

APPENDIX 12

BEST MANAGEMENT PRACTICES

12. BEST MANAGEMENT PRACTICES²

Definition, Purpose, and Condition Where Practice Applies (*parameter*)

The Bully Creek Coalition, working with NRCS and BLM, selected 21 BMPs as the potential actions which need the most attention in the Bully Creek subbasin. The chart below provides a definition of each BMP, the purpose for its application, and the condition of the resource where the practice applies. These definitions have been adapted from various NRCS technical manuals.

Definition	Purpose	Condition Where Practice Applies
1. Brush Management (<i>acre</i>) “Brush” includes woody halfshrubs, shrubs, and trees that invade areas on which the are not part of the natural (climax) plant community or that occur in amounts significantly in excess of that natural to the site.		
Managing and manipulating stands of brush on rangeland, pastureland, and recreation and wildlife areas by mechanical, chemical, or biologic means, or by prescribed burning. This includes reducing excess brush to restore natural plant community balance and manipulating brush stands through selective and patterned treatments to meet specific needs of the land and objectives of the land user.	To improve or restore a quality plant cover to: <ul style="list-style-type: none"> • reduce sediment and improve water quality; • increase quality and production of desirable plants for livestock and wildlife; • maintain or increase wildlife habitat values; • enhance esthetic and recreation qualities; • maintain open land; and • protect life and property. 	<ul style="list-style-type: none"> • On brush-infested land having the potential to produce desirable native or adapted forage plants; • Where adjustments in grazing management along will not restore the kind of plant cover needed to attain conservation objectives within a reasonable time; • Where brush management will improve area for wildlife, recreation, or natural beauty; • Where control of woody phreatophytes is necessary to conserve moisture; or • Where a reduction of brush is necessary to the safety of life and property in areas of high wildfire hazard.
2. Burning (prescribed) (<i>acre</i>)		
Applying fire to predetermined areas under conditions that control the intensity and spread of the fire.	<ul style="list-style-type: none"> • To control undesirable vegetation; prepare sites for planting or seeding, control plant disease, reduce fire hazards, improve wildlife habitat, forage production, forage quality. • To facilitate distribution of grazing and browsing animals. 	On woodlands, rangelands, native pastures, wildlife areas, or native hay meadows.

² Adapted from various NRCS technical manuals

Definition	Purpose	Condition Where Practice Applies
3. Channel Vegetation (acre)		
Establishing and maintaining adequate plants on channel banks, berms, spoil, and associated areas.	<ul style="list-style-type: none"> • To stabilize channel banks and adjacent areas and reduce erosion and sedimentation. • To maintain or enhance the quality of the environment, including visual aspects and fish and wildlife habitat. 	<ul style="list-style-type: none"> • On channel banks, berms, ,spoil, and associated areas, • Exceptions: grassed waterways, diversions and areas with protective linings, those covered with water for an extended period, or in areas where conditions will not support adequate vegetation.
4. Critical Area Planting (acre)		
Planting vegetation, such as trees, shrubs, vines, grasses, or legumes, on highly erodible or critically eroding areas. This does not include tree planting mainly for wood products.	<ul style="list-style-type: none"> • To stabilize the soil, reduce damage from sediment and runoff to downstream areas • To improve wildlife habitat and visual resources. 	On highly erodible or critically eroding areas. These areas usually cannot be stabilized by ordinary conservation treatment and management and if left untreated can cause sever erosion or sediment damage. Examples of applicable areas are dams, dikes, mine spoil, levees, cuts, fills, surface-mined areas, and denuded or gullied areas where vegetation is difficult to establish by usual planting methods.
5. Deferred Grazing (acre)		
Postponing grazing or resting grazing land for a prescribed period.	<ul style="list-style-type: none"> • To promoted natural revegetation by increasing the vigor of the forage stand and permitting desirable plants to produce seed; • To provide a feed reserve for fall and winter grazing or emergency use; • To improve the appearance or range having inadequate cover; and • To reduce soil loss and improve water quality. 	On all rangeland, native pasture, grazable woodland, and grazed wildlife land.

Definition	Purpose	Condition Where Practice Applies
6. Diversion, dam (<i>number</i>)		
<p>A structure built to divert part of all the water from a waterway or a stream into a different watercourse, an irrigation canal or ditch, or a water-spreading system.</p>	<ul style="list-style-type: none"> • To divert part of all the water from a waterway in such a manner that it can be controlled and used beneficially, or • To divert periodic damaging flows from one watercourse to another watercourse having characteristics that reduce the damage potential of the flows. 	<ul style="list-style-type: none"> • Where a diversion dam is needed as an integral part of an irrigation system or a water-spreading system designed to facilitate the conservation use of soil and water resources. • Where it is desirable to divert water from an unstable watercourse to a stable watercourse. • Where the water supply available is adequate for the purpose for which it is to be diverted. • Where the impact of a proposed dam on water quality, fish and wildlife habitat, forest, and visual resources are evaluated and the techniques and measures necessary to overcome the undesirable effects are made part of the work.
7. Fencing (<i>feet</i>)		
<p>Enclosing or dividing an area of land with a suitable permanent structure that acts as a barrier to livestock, big game, or people (does not include temporary fences).</p>	<ul style="list-style-type: none"> • To exclude livestock or big game from areas that should be protected from grazing; • To confine livestock or big game in an area; • To control domestic livestock while permitting wildlife movement; • To subdivide grazing land to permit use of grazing systems; • To protect new seedlings and plantings from grazing; and • To regulate access to areas by people or prevent trespassing. 	<p>On any area requiring control or exclusion of livestock or big game or regulation of access by people.</p>
8. Fish Stream Improvement (<i>feet</i>)		
<p>Improving a stream channel to make a new fish habitat or to enhance an existing habitat.</p>	<p>To increase the production of desired species of fish.</p>	<p>In streams where poor habitat limits production of desired species.</p>

Definition	Purpose	Condition Where Practice Applies
9. Irrigation Water Management (<i>acre</i>)		
<p>Determining and controlling the rate, amount, and timing of irrigation water in a planned and efficient manner.</p>	<ul style="list-style-type: none"> • To effectively use available irrigation water supply in managing and controlling the moisture environment of crops to promote the desired crop response. • To minimize soil erosion and loss of plant nutrients, to control undesirable water loss. • To protect water quality. 	<ul style="list-style-type: none"> • This practice is suited to all areas that are suitable for irrigation and that have a water supply of suitable quality and quantity. • An adapted conservation irrigation system must be available, either a portable system or a system that is established on the land to be irrigated. • The irrigator shall have a knowledge and capability to manage and apply irrigation water in such a manner that the objectives mentioned under "Purpose" can be reasonably attained. The knowledge should include: <ul style="list-style-type: none"> • How to determine when irrigation water should be applied, based on the rate of water used by crops and on the stages of plant growth. • How to measure or estimate the amount of water required for each irrigation, including the leaching needs. • The normal time needed for the soil to absorb the required amount of water and how to detect changes in intake areas. • How to adjust stream size, application rate, or irrigation time to compensate for changes in such factors as intake rate or the amount of water to be applied. • How to recognize erosion caused by irrigation. • How to estimate the amount of irrigation runoff from an area. • How to evaluate the uniformity of water application.

Definition	Purpose	Condition Where Practice Applies
10. Livestock Exclusion (<i>acre</i>)		
Excluding livestock from an area not intended for grazing.	<ul style="list-style-type: none"> • To protect, maintain, or improve the quantity and quality of the plant and animal resources. • To maintain enough cover to protect the soil. • To maintain moisture resources. • To increase natural beauty. 	<ul style="list-style-type: none"> • In areas where forest reproduction, soil hydrologic values, existing vegetation (including trees), or aesthetic values or recreation are prevented or damaged by livestock. • This practice is applicable only if an owner or operator physically constructs or maintains a barrier (fence, for example) necessary to exclude livestock. It is not applicable on areas where livestock are not present or are usually confined to fenced areas such as pastures or feedlots.
11. Pasture and Hayland Management (<i>acre</i>)		
Proper treatment and use of pastureland or hayland	<ul style="list-style-type: none"> • To prolong life of desirable forage species. • To maintain or improve the quality and quantity of forage. • To protect the soil and reduce water loss. 	On all pastureland or hayland
12. Planned Grazing Systems (<i>acre</i>)		
A practice in which two or more grazing units are alternately reseeded and grazed in a planned sequence for a period of years. Rest periods may be throughout the year or during the growing season of key plants.	<ul style="list-style-type: none"> • To maintain existing plant cover or hasten its improvement while properly using the forage of all grazing units. • To reduce erosion and improve water quality. • To increase efficiency of grazing by uniformly using all parts of each grazing unit. • To ensure a supply of forage through the grazing season. • To increase production and improve quality of forage. • To enhance wildlife habitat. • To promote flexibility in the grazing program and buffer the adverse effects of drought. • to promote energy conservation through reduced use of fossil fuel. 	On rangeland, pastureland, hayland, native pasture, grazable woodland, and grazed wildlife land.

Definition	Purpose	Condition Where Practice Applies
13. Pond (number)		
<ul style="list-style-type: none"> • A water impoundment made by constructing a dam or an embankment, or by excavating a pit or dugout. • Impoundments constructed by the first method are referred to as embankment ponds. Those constructed by the second method are referred to as excavated ponds. • Ponds constructed by both the excavation and the embankment methods are classified as embankment ponds if the depth of water impounded against the embankment at spillway elevation is 3 feet or more. 	<ul style="list-style-type: none"> • To provide water for livestock, fish and wildlife, recreation, fire control, crop and orchard spraying, and other related uses. • To maintain or improve water quality. 	<p>Site Conditions shall be such that runoff from the design storm can be safely passed through:</p> <ul style="list-style-type: none"> • a natural or constructed emergency spillway; • a combination of a principal spillway and an emergency spillway; or • a principal spillway. <p>The Drainage Area above the pond must be protected against erosion to the extent that expected sedimentation will not shorten the planned effective life of the structure. The drainage area shall be large enough to that surface runoff and ground-water flow will maintain an adequate supply of water in the pond. The quality shall be suitable for the water's intended use.</p> <p>Reservoir Area. The topography and soils of the site shall permit storage of water at a depth and volume that ensure a dependable supply, considering beneficial use, sedimentation, season or use, and evaporation and seepage losses. If surface runoff is the primary source of water for a pond, the soils shall be impervious enough to prevent excessive seepage losses or shall be of a type that sealing is practicable.</p>
14. Proper Grazing Use (acre)		
<p>Grazing at an intensity that will maintain enough cover to protect the soil and maintain or improve the quantity and quality of desirable vegetation.</p>	<ul style="list-style-type: none"> • To increase the vigor and reproduction of key plants. • To accumulate litter and mulch necessary to reduce erosions and sedimentation and improve water quality. • To improve or maintain the condition of the vegetation. • To increase forage production. • To maintain natural beauty. • To reduce the hazard of wildfire. 	<p>On all rangeland, native pasture, and grazed wildlife land.</p>

Definition	Purpose	Condition Where Practice Applies
15. Range Seeding (<i>acre</i>)		
Establishing adapted plants by seeding on native grazing land. This does not include pasture and hayland planting.	<ul style="list-style-type: none"> • To prevent excessive soil and water loss and improve water quality. • To produce more forage for grazing or browsing animals on rangeland or land converted to range from other uses. • To improve the visual quality of grazing land. 	On rangeland, native pasture, grazable woodland and grazed wildlife land.
16. Spring Development (<i>number</i>)		
Improving springs and seeps by excavating, cleaning, capping, or providing collection and storage facilities.	<ul style="list-style-type: none"> • To improve the distribution of water or to increase the quantity of water for livestock or wildlife. • To obtain water for irrigation if water is available in a suitable quantity or quality. 	<ul style="list-style-type: none"> • Developments shall be confined to springs or seepage areas that can furnish a dependable supply of suitable water during the planned period or periods of use. • The need for an feasibility of protection from flooding, sedimentation, and contamination shall be considered in determining the suitability of site for development.
17. Streambank and Shoreline Protection (<i>feet</i>)		
Using vegetation or structures to stabilize and protect banks of streams, lakes, estuaries, or excavated channels against scour and erosion.	<p>To stabilize or protect banks of streams, lakes, estuaries, or excavated channels for one or more of the following purposes:</p> <ul style="list-style-type: none"> • To prevent the loss of land or damage to utilities, roads, buildings, or other facilities adjacent to the banks; • To maintain the capacity of the channel; • To control channel meander that would adversely affect downstream facilities; • To reduce sediment loads causing downstream damages and pollution; or • To improve the stream for recreation or as a habitat for fish and wildlife. 	<ul style="list-style-type: none"> • To natural or excavated channels where the streambanks are susceptible to erosion from the action of water, ice, or debris, or to damage from livestock or vehicular traffic. • To controlling erosion on shorelines where the problem can be solved with relatively simple measures (structural, vegetation, or upland erosion control practices) and where either failure or structural measures will not create a hazard to life or serious damage to property.

Definition	Purpose	Condition Where Practice Applies
18. Trough or Tank (number)		
A trough or tank, with needed devices for water control and waste water disposal, installed to provide drinking water for livestock.	<ul style="list-style-type: none"> • To provide watering facilities for livestock at selected locations that will protect vegetative cover through proper distribution of grazing or through better grassland management for erosion control. • On some sites, to reduce or eliminate the need for livestock to be in streams, which reduces livestock waste there. 	<ul style="list-style-type: none"> • Where there is a need for new or improved watering places: <ul style="list-style-type: none"> • To permit the desired level of grassland management. • To reduce health hazards for livestock. • To reduce livestock waste in streams.
19. Wildlife Upland Habitat Management (acre)		
Creating, maintaining, or enhancing areas, including wetland, for food and cover for upland wildlife.	To create, maintain, or enhance habitat suitable for sustaining desired kinds of upland wildlife.	On all lands that are suitable for the kinds of wildlife food or cover lands that are needed.
20. Wildlife Watering Facility (number)		
Constructing, improving, or modifying watering places for wildlife.	To provide drinking water for wildlife.	In areas where new, additional, or improved watering places are needed to increase the range to improve the habitat of wildlife.
<p>21. Plans and specifications for irrigation water management (IWM). The irrigation water management plan shall be in keeping with the purpose and principles in this standard. Instead of an actual evaluation at each irrigation, evidence that the physical layout of the irrigated area meets the requirements of a conservation irrigation system plus the technician's evaluation as to the knowledge and use of the principles of water management by the irrigator is acceptable in determining that good water management is being practiced.</p>		

APPENDIX 13

PLANNING CRITERIA

13. PLANNING CRITERIA³

A. PLANNING CRITERIA

Planning criteria influence all aspects of the planning process, including inventory and data collection, formulation of alternatives, estimation of effects, and selection of the preferred alternative. Planning criteria help to:

- Streamline the plan's preparation and focus.
- Establish standards, rules, and measures to be used in the process.
- Guide development of the resource management plan (RMP).
- Guide and direct issue resolution.
- Identify factors and data to consider in making decisions.

B. GENERAL PLANNING CRITERIA

The principles of multiple use and sustained yield will guide the land use decisions in the planning area. However, all lands may not be open for all uses. Some uses may be excluded on some lands to protect specific resource values or uses. Any such use exclusion will be accomplished by law, regulation, or by a decision through the planning process.

The RMP is prepared using the most current and best available information. Limited inventories for the purpose of gathering additional data will be conducted.

The following general planning criteria will be considered in developing the RMP:

- Existing laws, regulations, and BLM policies.
- Valid existing decisions in previous land use plans, activity plans, etc.
- Plans, programs and policies of other Federal agencies, State and local governments, and Indian tribes.
- Public input.
- Quantity and quality of non-commodity resource values.
- Future needs and demands for existing and potential resource commodities and values.
- Past and present uses of public and adjacent lands.
- Public benefits of providing goods and services.
- Environmental impacts.
- Social and economic values.
- Public welfare and safety.

³ Source: various BLM planning guidelines

APPENDIX 14

WATER QUALITY MONITORING

14. WATER QUALITY MONITORING

A. MONITORING PROGRAM

The following data will be collected to meet the goal of assessing the water quality of the watershed. Additional data will be collected when specific project effectiveness is being assessed. The additional data will vary depending on the project type and location. Data will be collected on the following parameters.

- **Water temperature** — This will be collected to assess existing habitat for cold-water fish and to gather further data to determine natural background conditions. Temperature will be read using instream temperature monitoring devices, hobos and optic stowaways (the latter is also non-permanent, but can store data for longer intervals). The devices will be mounted on a stake submerged in the water. The devices will be located in shaded areas of the stream, preferably at the edge of a pool. Temperature will be read at 45-minute intervals. The Hobos will be downloaded every 30 days and the optic stowaways will be downloaded every 60 days. The data will be converted to a 7-day average maximum temperature.
- **Ambient air temperature** — Air temperatures will be taken to gather data to determine natural background conditions and to assess the degree of effect ambient air temperature has on stream temperature. Air temperatures will be collected using Hobos and optic stowaways. The air and water samples will be taken from the same type of device for each site, either the hobo or stowaway. The data will be logged in a lap-top computer.
- **pH (hydrogen ion concentration in “standard units,” SU)** — The pH values will be taken to determine if the stream is within the appropriate range for fish habitat. The data will also be used to help determine the natural pH values for Bully Creek. The pH will be taken in the field using a Hach brand pH meter.
- **Conductivity** (micromhos, μmhos) — This is measured as an index of the concentration of dissolved constituents in water (also referred to as “total dissolved solids” or TDS) and is useful in assessing the suitability of water for irrigation use.
- **Bacteria** (colony counts per 100 milliliters, mL) — Bacteria will be analyzed to determine the quality of the water for water contact recreational purposes, mainly fishing and swimming in Bully Creek. Samples will be collected on site and shipped within 24-hours to the Bureau of Reclamation Water Quality Lab in Boise, Idaho for analysis. Samples will be analyzed for E. coli.
- **Dissolved oxygen (DO)** — This will be analyzed to determine the water quality for aquatic life and give an indication for potential problems with algae populations. Water samples will be collected and analyzed in the field by using DO pillows and a field titration method.

- **Nitrates (NO₃) + Nitrites (NO₂) and Phosphorus (total P)** — These will be analyzed to determine if they are at levels that can cause excessive algae growth, which in turn can result in high pH and both high and low DO levels. Samples will be collected and preserved in the field shipped to the Reclamation Water Quality Lab for analysis using standard Environmental Protection Agency (EPA) methods. These will also be shipped within 24-hours.
- **Turbidity** — This will be analyzed and used as an indicator to determine suspended sediment within the stream. Appreciable sediment could be a concern for recreation, irrigation, and fish habitat. Bully Creek drains into Bully Creek Reservoir. The reservoir is used for irrigation and recreational pursuits such as fishing, swimming, and boating. Reclamation is concerned that the amount of sediment entering the reservoir is reducing the holding capacity of the reservoir. Samples will be collected and preserved in the field and shipped to Reclamation's Boise Water Quality Lab. Measurements will be read in "NTUs" (nephelometric turbidity units).
- **Stream flow** — This will be taken at selected sites. Stream flow rates will be used to correlated data listed above and allow measurement of the effectiveness of instream flow improvement projects. The stream channel will be "cross-sectioned" and velocity will be measured.

B. DATA ANALYSIS

Data analysis will be completed by the Bully Creek Technical Committee which consists of a representative from the Bully Creek Coalition, ODFW, BLM, Cooperative Extension Service, NRCS, and Malheur County Weed Control.

C. SAMPLING SITES

The following sites were selected to meet the objectives of the first goal, assessing the water quality of Bully Creek and its tributaries. Future sites will be determined when projects are identified, in order to accomplish the second goal. See table 14-1 below and figure 14-1 for site locations.

Table 14-1. Name and Location of Monitoring Sites on Bully Creek and Tributaries

Site	Location
1. Bully Creek (RM 16.5)	On Bully Creek. T18S R43E, Section 4 (<i>downstream of discontinued USGS gauging station</i>)
2. Clover Creek, lower bridge	Bridge on Clover Creek Road near Richie Flat. T18S R41E, Section 6
3. Bully Creek (RM 34)	Downstream of confluence of Bully, Indian, and Cottonwood Creeks, where Harper Westfall Road crosses Bully Creek. T18S R41E, Section 20
4. Upper Bully Creek	Davis Ranch. T18S R41E, Section 11
‡ 5. Indian Creek, Amick's Ranch	First bridge on Indian Creek Road, upstream from confluence of Bully and Indian Creeks. T18S R41E, Section 19
6. Upper Cottonwood Creek	Base of hill in grove of trees about ½-mile southwest of trail off of Lawrence Road. T18S R40E, Section 35.
7. Bully Creek (RM 32)	Dahle Road Bridge south of Stage Road. T18S R41E, Section 26.
8. Lower Cottonwood Creek	On McElroy Ranch, above irrigated pasture. T16S R39E, Section 36.
@ 9. Clover Creek	Bridge on Bonita Road at Clover Creek Ranch. T16S R29E, Section 36.
@ 10. Clover Creek	Confluence of Rail and Clover Creeks. T16S R39E, Section 23.
‡ This is a different location than used for 1995 water monitoring.	
@ New for 1996	

Table 14-2. Bully Creek at Warm Springs Gauging Station (USGS 13226500)

Location	At RM 17.2, on left bank 400 feet down stream from Lower Cottonwood Creek, 4.7 miles upstream from Bully Creek Dam. Latitude 44°01'10", longitude 117°27'35". In SE¼NW¼, Sect. 9, T18S, R43E. Hydrologic unit 17050118. Discontinued in 1985.
Drainage area	539 square miles.
Gauge	Water-stage recorder. Datum (elevation) is 2527.21 feet above NGVD (national geodetic vertical datum) of 1929, a Bureau of Reclamation benchmark.
Period of record	28 years (water year 1906, 1912-18, 1964-1985)
Average discharge	53.6 cfs; 38,830 acre-feet per year
Maximum discharge	12,800 cfs (December 22, 1964)
Minimum discharge	no flow (various occurrences)
Source: <i>USGS Water Data Report OR-85-1</i>	

Table 14-3. Sampling Events

		Period of collection of data from sampling at each site									
Parameter	Unit	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10
Water temperature	°F	mo.	mo.	mo.	mo.	mo.	mo.	mo.	mo.	60	60
Air temperature	°F	mo.	mo.	mo.	mo.	mo.	mo.	mo.	mo.	60	60
pH	SU	mo.	mo.	mo.	mo.	mo.	mo.	mo.	mo.	mo.	mo.
Electrical conductivity	μmhos/cm	mo.	mo.	mo.	mo.	mo.	mo.	mo.	mo.	mo.	mo.
Bacteria (fecal coliform)	counts/100 mL	mo.	mo.	mo.	mo.	mo.	mo.	mo.	mo.	mo.	mo.
DO (dissolved oxygen)	mg/L	mo.	mo.	mo.	mo.	mo.	mo.	mo.	mo.	mo.	mo.
Nitrates + nitrites (NO ₃ + NO ₂)	mg/L	mo.	mo.	mo.	mo.	mo.	mo.	mo.	mo.	mo.	mo.
Total phosphorus	mg/L	mo.	mo.	mo.	mo.	mo.	mo.	mo.	mo.	mo.	mo.
Turbidity	NTU's	mo.	mo.	mo.	mo.	mo.	mo.	mo.	mo.	mo.	mo.
Stream flow	cfs	mo.	mo.	mo.	mo.	mo.	mo.	mo.	mo.	mo.	mo.

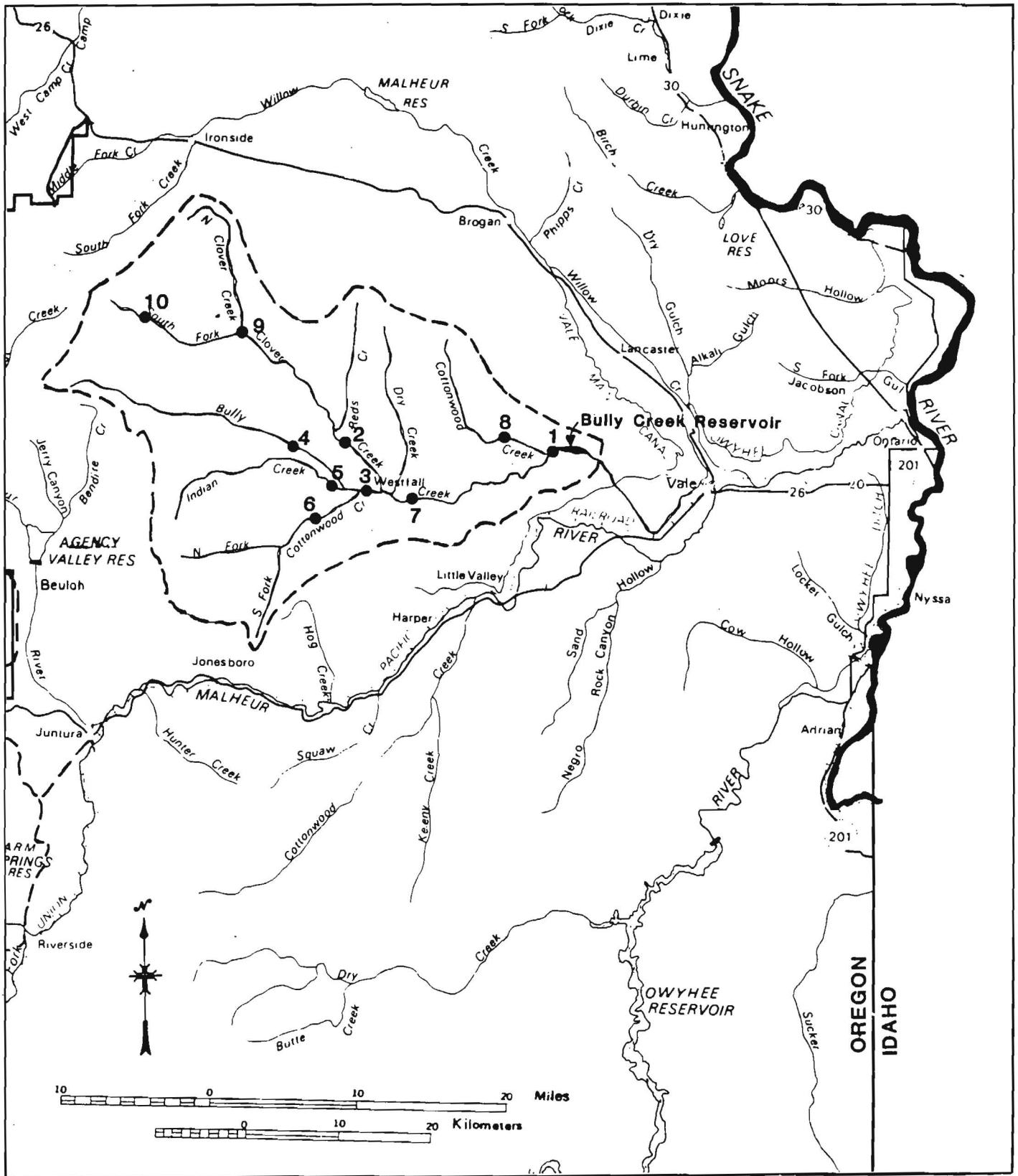


Figure 14-1. Location Map of Water Quality Monitoring Sites

(Source: NRCS, Ontario, OR; 1996)

APPENDIX 15

GLOSSARY

15. GLOSSARY

Anadromous fish — Fish that live some or all of their adult lives in saltwater but migrate to freshwater to spawn. See *salmonid*.

Active mining claim — A mining claim staked in accordance with the provisions of the Mining Law of 1872 and not voided or extinguished by a Federal administrative or legal action.

Active preference — That portion of the total grazing preference for which grazing use may be authorized. See *total preference*

Active Use — The total number of *animal unit months* (AUM's) authorized for grazing by livestock.

Activity Plan — A document which describes management objectives, actions, and projects to implement decisions of planning documents.

Allotment — An area of public land, consisting of one or more pastures, where one or more operators graze their livestock. It may include parcels of state or private land. The number of livestock and the period of use are stipulated for each allotment.

Animal unit month (AUM) — The amount of forage required to sustain one cow with one calf, or their equivalent, for one month.

Aquatic — Water habitat dependent. Usually refers to such things as fish, macroinvertebrates, algae, and other plants that require complete water submersion for survival.

Aquifer — A geologic layer of permeable rock, sand, or gravel bearing water. The source of ground water for wells.

Area of critical environmental concern (ACEC) — Lands administered by BLM where special management attention is needed to protect important historic, cultural, or scenic values, fish and wildlife resource, or other natural systems or processes; to prevent irreparable damage; or to protect life and provide safety from natural hazards.

Aridisols — see *Soils*

Bankfull flow — The channel forming flow of the stream usually equivalent to 1½- to 2-year storm recurrence interval.

Base Flow — That part of stream flow that is not attributable to direct *runoff* from precipitation or melting snow, primarily sustained by groundwater discharge into the stream. See also *stream flow*.

Baseline — A selected set of data that forms a known starting point that will help identify trends as the system changes.

Benthic — Pertaining to the bottom of a body of water. *Benthic* algae grows on the bottom of a water body.

Biochemical oxygen demand (BOD) — The amount of oxygen needed for biological decomposition and chemical oxidation of sediments.

Biodiversity — Biological diversity; variety of life forms in a given area.

Biota — All living organisms that exist in a region.

Buffer areas — Zones created or sustained to separate the effects of land-use practices on animals and plants and their habitats.

Bureau [BLM] sensitive species — Those which the State of Oregon is concerned about; the BLM treats these as if they were *candidate species*.

Candidate Species — Those plants and animals included in Federal Register “Notices of Review” that are being considered by the U.S. Fish and Wildlife Service (FWS) for listing as *threatened* or *endangered*. BLM policy for *candidate species* is to not allow actions which would cause it to become listed as threatened or endangered.

- **Category 1 Species** are those for which there is substantial information to support proposing the species for listing as threatened or endangered; listing proposals are either being prepared or have been delayed by higher priority listing work.
- **Category 2 Species** are those for which there is information to indicate that listing is possibly appropriate and additional information is being collected.

Canopy cover — The leafy crown of trees or large shrubs that rises above low growing forbs, grasses, and water.

Carrying Capacity — The maximum number of animals an area can sustain without inducing damage to vegetation or related resources, such as soil and water.

Channelization — The straightening and smoothing of river channels, frequently for flood control, sometimes accompanied by paving or bank armoring.

Conjunctive use — The use of land, air, or water for more than one purpose or by more than one person, or the sequential use of a resource dependent on availability of source. Using ground water and surface water at different times of the year, based on availability, is *conjunctive use* of water resources.

Contiguous habitats — Wildlife or other habitat that is connected physically, even if parcel lines or other political divisions otherwise bisect it.

Critical Growing Period — The portion of a plant’s growing season, generally between flowering and seed ripe, when defoliation is most detrimental.

Cultural Resources — Any definite location of past human activity identifiable through field survey, historical documentation, or oral evidence; includes archaeological sites, structures or places, and places of traditional cultural or religious importance to specified groups whether or not represented by physical remains.

Deferred grazing — Grazing occurs after a specified period, such as after seed ripe of key forage species.

Developed recreation site — A site developed with permanent facilities designed for recreational use

Discharge — Volume of water flowing past a reference point per unit of time (e.g., cubic feet per second, cfs).

Dispersed recreation — Outdoor recreation which visitors are distributed over relatively large areas. Where facilities or developments are provided, they are primarily for access and protection of the environment rather than comfort or convenience of the user.

Dissolved oxygen (DO) concentration — The amount of oxygen dissolved in water, measured in milligrams per liter (mg/L).

Diversion — In water rights, altering natural water flow in a drainage. It includes such actions as collecting water in a reservoir before it reaches a main stream channel, pumping from the stream, and damming the stream itself.

Ecology — The study of the interactions of living things and their environment.

Ecosystem — An interdependent community of plants and animals interacting with one another and with the chemical and physical factors making up their environment.

Endangered species — When a species faces possible extinction throughout all, or a significant portion of, its range. The predominant cause is loss of habitat.

Enhancement — Improving a system or habitat.

Entisols — See *Soils*.

Environmental assessment (EA) — A systematic analysis of site-specific Federal activities used to determine whether they have a significant effect on the quality of the human environment and whether a *environmental Impact Statement (EIS)* is required. It is also used to aid an agency's compliance with the National Environmental Protection Act (NEPA) when no EIS is necessary.

Environmental impact — The positive or negative effect of any action upon a given area or resource.

Environmental impact statement (EIS) — A formal document filed with the Environmental Protection Agency that considers significant environmental impacts expected from implementation of a major Federal action.

Ephemeral stream — A stream that flows only a short time (days or weeks) in direct response to rain storms.

Erosion — The movement of soil by water and wind and frost.

- **Gully erosion** — If left unchecked, rills caused by erosion become larger, forming gullies.
- **Rill erosion** — As water picks up speed moving downhill, the sheets begin to form rills, or small channels.
- **Sheet erosion** — Water moves over the soil surface in thin layers like a sheet; also called “invisible erosion” because it is difficult to see it happening.

Eutrophication — Excess decomposition of dead matter in water that lowers the *dissolved oxygen* concentration such that fish and other aquatic animal life are threatened.

Floodplain — Flat areas bordering streams that are subject to flooding.

Fluvial — Relating to a stream or river, or caused by the action of flowing water.

Fluvial geomorphology — The science that deals with the relationship of moving water and river forming relief features of the earth, such as vegetation, geology, and topography.

Geomorphology — Geologic study of the evolution of landscape and land-forming processes.

Gradient — Degree of slope from horizontal or steepness of a geographic feature.

Grazing System — The specific way in which the amount and timing of grazing is planned for a given area.

Ground water — Water which occurs below the surface of the land.

Groundwater recharge — Replenishment of water removed or otherwise drained from an underground *aquifer*.

Gully — A channel, concentrated in a narrow area, formed by surface water eroding the soil. Depths can range from a few feet to as much as 100 feet.

Habitat — The specific area or environment in which a plant or animal lives and which provides all of the basic requirements for life for that organism.

Humus — Decayed organic matter in or on the soil's surface

Hydrology — The study of relationships between water and the geologic environment.

Impact — A spatial or temporal change in the environment caused by human activity.

Impair — To diminish in value or quality.

Impoundment — The water, usually in a reservoir or pond, which is retained by a structure.

Indicator species — A species whose characteristics show the presence of specific environmental conditions and are representative of a certain habitat type or function.

Indigenous — Species which naturally originated, resided at, or utilized a given site since a baseline period or date.

Infiltration — The entry of into the soil from any direction; see also *percolation*.

Integrated pest management — A systemic approach to agricultural pest control that utilizes cultural practices, biotechnology, chemicals, and other crop protection techniques as a means to achieve acceptable levels of control with the least possible environmental harm.

Lacustrine — Related to or growing in lakes.

Land stewardship — An ethical or cultural value that promotes land use practices which protect the resources for succeeding generations.

Leaching — Removal of salts, nutrients, and other materials from the soil by water movement through the soil profile

Leasable minerals — Oil, gas, coal, and geothermal resources which may be leased to private interests by the Federal government.

Levee — Raised bank of earth built to control or confine water, sometimes known as a dike.

Listed species — Any species of fish, wildlife or plant which has been determined to be *endangered* or *threatened* under Section 4 of the Endangered Species Act. It is any plant or animal which is in danger of extinction throughout all or a significant part of its range. *Listed species* are found in 50 CFR [Code of Federal Regulations] 17.11-17.12.

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

Management framework plan (MFP) — A land use plan that established coordinated land use allocations for all resource and support activities for a specific land area within a BLM district. It established objectives and constraints for each resource and support activity and provided data for consideration in program planning. This process has been replaced by the Resource Management Planning process.

Marsh — A wetland where the dominant vegetation is non-woody plants such as grasses and sedges (as opposed to a swamp where the dominant vegetation is woody plants like trees).

Mesic — Characterized by a moderate amount of moisture; about 7–12" of annual precipitation.

Mining claim — Public lands with *locatable mineral* deposits, claimed for possession by locating and recording under established rules and pursuant to the 1872 Mining Law.

Mitigating Measures — Modifications of actions which

- avoid impacts by not taking a certain action or parts of an action;
- minimize impacts by limitations on the magnitude of the action and its implementation;
- rectify impacts by repair, rehabilitation, or restoration of the affected environment;
- reduce or eliminate impacts over time by preservation and maintenance operations during the life of the action;
- compensate for impacts by replacement or substitution of resources or environments.

Mollisols — see *Soils*

Monitoring and Evaluation — Scheduled sampling of selected environmental and biological variables and analysis of data to evaluate the progress and effectiveness of actions in meeting resource management objectives.

Mulch — Any substance which is spread or allowed to remain on the soil surface to decrease the erosion effects of raindrop impact, water runoff, or wind.

Native — Species that have originated naturally in a particular region.

Natural processes — Those physical, chemical, and biological processes that normally function in nature without adjustment or interference from human activity.

Natural resources — Naturally occurring resources such as soil, water, air, and trees that are needed by an organism, population, or ecosystem to sustain or optimize survival.

Nitrogen — A common, necessary elemental *nutrient* that in excess concentrations can cause environmental problems. Excess concentrations can come from fertilizers, septic systems, and animal wastes. Nitrogen dissolves in rainfall or irrigation water and leaches to the groundwater.

Nonpoint source pollution — Water pollution from dispersed and uncontrolled sources (such as surface runoff from rain storms).

Noxious weed — A plant specified by law as being especially undesirable, troublesome, and difficult to control.

Nutrients — That portion of any element or compound in the soil that can be readily absorbed and assimilated to nourish growing plants.

Off-highway vehicle (OHV) — A motorized track or wheel vehicle designed for cross country travel over natural terrain. OHV designations are:

- **Open** — Areas and trails where OHV's may be operated subject to operating regulations and vehicle standards (in BLM Manuals 8341 and 8343).
- **Limited** — Areas and trails where OHV's are subject to restrictions limiting the number or types of vehicles, and the date and time of use; limited to existing or designated roads and trails.
- **Closed** — Areas and trails where the use of OHV's is permanently or temporarily prohibited. Emergency use is allowed.

Organic matter — Residue of plant or animal origin.

Pasture — A subdivision of an *allotment* capable of being grazed by livestock independently from the rest of the allotment.

Percolation — Downward movement of water through soil.

Perennial — Occurs throughout a year.

PFC — see *Proper Functioning Condition*

pH — The symbol used to indicate an “acid” or “alkaline” condition, the relative concentration of hydrogen ions. A pH of 7 indicates neutrality, less than 7 is acid, and greater than 7 is alkaline.

Phosphorus — A common *nutrient* that in excess concentrations can cause problems in the environment. Phosphorus attaches to soil particles via chemical attraction. When soil erosion occurs and sediment enters water bodies, the phosphorous is carried with it.

Photo point — A marked location from which photographs are systematically shot over a period of time to record changes.

Point source pollution — A source of *pollutants* from a single point of conveyance such as a pipe. For example, the discharge from a sewage treatment plant or a factory is a *point source of pollution*.

Pollutant — A harmful chemical or waste material discharged into the environment. Persistent *pollutants* are those that do not chemically break down (degrade), causing potential long-term toxicity to the environment.

Pollution — Impairment of land, air, or water quality by agricultural, domestic, or industrial waste to a degree having an adverse affect on beneficial uses or the facilities that serve such beneficial uses

Population — Total number of individuals of the same species inhabiting a specified area.

Primitive and unconfined recreation — Nonmotorized and undeveloped types of outdoor recreation activity.

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

Raptor — Bird of prey, such as hawks, eagles and owls.

Rare species — A classification given only when a species exists in such small numbers throughout its range that it may become *endangered* if its present environment worsens, although it is not presently threatened with extinction.

Reach — A section of river between two specified points or possessing some common characteristic(s).

Refugia — (plural *of refugium*, refuge) An area of relatively unaltered climate inhabited by plants and animals during a period of continental climate change (such as glaciation) and remains as a center of “relic” forms from which a new dispersion and speciation may take place after climatic readjustment.

Resource conservation district — An autonomous units of local government, formed under state law by local vote and governed by an unpaid board of directors. Its purpose is to provide local direction for Federal and State governments to protect the soil, water and other natural resources of the district.

Resource management plan (RMP) — A land use plan that establishes coordinated land use allocations for all resource and support activities for a specific land area within a BLM district. It establishes objectives and constraints for each resource and support activity and provides data for consideration in program planning.

Restore — To bring back to the original condition, or to put back in place something that was lost. Ecological restoration is closely associated to the terms rehabilitation, recovery, and reclamation.

Revegetation — Reestablishment of a vegetative cover on a disturbed or burned area.

Revetment — Facing, as with cement or rock, to support an embankment and prevent its erosion.

Riffles — The fast, shallow waters of a stream where current passes over gravel bars between two pools.

Right-of-way — A permit or an easement that authorizes the use of public lands for specified purposes, such as pipelines, roads, telephone lines, electric lines, and reservoirs and the lands covered by such an easement or permit.

Riparian — Plant community succession -naturally occurring along the bank of a natural freshwater waterway such as a river, stream, or creek. Riparian zones support diverse and abundant terrestrial wildlife species, protect stream banks and adjacent land from erosion, and contribute significantly to aquatic communities by providing shade, cover from predators, nutrients, a buffer from nearby land use activities, and a filter for overland soil erosion.

Riprap — Rock covering used to protect streambanks from erosion

Riverine — Related to or growing in rivers and streams.

Rotational grazing — Grazing use is subdivided into units or pastures with grazing taking place in one unit, then another, in regular succession. This rotational use can be alternated between years in a variety of grazing systems.

Runoff — Water from rain, melted snow, or agricultural or landscape irrigation that flows over the land surface.

Salable minerals — Minerals which may be sold or otherwise disposed of by the Federal government, as authorized by the Material Sale Act of 1947. These include common varieties of stone, clay, sand, gravel, volcanic cinders, petrified rock, etc.

Salinity — The relative content of dissolved salt in water or soil.

Salmonid — Any species of a genus of Pacific Ocean fishes that can breed in rivers and streams tributary to the North Pacific. A fish in the salmon or trout family.

Scenic quality — The relative worth of a landscape from a visual point-of-view.

Scour — Localized concentrated erosion by flowing water, usually in stream bottoms or floodplains.

Sediment — Soils, mud, sand, silt, clay, and other particles transported from outside a stream system, or generated by erosion in the stream, that settle on the bottom of waterways.

Sediment load — Sediment held in suspension by turbulence in river water.

Sediment yield — The amount of sediment transported from a river basin or other drainage area.

Sensitive habitat — Habitat, such as riparian corridors or wetlands, that exhibits rapid response to environmental changes.

Soil — The loose upper layer of the earth in which plants grow; made up of inorganic material, organic material, air, and water. There are three classifications, based on landscape position:

- **Aridisols** are on the warmest landscape positions.
- **Entisols** are on steep erodible badlands and flat lying, frequently flooded areas.
- **Mollisols** occur where moisture is favorable for plant growth.

Soil compaction — Increase in soil density due to mechanical forces.

Soil erosion — Detachment and movement of soil or rock by water, wind, ice, or gravity.

Special status species — Plant or animal species falling in any of the following categories: *threatened*; *endangered*; proposed threatened or endangered; *candidate*; *state listed*; *Bureau [BLM] sensitive*; and Bureau [BLM] assessment.

Species — Individuals that are of the same kind or likeness that are able to interbreed and produce viable young.

Species of Concern — Those species about which the State of Oregon is concerned. These are termed by the BLM as *Bureau sensitive*; the BLM treats these species as if they were *candidates*.

Stakeholder — A resident of a watershed or someone who has an interest in it (such as land management, administrative, or other responsibilities). Stakeholders include (among others) private individuals, businesses, local, State, and Federal government agencies, special interest groups, wildlife, and fisheries.

State listed species — Plant or animal species listed by the State of Oregon as *threatened* or *endangered* pursuant to ORS [Oregon Revised Statutes] 496.004, ORS 498.026, or ORS 564.040.

Storm drain — A channel or pipe which carries rain water runoff from developed areas to a water body such as a lake or river. Sometimes also called a storm sewer system (which is usually separate from sanitary sewer systems).

Stream degradation — A lowering of the elevation of streambeds and flood plains by erosional removal of alluvium; may be caused when upstream sources of sediment are blocked, or if instream flows increase above historic levels.

Stream flow — Volume of water carried by a stream. Stream flow has two major components: *runoff* and *baseflow*.

Stream order — A system used to classify and analyze streams.

Stream stabilization — The coordination of hydraulics, hydrology, physics, biology, and geology to establish a stable stream system in equilibrium with the natural forces acting on and in the stream.

Streambed — the part of the stream over which the water moves

Substrate — Inorganic material that forms the bottom of a stream.

Suspended preference — The number of *AUM's* removed from a permittee's *active preference*.

Sustainable land use — Use of low input land management systems and concepts that leave the land in the same, or better condition that when the land use started. Land management measures that can continue indefinitely without natural resource depletion.

Swales — Low, usually damp, areas of ground.

Threatened Species — A species is *threatened* when, although not presently at risk of extinction, in the absence of special protection and management efforts it is likely to become *endangered* in the foreseeable future.

Total dissolved solids (TDS) — The amount of dissolved material in water.

Total preference — The sum of *active preference* and *suspended preference*.

Transect — A line between two points of a study area along which data is collected.

Turbidity — Degree to which light penetration is blocked because water is muddy or cloudy.

Utilization — The proportion of the current year's forage production consumed or destroyed by grazing animals. This term may refer to a single species or to the whole vegetative complex.

Visual resource management (VRM) classes — The inventory and planning actions to identify visual values and establish objectives for managing those values and the management actions to achieve visual management objectives.

Water column — Layer of water between the surface and bottom of streams, estuaries, and lakes.

Water table — Upper level of a saturated zone in an *aquifer* below the soil surface

Wellhead protection — Practices that of prevent *pollutants* from seeping into well water at or near any active or abandoned well.

Wetlands — Transitional areas between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. Two major types of concern locally are seasonal wetlands inundated by winter and spring rainfall and flooding, and tidal wetlands flooded daily by ocean tides.

Withdrawal — A designation which restricts or closes public lands from the operation of land or mineral disposal laws.

Xeric — Characterized as extremely dry; a climate where winters are moist and cool and summers warm and dry.