occur), sometimes with sagebrush. Soils are usually white, and sites are characterized by lots of bare ground.

## Subalpine Forests and Woodlands

**Oregon Habitat:** Subalpine Forests and Woodlands

**Oregon Name/OR Code:** Subalpine Woodland and Parkland/4233

**GAP Name/ESLF Code:** Northern Rocky Mountain Subalpine Woodland and Parkland/4233

**Range:** Found in Pacific Northwest mountains of Montana and Wyoming north to Alberta, west to BC, Washington and eastern Oregon.

**Min Elev:** 6,000 feet

**Max Elev:** 10,000 feet

**Spatial Pattern:** Large patch

**Vegetation:** Vegetated (>10% vasc.)

**Upland:** Yes

**Wetland:** No

**Description:** These are open, high mountain woodlands, usually mixed with open subalpine and alpine parklands, found in the northern Rocky Mountains. They are usually dominated by whitebark pine or subalpine larch, and found on ridgetops, mountain slopes, talus slopes, rocksides and in cirque basins. They are often dry and windblown, with a limited understory of alpine sedges, grasses, forbs and dwarf shrubs.



# Appendix J - Responses to Public Comments

---

## Introduction

This Response to Public Comments Appendix addresses comments received regarding the Draft Assessment. All comments have been considered by HCWC and, where appropriate, have been addressed in the final document. Not all comments resulted in modifications to the document.

The comments received generally led to changes that improved the assessment. HCWC appreciates the time and efforts of the reviewers.

## Background

The public review period was November 29, through December 20, 2010. During that time we held one public meeting to review the draft in Fields, Oregon. The meeting was announced in the initial letters to project area landowners and advertised by radio. Four people (one citizen and three HCWC members) attended the Fields meeting. The discussions in Fields was mostly general in nature, with only a few specific topics covered. The HCWC policy, as stated in the announcements, was that public comments must be submitted in writing by December 20 to be addressed in the final report. HCWC did accept late comments provided they were postmarked by December 20 and HCWC was notified that the comments were being mailed.

The following entities provided comments on the assessment.

Commenter ID	Name	Comments Received
1	Pete Mehringer	Oral
2	Burns BLM	Written
3	Lakeview BLM	Written
4	Stacy Davies, Roaring Springs Ranch	Written
5	Ellen Hammond	Written
6	Karen Moon	Written
7	Tony Svejcar, Eastern Oregon Agricultural Research Center	Written

## Response to Comments

Comments and responses in the following pages are organized by commenter ID and the comment number (e.g. comment 2-1 corresponds to Burns BLM Comment #1). Comments received orally were summarized and follow a similar format.

### Responses to Pete Mehringer Comments.

Comment	Page	Paragraph	Statement from Document	Questions/Comments/Recommendation
1-1	2.14	Table 2-5	Caption - "CHT's..."	Commenter does not like acronyms in captions or headers. Commenter would like full spelling.
HCWC Response	The text has been edited as requested.			

Comment	Page	Paragraph	Statement from Document	Questions/Comments/Recommendation
1-2	2-15	5	"...documenting data errors"	"...documenting data differences"
HCWC Response	A review of the section revealed several references to "data errors". Substituting "data differences" was not appropriate in all cases. The term "data discrepancies" was substituted instead.			

Comment	Page	Paragraph	Statement from Document	Questions/Comments/Recommendation
1-3	3-10	Figure 3-5		Text in graphic is not readable. Commenter would like enlarged text
HCWC Response	The referenced text in the graphic was enlarged to improve readability.			

Comment	Page	Paragraph	Statement from Document	Questions/Comments/Recommendation
1-4	3-10	text frame	Title - "Recreating the Pleistocene Lakes"	Commenter felt the term "Recreating" was inappropriate.
HCWC Response	Title of text frame was modified to read "Mapping the Pleistocene Lakes"			

Comment	Page	Paragraph	Statement from Document	Questions/Comments/Recommendation
1-5	3-10	text frame	"...be"	Should read "by"
HCWC Response	The referenced typographical error has been corrected.			

Comment	Page	Paragraph	Statement from Document	Questions/Comments/Recommendation
1-6	3-10	text frame	"...Dr. Mehringer"	Mr. Mehringer requested that "Dr." be removed.
HCWC Response	The referenced text was modified to read "...Pete Mehringer".			

Comment	Page	Paragraph	Statement from Document	Questions/Comments/Recommendation
1-7	3-11	Map 3-4		Perimeter of Lake Catlow is incorrect. The lake never spilled into Donner und Blitzen sub-basin. Correct map by using a perimeter of 4770 ft for Lake Catlow.
HCWC Response	Map was changed to reflect a Lake Catlow perimeter of 4770 feet. The corresponding description located on Page 3-10 was also modified to reflect the map change.			

### Responses to Burns BLM Comments.

Comment	Page	Paragraph	Statement from Document	Questions/Comments/Recommendation
2-1	1-3	2	"The funds available..."	Edit to read "Funds available..."
HCWC Response	The text has been edited as requested.			

Comment	Page	Paragraph	Statement from Document	Questions/Comments/Recommendation
2-2	1-3	3	"... shaped the land we now see."	Edit to read "...shaped the land".
HCWC Response	The text has been edited as requested.			

Comment	Page	Paragraph	Statement from Document	Questions/Comments/Recommendation
2-3	1-6-	Map 1-1	Caption - "...5th Field Watersheds Map."	Edit to read "...5th Field Watershed Map".
HCWC Response	The text has been edited as requested.			

Comment	Page	Paragraph	Statement from Document	Questions/Comments/Recommendation
2-4	2-4	Map 2-2	Caption - "Regional Aquifers Map".	Edit to read "Regional Aquifer Map".
HCWC Response	The text has been edited as requested.			

Comment	Page	Paragraph	Statement from Document	Questions/Comments/Recommendation
2-5	2-12	Map 2-5	Caption - "National Wetlands Inventory".	Edit to read "National Wetland Inventory".
HCWC Response	The text has been edited as requested.			

Comment	Page	Paragraph	Statement from Document	Questions/Comments/Recommendation
2-6	3-28	3	"...several habitat types".	Edit to read "all habitat types".
HCWC Response	The text has been edited as requested.			



Comment 2-7	Page 3-30	Paragraph	Statement from Document "Sage-grouse"	Questions/Comments/Recommendation Edit to read "Greater Sage-grouse" in captions and first use in body text. All other occurrences should use "Sage-grouse"
HCWC Response	The text has been edited as requested.			

Comment 2-8	Page 3-31	Paragraph 1	Statement from Document "...the use of some leks are no longer used".	Questions/Comments/Recommendation Edit to read "...the use at some leks ceases".
HCWC Response	The text has been edited as requested.			

Comment 2-9	Page 3-35	Paragraph Map 3-5	Statement from Document	Questions/Comments/Recommendation Map incorrectly displays "Horse Areas" (Inactive Areas) as "Horse Management Areas" (Active Areas).
HCWC Response	Map was corrected by removing inactive areas. Table 3-5, on page 3-34 was also corrected to reflect map changes.			

Comment 2-10	Page F-1	Paragraph 2	Statement from Document Heading - "Animals"	Questions/Comments/Recommendation Edit to read "Fish and Wildlife"
HCWC Response	The text has been edited as requested.			

### Responses to Lakeview BLM Comments.

Comment 3-1	Page 2-1	Paragraph Table 2-1	Statement from Document	Questions/Comments/Recommendation Commenter questions the accuracy of 150.64 miles of perennial stream/rivers in the Guano sub-basin.
HCWC Response	The data in question was extracted from the most current (at time of publication) USGS NHD data available.			

Comment 3-2	Page 2-17	Paragraph Table 2-8	Statement from Document	Questions/Comments/Recommendation Commenter states that HCWC value for Sagehen Creek "is closer to reality".
HCWC Response				

Comment 3-3	Page 3-24	Paragraph 1	Statement from Document	Questions/Comments/Recommendation Commenter asks "Why is this section describing central Montana and Wyoming"
HCWC Response	The Ecological Description was taken verbatim from the National Vegetation Classification. Since producing the draft, HCWC has acquired the State of Oregon Vegetation Database. This database has simplified ecological descriptions that are focused on Oregon plants and is cross referenced to the NVC. The final document utilizes the Oregon database for ecological descriptions.			

Comment 3-4	Page 3-25	Paragraph 2	Statement from Document	Questions/Comments/Recommendation Commenter states "Same question here, need to focus on Oregon"
HCWC Response	See comment 3-3			

Comment 3-5	Page 3-38 thru 3-64	Paragraph	Statement from Document	Questions/Comments/Recommendation Commenter questions the accuracy of perennial/intermittent/ephemeral streams/ rivers
HCWC Response	See comment 3-1			

Comment 3-6	Page 4-6	Paragraph 3	Statement from Document "Ranches"	Questions/Comments/Recommendation Commenter states "Include other Ranches"
HCWC Response	HCWC chose to focus on RSR due to its size as well as its contributions to environmental issues. HCWC acknowledges there are other ranches that are also contributing to environmental issues.			

### Responses to Roaring Springs Ranch Comments.

Comment 4-1	Page 2-24	Paragraph 2	Statement from Document "Seasonal runoff from Beatys Butte currently nourishes Garrison Lake".	Questions/Comments/Recommendation This statement is untrue as water from Beaty Butte runs north into Guano Slough or southeast into shallow lake.
HCWC Response	Commenter is correct. Sentence was removed from assessment.			

Comment 4-2	Page 2-30	Paragraph 1	Statement from Document As a group, the Catlow Valley redbands are genetically distinctive.	Questions/Comments/Recommendation This statement is in error. The United States Fish and Wildlife Service determined that the species of Redband found in the five closed basins were not significantly different in the determination that the species was not warranted for listing as an endangered species.
HCWC Response	Commenter is correct. Sentence was removed from assessment.			

Comment	Page	Paragraph	Statement from Document	Questions/Comments/Recommendation
4-3	2-32	1-4		Page 2-32 lists a few times when fish were introduced into the Catlow Valley. Mr. Mason was a biologist for ODFW in this area for many years in the 40's 50's 60's and reported to me that he transplanted rainbow trout into these streams many times through those years. ODFW and others planted fish in these streams through the years. I think it is a little out of context to highlight the illegal planting of German Browns by the ranch in the 70's. I would like to see that reference removed as it is not necessary information in a watershed assessment.
HCWC Response	The information regarding stocking of fish was presented for information only. HCWC believes that the information is important to the assessment. HCWC also concedes that information specifying Roaring Springs Ranch is not necessary. References to RSR were removed from the "Introduced Fish" section.			

Comment	Page	Paragraph	Statement from Document	Questions/Comments/Recommendation
4-4	3-19	1		Biological crusts is a very questionable science. Would you please ask someone at ARS to read the section on biological crusts and verify the scientific accuracy?
HCWC Response	HCWC spoke with Tony Svejcar regarding the "Soil Crust" section. He stated that he did not have any issues with the section as written..			

Comment	Page	Paragraph	Statement from Document	Questions/Comments/Recommendation
4-5	3-65 thru 3-72	Map 3-6 thru Map 3-13		The maps for the fifth field watersheds are very questionable in my opinion. I can't how the boundaries were drawn as the separations/boundaries do not make sense when compared to actual water flow on the land. For example why would Dry Creek, Roaring Springs Creek, Black Canyon and Kueny Canyon be included in the Walls Lake watershed when the water actually runs south and combines with Home Creek and Threemile Creek to fill Garrison Lake? The boundary delineations for Guano Slough do not make sense either.
HCWC Response	The fifth field watersheds have been delineated by the USGS as part of the National Hydrologic Dataset. As such, HCWC does not have the authority to modify the map data.			

Comment 4-6	Page F-1	Paragraph	Statement from Document	Questions/Comments/Recommendation I do question why sensitive status animals and plants are included in a watershed assessment? Only those which are directly linked to water quantity or quality should be included.
HCWC Response	The Special Status Species is critical information. Special Status Species will be a major factor in future watershed projects.			

### Response to Ellen Hammond Comments

Comment 5-1	Page 1-3	Paragraph 2	Statement from Document “...work, which can be...”	Questions/Comments/Recommendation Edit to read “...work that can be...”
HCWC Response	The text has been edited as requested.			

Comment 5-2	Page 1-3	Paragraph 3	Statement from Document “HCWC has in past watershed assessments, filled...”	Questions/Comments/Recommendation Edit to read “In past watershed assessments, the HCWC filled...”
HCWC Response	The text has been edited as requested.			

Comment 5-3	Page 1-5	Paragraph 3	Statement from Document “...four government documents...”	Questions/Comments/Recommendation Only three documents are listed. Edit to read “...three government documents...”
HCWC Response	The text has been edited as requested.			

Comment 5-4	Page 1-5	Paragraph 4	Statement from Document “There has been...”	Questions/Comments/Recommendation Edit to read “There have been...”
HCWC Response	The text has been edited as requested.			

Comment 5-5	Page 1-7	Paragraph 2	Statement from Document “...North by a subtle rise at the North end...”	Questions/Comments/Recommendation “North” should not be capitalized
HCWC Response	The text has been edited as requested.			

Comment 5-6	Page 1-8	Paragraph 3	Statement from Document	Questions/Comments/Recommendation Paragraph does not make sense.
HCWC Response	Punctuation and sentence structure were corrected.			

Comment	Page	Paragraph	Statement from Document	Questions/Comments/Recommendation
5-7	2-3	2	"... unconsolidated valley fill, fan or fragmented rock layers..."	Sentence doesn't make sense.
HCWC Response	Sentence was edited to read "... unconsolidated valley fill or fragmented rock layers..."			

Comment	Page	Paragraph	Statement from Document	Questions/Comments/Recommendation
5-8	2-5	1	"...sensitive beneficial uses within..."	Edit to read "...sensitive within..."
HCWC Response	The text has been edited as requested			

Comment	Page	Paragraph	Statement from Document	Questions/Comments/Recommendation
5-9	2-6	Map 2-3		Commenter questioned the effectiveness of the color ramp used to delineate map data.
HCWC Response	The map was modified by using a qualitative color ramp instead of the sequential color ramp used in the original map.			

Comment	Page	Paragraph	Statement from Document	Questions/Comments/Recommendation
5-10	2-15	1	"... streams which are informative about stream functioning and which have..."	Edit to read "... streams that are informative about stream functioning and that have..."
HCWC Response	The text has been edited as requested			

Comment	Page	Paragraph	Statement from Document	Questions/Comments/Recommendation
5-11	2-15	2	"...have water, which commonly flows..."	Edit to read "...have water that commonly flows..."
HCWC Response	The text has been edited as requested			

### Response to Karen Moon Comments.

Comment	Page	Paragraph	Statement from Document	Questions/Comments/Recommendation
6-1	1-4	2	"...present itself in this for assessment".	Edit to read "...present itself in this assessment".
HCWC Response	The text has been edited as requested.			

Comment	Page	Paragraph	Statement from Document	Questions/Comments/Recommendation
6-2	1-4	8	"...and hired Scott Miles..."	Edit to read "...and HCWC then hired Scott Miles..."
HCWC Response	The text has been edited as requested.			

Comment 6-3	Page 1-7	Paragraph 1	Statement from Document “...ends at the State boarder,”	Questions/Comments/Recommendation Edit to read “...ends at the State border,”
HCWC Response	The text has been edited as requested.			

Comment 6-4	Page 1-8	Paragraph 2	Statement from Document “Great Basin redband Trout...”	Questions/Comments/Recommendation Edit to read “Great Basin redband trout...”
HCWC Response	The text has been edited as requested.			

Comment 6-5	Page 1-8	Paragraph 3	Statement from Document “...sub-basins is...”	Questions/Comments/Recommendation Edit to read sub-basins are...”
HCWC Response	The text has been edited as requested.			

Comment 6-6	Page 1-8	Paragraph 3	Statement from Document	Questions/Comments/Recommendation Second sentence does not make sense.
HCWC Response	See comment 6-6			

Comment 6-7	Page 2-24	Paragraph 6	Statement from Document “...is still widely used...’	Questions/Comments/Recommendation Edit to read “...is still used...”
HCWC Response	The text has been edited as requested.			

### Response to Tony Svejcar Comments.

Comment 7-1	Page 2-16	Paragraph 1	Statement from Document	Questions/Comments/Recommendation Commenter suggests definition of perennial, intermittent, and ephemeral
HCWC Response	The requested definitions have been included as a footnote. The definitions are also located in the Glossary			

Comment 7-2	Page 2-17	Paragraph Tables 2-6, 2-7, 2-8	Statement from Document	Questions/Comments/Recommendation Commenter states “Tables need to stand alone. These tables clarification regarding table values”
HCWC Response	Tables have been modified.			

Comment 7-3	Page 2-36	Paragraph Map 2-7	Statement from Document	Questions/Comments/Recommendation Commenter states “Map may well underestimate current juniper extent”.
HCWC Response	A text box has been added that explains the limitations of the map data. And that field observations indicate the map does underestimate current juniper extent.			

Comment	Page	Paragraph	Statement from Document	Questions/Comments/Recommendation
7-4	2-37	5	"... areas in its range estimated..."	Edit to read "... areas estimated..."
HCWC Response	The text has been edited as requested.			

Comment	Page	Paragraph	Statement from Document	Questions/Comments/Recommendation
7-5	2-38	2	"The minimum time for the tree overstory to begin suppressing the understory is 45 to 50 years, and the minimum to approach stand closure is 70 to 90 years on cool wet sites and 120-170 on dry warm sites."	Edit to read "The minimum time for the tree overstory to begin suppressing the understory is 45 to 50 years, by 70 to 90 years on cool wet sites and 120-170 on dry warm sites, juniper influences understory vegetation."
HCWC Response	The text has been edited as requested.			

Comment	Page	Paragraph	Statement from Document	Questions/Comments/Recommendation
7-6	2-40	1	"Juniper management is expensive, and future decisions regarding the species in the sub-basin will probably be based on cost/benefit analyses as to when to implement control measures to manage the species."	Edit to read "Treating Phase III juniper stands is expensive. Keeping juniper from reaching Phase III is more cost-effective".
HCWC Response	The text has been edited as requested.			

Comment	Page	Paragraph	Statement from Document	Questions/Comments/Recommendation
7-7	2-40	3	Fall germination,	Edit to read "Multiple germination times (fall, winter, or spring),"
HCWC Response	The text has been edited as requested.			

Comment	Page	Paragraph	Statement from Document	Questions/Comments/Recommendation
7-8	2-51	Cheatgrass bullet list	"...on watershed..."	Edit to read "...on wildfire and watershed..."
HCWC Response	The text has been edited as requested.			

Comment	Page	Paragraph	Statement from Document	Questions/Comments/Recommendation
7-9	3-14 thru 3-18			Commenter asks "What is the source for soil descriptions?"
HCWC Response	The soil section has been modified to include a reference to the source document preceding the soil descriptions.			



Comment	Page	Paragraph	Statement from Document	Questions/Comments/Recommendation
7-10	3-25	1		Commenter states "I would think the description would focus on our part of the sagebrush steppe"
HCWC Response	See comment 3-3			

Comment	Page	Paragraph	Statement from Document	Questions/Comments/Recommendation
7-11	4-5	4	"...Guidelines were developed..."	Edit to read "...Guidelines was developed..."
HCWC Response	The text has been edited as requested.			

Comment	Page	Paragraph	Statement from Document	Questions/Comments/Recommendation
7-12	Appendices			Commenter suggests modifying titles with "Appendix" and appendix letter. (e.g. Appendix A)
HCWC Response	Appendices have been modified			