Large fluctuations in flow over the course of a year, and from year to year, are products of variable weather and the free-flowing condition of the John Day River. The bedload materials in the river channel now consist of large gravels, cobbles and boulders. During large flow events, the bedload is moved and deposited downstream, either as part of a new gravel bar or eventually as part of the sediments in the Columbia River. When the bedload is deposited in mid-channel, hydrologic forces are exerted against river banks, causing more lateral expansion, adding more sediment and gravel to the system, and decreasing water quality. Overall, the John Day River can be characterized as a system dominated by geologic and geomorphic processes that can, at times, introduce large amounts of sediment into the system. These sediments are typically deposited in downstream reaches of the basin or flow into the Columbia River system.

This process has some implications for many different aspects of the WSR outstandingly remarkable values. The widening of the channel has contributed to the heating of the water through exposure to air and sunlight and, therefore, resulted in elevated water temperatures. Channel widening has removed vegetation along the river banks and continues to reduce reestablishment where the widening processes are still active.

The North Fork John Day is listed by ODEQ as water quality limited for habitat modification and temperature. In this condition, the North Fork does not meet PACFISH pool frequency management objectives. Because the North Fork contributes 60 percent of the flow to the mainstem John Day, the influence of the North Fork on temperature and, therefore, fisheries is significant. Converse to the North Fork, the basin drainage area between Service Creek and McDonald Ferry gaging stations contributes only 13, 9, and 1 percent of the flow during July, August, and September, respectively, to the mainstem John Day. This exemplifies the limited influence that flows in the lower basin have on water quality and quantify.

Ground Water

During the summer months (approx. July to September), groundwater provides much of the base flow to the Lower John Day River. Although ODEQ has listed the lower river as water quality limited for temperature, other water quality constituents such as total phosphates, biochemical oxygen demand, and fecal coliform could also become limited during late summer when flows are the lowest and water temperatures are the greatest (Cude 2000).

Water Rights

Two types of water rights exist on the public lands: federal water rights, which consist of reserved water rights that originate under Federal law; and water rights, which are acquired pursuant to State water law.

All waters in Oregon are publicly owned, so users must obtain water rights from the Oregon Water Resources Department (OWRD) to use waters under ground, in a lake, or flowing in a stream. This principle of prior-appropriation is the foundation of water law in

Table G-2. Principal Aquifers in John Day River System

Aquifer	Square Miles	Rock Type
Columbia Plateau aquifer system	1679	Basalt and other volcanic-rock aquifers
No Principal Aquifer	930	N/A
Miocene basaltic-rock aquifers	238	Basalt and other volcanic-rock aquifers
Volcanic- and sedimentary-rock aquifers	162	Basalt and other volcanic-rock aquifers
Pacific Northwest basin-fill aquifers	132	Unconsolidated sand and gravel aquifers

(Source: USGS Principal Aquifers of the 48 Contiguous United States 1998)EPA web site

Oregon. Water rights are attached to the land where they were established. Water may only be legally diverted if it is used for a beneficial purpose without waste. The OWRD is responsible for administering state water laws and ensuring the wise use and conservation of water. State waters must be used for beneficial purposes at least once every five years or a right is forfeited. Water rights in the John Day Basin are assigned for consumptive use, instream flow rights, and maintenance of Federal and State Scenic Waterways.

The Oregon Water Resources Commission is responsible for setting policy and making long-range plans for use and control of the state's water resources. Obtaining a water right requires application and permit issuance through the OWRD. Additional water right permits for consumptive uses are issued based upon the availability of water to satisfy the permit. In 1993, OWRD began determining water availability using a model called the Water Availability Resource System. This model is based on an 80 percent exceedence value for stream flows within segments by month (80 percent of the time flow meets or exceeds this level). Available water is equal to the 80 percent valueless current authorized use, less the state determined scenic flow requirements (Diack flows), less any instream water rights. This means new water right permits would only be issued in months where a surplus exists after all current uses, Diack flows, and instream water rights are satisfied. No surplus water is available during the irrigation season on the John Day River, so OWRD has ruled that no additional water rights will be issued within the basin for the period from May to October.

Consumptive Use

Consumptive use occurs when water is removed from the stream and used for purposes such as irrigation or mining. Water in the John Day Basin has been used for these purposes since the early 1860s (OWRD 1986). Competition for limited river water increased as population and acres under cultivation increased in the basin. Established water uses were adjudicated by four court decrees; Cochran Creek and its tributaries in the North Fork subbasin (1910), Cherry Creek and its tributaries (1922), Bridge Creek and its tributaries in (1937), and the remainder of the John Day Basin (1956). These adjudications resulted in the legal assignment of rights in these basins.

Since the 1860s, about 4,500 rights have been established for 6,200 cfs flow. Subsequent to that time approximately 800 rights that account for 3,600 cfs have been canceled. Sixty percent of historical water right appropriations were assigned between 1860 and 1920. A moderate increase in water rights allocation occurred from 1920 to 1970, with a larger increase occurring during the 1970s. Recently, the number of applications for water rights has been declining. Table 2-I (reprinted below from FEIS-June 2000) summarizes current rights by cfs and use by subbasin.

The total water diversions permitted for the basin account for 76 percent of the basin's average annual discharge of 1,475,000 acre feet. Actual consumption is less than the permitted rights. The USGS Water Use Report of 1990, reported that 37.17 Mgal/day were being withdrawn from the Lower John Day Sub Basin. Of this 37.17Mgal/day, 5.47 Mgal/day were groundwater withdrawals. Basin discharge is adequate to satisfy all water rights on an average annual basis, even in critically low flow years. However, because of the wide variation in seasonal distribution of runoff, there is insufficient flow during the late summer to satisfy all the water rights when they are most needed (OWRD 1986).

As mentioned earlier, the counties have planned and zoned private lands adjoining the west bank of the river as Exclusive Farm Use to protect agricultural uses from encroachment by incompatible uses and to provide tax incentives to assure that

Table 2-I. Summary of Existing Water Rights for the John Day Basin by Cubic Feet Per Second and Benefical Use

Beneficial Use	Water Rights in Cubic Feet Per Second (CFS)						
	Lower John Day	Middle Mainstem	Upper Mainstem	North Fork	Middle Fork	South Fork	Total
Agriculture			0				0.0
Commercial				3.7			3.7
Domestic (lawn & garden)	0.2	0.2	0.2	0.1			0.7
Domestic	0.1	1.3	1.6	1.2	1.8	0.1	6.1
Fish Life	0.1	0.7	12.8	2.0			15.6
Fire Protection		0.0	0.2		0.1	0.0	0.3
Industrial/Manufacturing	0.8		7.3	2.1	2.1		12.3
Irrigation	229.0	495.5	927.0	291.5	88.5	97.5	2,129.0
Livestock	4.0	0.6	0.9	1.7	0.8	0.3	8.3
Mining		30.8	40.5	202.2	49.5		323.0
Municipal	15.4	5.4	9.3	3.9	3.1	5.1	42.2
Power			13.9	25.0	0.8		39.7
Quasi-Municipal	2.5	2.8					5.3
Recreation	0.2		0.0	2.0	0.0		2.2
Temperature Control	3.3						3.3
Wildlife		0.0	0.0				
Other	9.6	6.8	4.3	0.7			21.4
Total	265.2	544.1	1,018.0	536.1	146.7	103.0	2,613.2

Source: OWRD 1986

agricultural land is retained in agricultural use. In the lower valley bottoms, this zoning means that irrigation withdrawal from the John Day will continue. On the other hand, water use associated with subdivisions and major partitions will minimal if any.

Incidental, short-duration water uses for recreation site maintenance or wildlife guzzler refills do not require water rights. These uses do not involve continuous water removal that would have a rate or duty, much like the rate or duty assigned to a consumptive or instream water right, associated with it. Irrigation accounts for over 69 percent (by volume) of all water used in the basin. While mining accounts for 12 percent of allocated water rights in the basin, USGS (1985, 1990, 1995) compilation reports on water availability found no reported data for water use related to mining activity.

Water rights associated with BLM-managed lands could result in the consumption of approximately 0.8 percent of the total John Day River Basin water for irrigation (OWRD 1986). Currently, about 50 percent of water allocated to BLM-managed lands is available for irrigation (0.4 percent of basin irrigation water). The other 50 percent is retained for instream uses.

Instream Leases

Instream flow rights are water rights reserved instream for the benefit of fish, wildlife, recreation, and water quality. Three state agencies are authorized to request instream water rights. The Oregon Department of Fish and Wildlife may request instream rights for public uses relating to the conservation, maintenance, and enhancement of aquatic and fish life, wildlife, and their habitat. The ODEQ may request instream rights to protect and maintain water quality standards established by the Environmental Quality Commission. The Oregon State Parks and Recreation Department may request instream rights for public uses related to recreation and scenic attraction. As of June 2000, there were 41 instream water rights and 17 pending applications for instream rights. These rights are regulated much like consumptive water rights and are assigned according to priority.

The federal government is not allowed to apply for or hold state instream water rights under State of Oregon water laws. Instead, they may lease or purchase an existing right for conversion to an instream right to be held by the OWRD for the people of Oregon. In order to improve instream flows and in order to protect and enhance river values associated with these rights, the BLM may: 1) consult and coordinate with state agencies that can apply for and hold an instream water right, or 2) acquire land with a consumptive water right and transfer that right to an instream right to be held in trust by the OWRD.

State and Federal Recommended Flows

The Oregon Supreme Court ruled in 1988, that before authorizing any new diversion of water from or above a State Scenic Waterway, or from a tributary to it, the OWRC must find that the needs of the State Scenic Waterways are met. The OWRD identified minimum flows necessary to maintain river values in the John Day River State Scenic Waterway (OWRD 1990) (Table 2-J, reprinted below from the FEIS-June 2000). For example, the OWRD found that a minimum of 1,000 cfs is needed for rafting and drift boating, and a minimum of 500 cfs is needed for canoes, kayaks, and other small water craft these. These minimum flows are referred to as the "Diack" flows. Table 2-J quantifies natural flow at 50 percent and 80 percent exceedence and total consumptive use and storage for the various designated State Scenic Waterway segments. Net flow at the exceedence levels quantifies resultant river flows after consumptive uses and storage are subtracted. The scenic flow represents the minimum waters level in the river for recreational uses, fish flows, optimum and minimum quantify flows needed for anadromous fish species in the river. Instream flow rights are also quantified and represents water for which there is a valid water right that has been designated for instream use. Table 2-J shows that in all segments recommended minimal and optimal instream flow for anadromous fish, as described by Lauman (1977), are not met during the critical summer time period; however, this is consistent with observations that in the lower river (below Service Creek) anadromous fish and resident salmonids are not highly concentrated in the summer season.

The right of the federal government to John Day River water was established in 1988 when segments of the river were designated Wild and Scenic by the U.S. Congress. In this case, the managing federal agencies were granted title to the water necessary to maintain the purposes for which the river segments were designated. The priority date of this right becomes the date of the particular WSR designation. The purpose of these federal water rights is similar to the state Diack flows, in that they are necessary to protect the outstanding, remarkable or significant values identified in the legislation designating a WSR.

About 50 percent of BLM's existing water rights is maintained instream through non-use or instream lease agreements with OWRD. According to current management practices

Table 2-J Monthly natural stream flow estimates, consumptive use estimates, net stream flow estimates, and State Scenic Waterway Flow values (OWRD), recommended minimal an doptimal instream flow for anadromous fish; and instream water rights at or near the John Day River (RM21 and RM 156.5). (all figures represent cfs)
(Note: This table is a modification of Table 2-J in FEIS-June 2000; it includes only data between McDonald Ferry and Service Creek, which is the area addressed by this WQRP.)

Stream	Category	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
John Day River Mile 21 McDonald Ferry	Natural (50%)	1250	2440	3250	4860	5050	2700	715	340	271	380	542	940
	Natural (80%)	626	1050	1680	2920	3020	1440	476	246	194	283	393	513
	C U A Storage	16.7	23.9	32.8	157.6	321.4	292.8	265.6	192.6	128.5	51.6	12.1	14.7
	Net Flow (50%)	1233	2416	3217	4702	4729	2407	449	147	142	328	530	925
	Net Flow (80%)	609	1026	1647	2762	2699	1147	204	53	65	231	381	498
	Scenic Flow	500	1000	2000	2000	2000	2000	500	500	500	500	500	500
	Fish Flow (opt.)	500	500	500	500	500	500	500	500	500	500	500	500
	Fish Flow (min.)	390	390	390	390	390	390	390	390	390	390	390	390
	Instream Right	20	20	20	20	20	20	20	20	20	20	20	20
John Day River Mile 156.5 Service Creek	Natural (50%)	1130	2060	2860	4610	4770	2410	652	312	260	385	508	859
	Natural (80%)	556	953	1506	2710	2860	1270	420	242	203	280	384	473
	C U & Storage	12.5	16.5	25.8	100.5	192.2	189.6	230.3	176.6	119.3	50.1	9.6	11.3
	Net Flow (50%)	1118	2043	2834	4510	4578	2220	422	136	141	335	498	848
	Net Flow (80%)	544	936	1480	2610	2668	1080	190	66	84	230	374	462
	Scenic Flow	500	1000	2000	2000	2000	2000 – 1000	500	500	500	500	500	500
	Fish Flow (opt.)	500	500	500	500	500	500	500	500	500	500	500	500
	Fish Flow (min.)	390	390	390	390	390	390	390	390	390	390	390	390
	Instream Right	30	30	30	30	30	30	30	30	30	30	30	30

Source: Lauman (1977)

a BLM water right maintained instream through non-use or an instream lease agreement would manage the full rate as an instream flow from the original BLM point of diversion downstream to the next water right point of diversion, without guarantee of any instream flow below the next point of diversion. If, however, the BLM water right was transferred to OWRD to hold in trust, the OWRD would manage a portion for a specific allocation, to be determined by OWRD, as an instream flow right from the original BLM point of diversion downstream to the mouth of the John Day River.

Rangeland Health and Productivity

The Secretary of the Interior approved and began implementation of the Oregon/ Washington Standards for Rangeland Health and Guidelines for Livestock Grazing Management (USDI-BLM 1997a) in August 1997. These standards and guidelines are intended to form the basis for all livestock grazing management occurring on all BLM-administered lands. They provide specific goals to be addressed in grazing permits and leases, and Final John Day River Plan and EIS identify an array of indicators to consider in designing monitoring plans used to track progress in achieving standards.

Currently, there are 52 grazing allotments partially within the mainstem John Day WSR corridor, and 12 grazing allotments partially within the South Fork John Day WSR corridor. Few pastures and no allotments lie completely within the corridor. The following occurred in the John Day River basin by June 1999:

- Allotment evaluations were conducted on 92 allotments within the basin, encompassing 91 percent of the public land river bank miles within the designated WSR segments.

- Grazing management adjustments occurred in cooperation with private landowners on 31 of the 64 grazing allotments in the WSR segments (Segments 1 , 2, 3, 10 and 11).

- Grazing management was in place for protecting and enhancing ORVs for 184.9 public land river bank miles (94%) in the WSR corridor.

- Planning processes were underway for protecting an additional 5.4 public land river bank miles (3%).

- Significant vegetative improvement is occurring on allotments where riparian-oriented grazing management was implemented. An inventory of willow communities was conducted on Segments 2 and 3 of the river in 1980 and 1995. The willow communities on those segments were not measurable in 1980. By 1995, there were 15.56 river bank miles of willow communities (USDI-BLM 1996a). Although much of the John Day River is not suitable for willow growth, further expansion of willow and other riparian plant communities is expected to occur with continued upland and riparian restoration throughout the basin. (See Appendix L in the Record of Decision for a summary for those studies near the river and Appendix M of the FEIS for photographic examples.)

Roads

Roads can alter the amount of impermeable area, altering infiltration and the flow of surface and subsurface water. The relative impervious nature of roads causes surface runoff to bypass longer, slower subsurface flow routes. In effect, roads expand the stream network, serving to intercept runoff and provide a surface flow route to streams at road crossings. Sediment generated from road surfaces in then hydrologically connected to the stream network. Changes in the hydrologic regime caused by roads

are usually the most pronounced where road densities are the greatest and where road segments are immediately adjacent to or cross streams. Roads segments that constrict floodplains also contribute to potential increases in peak flows. Changes in hydrologic processes resulting from roads are as long lived as the road systems themselves. (USDA 2000).

High road densities are often associated with timber harvest. The upper elevations of the John Day River basin are important for timber-production. There is no significant timber harvest in Sherman and Gilliam counties. (See discussion in Land Use Patterns, Lumber and Wood Production. See also discussion in Dominant Land Vegetation, Forests and Woodland)

The BLM road densities in Segments 1, 2 and 3 are minimal, and do not significantly contribute to increased sedimentation or expansion of the drainage network. However, examining road densities at a landscape scale identifies sources of sedimentation and locations where roads are contributing to expansion of the drainage network. Analysis of the Summit Fire on the North and Middle Fork John Day River Subbasins and Watershed Analysis of Deer and Murderer's Creek on the South Fork John Day River quantify road density problems.

Road densities exceed Forest Plan goals in some of the forested headwaters of the John Day basin. Road densities in the Summit Fire on the Middle and North Fork John Day drainages are 4.8 miles per square mile in the summer range, and 3.9 miles per square mile in the winter range. (USDA 1997)

Equivalent Roaded Area (ERA) is an indexed dimensionless measure of watershed risk based on current watershed disturbance. It is a disturbance model that incorporates some impacts of logging, roading, grazing, and wildfire on watershed function. Post fire ERA as a percent of subwatersheds exceed the threshold of risk in six out of seven subwatersheds. Cumulative watershed risk includes risk of increased sedimentation, increased peakflow, decreased channel stability, and other factors that adversely affect proper functioning condition. (USDA 1997)

In general, a road-density-to-drainage-density ratio of >0.5 indicates a high potential for drainage network expansion to occur via the road system. On the South Fork John Day tributary of Deer Creek, road-density-to-drainage-density ratios increase with elevation, and exceed 0.5 for the majority of the watershed. In the South Fork John Day tributary Murderer's Creek, road-density-to-drainage-density ratios also increase with elevation. The upper watershed exceeds the 0.5 threshold. Road densities in the forested upper sixth field HUCs throughout the upper basin exhibit road densities, which have prompted restoration activities such as closing and rehabilitating roads. Although, road densities have not been identified as a problem in the lower subbasin, the affects of the elevated road densities in the headwaters indicate that road densities may be a limiting factor for the restoration of the lower segments. (USDA 2000)

Water Quality Parameters Driving Analysis—Temperature

Beneficial Uses Affected by Temperature Parameter

For stream temperature, the affected beneficial use is resident fish and salmonid fish spawning and rearing. Salmonid fish species require specific water temperatures at various stages of their fresh water life.

Applicable Oregon Water Quality Standard

The Oregon water quality standard [OAR 340-41-(basin) (6)] that applies to the John Day River from Tumwater Falls to the North Fork (this includes Segments 1, 2, and 3).

Standards applicable to all basins (adopted as of 1/11/96, effective 7/1/96) is: seven (7) day moving average of daily maximums shall not exceed the following values unless specifically allowed under a Department-approved basin surface water temperature management plan: 64 F (17.8 C); Rearing.

Basis for Listing

A stream is listed as water quality limited if there is documentation that the moving seven-day average of the daily maximums exceeds the appropriate standard. This represents the warmest seven-day period (commonly occurring in July or August) and is calculated by a moving average of the daily maximums. The time period of interest for rearing steelhead is April through June.

Section 303 (d)(1) requires that Total Maximum Daily Load (TMDLs) "be established at a level necessary to implement the applicable water quality standards with seasonal variations." Stream temperatures vary seasonally and from year to year in the John Day. Stream temperature in the Lower John Day is dependent on flow levels, which also vary seasonally and from year to year. Water temperatures are cool during the winter months, and exceed the standard during the summer months when flow is lowest and solar radiation is the highest.

Segments 1, 2 and 3 were listed based on two ODEQ sites at RM 39.5 where 20 of 25 and 20 of 27 summer values exceeded the standard each year between water years 86 and 95 with a maximum of 83. Two BLM sites near Service Creek and Spray also reported seven day maximums of 71.1 F and 78.3 F in 1993.

Data Available to Address Temperature Standard

All forks of the John Day River are listed as water quality limited for the parameter of temperature. Along the Mainstem, ODEQ records instantaneous water temperatures for the Oregon Water Quality Index at Service Creek and Cottonwood Bridge. However, no sites monitor the seven-day moving average water temperature between Clarno and the lower downstream reach. In addition, only one two-month record has been established at Clarno. Accurate monitoring of restoration activities will require more water temperature monitoring on Segments 1, 2, and 3. More monitoring could also explicate the natural variations in water temperature.

Current trends in the seven-day maximum reading of water temperature indicate that annual seven-day maximum occurs between the last week in July and the first week in August. The graph below indicates the range of the annual seven-day maximum readings from BLM water temperature data.

Conditions Affecting Parameters (such as shade, etc.)

Stream temperature is driven by the interaction of many variables. Energy exchange may involve solar radiation, long wave radiation, evaporative heat transfer, connective heat transfer, conduction, and advection. While interaction of these variables is complex, some are much more important than others. The principal source of heat energy for streams is solar energy striking the stream surface. Exposure to direct solar radiation will often cause a dramatic increase in stream temperatures. Highly shaded streams often experience cooler stream temperatures due to reduced input of solar energy. Surface stream shade is dependent on riparian vegetation type and condition. The ability of riparian vegetation to shade the stream throughout the day depends on vegetation height and the vegetation position relative to the stream. For a stream with a given surface area and stream flow, and increase in the amount of heat entering a stream from solar radiation will have a proportional increase in stream temperature. (BLM Little River Water Quality Restoration Plan, Draft 2000)

Shade

Riparian vegetation, stream morphology, hydrology, climate and geographic location influence stream temperature. While climate and geographic location are outside of human control, the condition of the riparian area, channel morphology and hydrology can be altered by land use activities.

Geographic Location

Geographic characteristics of streams such as elevation and aspect influence water temperature. Elevation affects stream temperature in several manners. Air temperatures are cooler at higher elevations. The cooler air results in less convection of heat from the air to the water. Higher elevations receive more snowfall. This snow pack is a source of cool water elevations through out the spring and early summer. (see Fig. 1 Range of Seven-Day Maximum Water Temperatures and Elevation by River Mile for the Mainstem John Day River at the end of this Appendix)

Stream aspect determines the duration of solar energy input daily and throughout the year. Stream segments extending east and west are directly exposed to sunlight longer than stream segments extending north and south, because the topography interrupts the path of the sun for more of the daylight hours. One major change in the aspect of the John Day occurs near Clarno. Upstream of Clarno, the river flows to the west. Downstream of Clarno, the river flows to the north. There is no site-specific analysis of how this change in aspect affects water temperatures. However, riparian vegetation generally has a higher influence on water temperatures than aspect.

Vegetation, Climate and Topography

Removal of riparian vegetation, and the shade it provides, contributes to elevated stream temperatures. Climatic factors dictate the vegetative potential as well as the risk associated with restoration practices such as seeding. Topography influences vegetative site potential because it regulates the sunlight regime and soil development. Topography also affects the shape of the channel, substrate of the valley, and water regime of riparian areas.

John Day Riparian Vegetation

A properly functioning riparian area performs various functions:

Dissipation of Stream Flow Energy: Riparian vegetation functions to reduce the velocity of water at high flow\ periods by increasing the hydraulic resistance to flow and therefore reduces the energy and erosive capacity of the water (Schumm and Meyer 1979). Riparian areas also function to dissipate energy associated with surface runoff by dispersing and slowing the surface runoff from agricultural land areas and other up slope areas thereby decreasing the water's erosive potential. The ability of a site to dissipate stream flow energy is unique to each site.

In most of the John Day River the majority of the riparian zone is flooded during part of the growing season and dry during the mid to late summer. There are several riparian ecological sites that have distinct potential plant communities. Some of these sites have potential for dense riparian plant communities, others do not. In areas where the soils are not developed enough to moderate the annual wet - dry cycle, vegetation is either lacking completely or restricted, above the normal high water line, to plants like service berry, hackberry, mock orange and various annual and perennial grasses and forbs. These plants have only a limited ability to dissipate stream flow energy, filter sediment and nutrient, or store and recharge groundwater.

Where management has been implemented which meets the physiological needs of plants, vegetative communities are coming into balance with the potential of the site. In areas where soils are developed and well-drained, more shrubs occur which are traditionally considered 'riparian', such as willow and alder, and some sites historically supported Cottonwoods. Willow communities along the river have been increasing (see BLM, 1996a, monitoring studies presented in Appendix L) Where water flow is slow or where saturated soil conditions last longer into the growing season, sedges and rushes define more of the plant composition.

The riverine terrace includes the primary terrace immediately adjacent to the river, as well as any secondary or tertiary terraces above. Depending on the subsurface water regime, the zone is more or less a transition between riparian and upland vegetation. The vegetation on these (typically) deeper soils is sagebrush, annual grasses, Great Basin wild rye, a mix of perennial bunchgrass and forb species, and western juniper.

Riverine terraces are formed from abandoned flood plains. When the John Day River channel eroded, the water table dropped and the flood plain soils drained. Vegetation on the abandoned flood plain changed because of lack of subsurface water to more xeric plants, such as sagebrush and annual grasses. These terraces are no longer available to the River during bankfull stage to dissipate stream energy or filter sediment and nutrients. The latest erosional event which developed these terraces could have been exacerbated by land management activities which increased the susceptibility of the basin to erosion and disrupted the hydrological function of the watershed. The period of adjustment which follows down cutting of a channel includes a widening of the channel and the construction of a new flood plain within the confines of the eroded channel.

Sediment and Nutrient Filtration: During high flow periods, much of the sediment load within the stream is the result of bank erosion from unstable streambanks. Riparian vegetation reduces the transport rate of sediment and nutrients by holding streambank soil intact via roots and also increases the hydraulic resistance to water at high flows. This, in turn, decreases water velocities while increasing sediment deposition within riparian areas. Sediment deposition is part of the process that builds and stabilizes streambanks. Nutrient filtering performed in riparian areas can help control agricultural non-point source pollution (Lowrance et al. 1985).

Store Water and Recharge the Groundwater Aquifer: Infiltration of surface runoff is high in properly functioning riparian areas due to the dissipation and slowing of overland flow which allows more water to seep into the riparian soils and subsequent groundwater aquifer. This allows for some storage of water during periods of high runoff that is discharged during later, drier periods and serves to maintain stream flow. Shade-Producing Capability - Riparian vegetation produces shade according to size and extent of vegetation, and proximity to the stream. Black cottonwood, when mature, will produce more streamside shade than the mature, low growing willow now present within the John Day River corridor. Shade presence along stream banks reduces the input of heat energy from solar radiation into the stream. Reduced input will decrease the amount of stream temperature fluctuation experienced during the summer. This leads to reduced summer maximum water temperatures. Elevated stream temperatures affect fish, salmonids in particular, in two important ways: 1) body metabolism in cold-blooded species is controlled by environmental temperatures, the warmer the environment (i.e. the water) the higher the metabolic rate. Salmonids such as trout, salmon and steelhead function optimally at lower environmental temperatures than warm water species, such as smallmouth bass, located within the John Day River. When water temperatures rise and the metabolic rate of salmonids increases, energy needs, even when at rest, increase. To compensate for this condition, the salmonid must consume more food or convert stored body reserves to energy. Either response increases the need for food and the expenditure of more energy in the search for more food. If high temperatures occur over a sufficient time mortality can be the result. Conversely, warm water species, such

as smallmouth bass, can be stressed when water temperatures drop below their optimum range, decreasing metabolism and thereby decreasing the amount of energy the fish has for evading predators, foraging, and reproducing. This condition can also lead to mortality if the condition persists for a sufficient period of time. 2) Oxygen-carrying capacity of water is lowered as temperature increases; therefore, the warmer the water, the less 'breathable' oxygen is available for fish to use. Higher water temperatures create higher environmental stress levels in fish and low oxygen levels over a sufficient period can lead to fish mortality. The specific level that is detrimental depends on species. For example, cold water fish species (such as trout and salmon) require more dissolved oxygen for survival than do warm water species (such as smallmouth bass). Therefore, an increase in stream temperature could be detrimental to salmon and trout while actually improving habitat for smallmouth bass.

Food Production Capability: Riparian areas are important nutrient cycling areas with respect to instream ecosystems. Riparian vegetation produces most of the detritus (such as dead leaves, plants, twigs, and insects) that supplies as much as 90 percent of the organic matter necessary to support aquatic communities (Campbell and Franklin 1979), or 54 percent of the organic matter ingested by fish in a large river (Kennedy 1977)).

Net changes in aquatic conditions resulting from improved functionality of riparian sites would not be immediately detectable. Riparian influence in the river corridor is inversely proportional to the width of the river, i.e. the wider the river the less influence the riparian vegetation exerts on the river. As management continues, increases in riparian functionality will be observed as more riparian areas are treated with cottonwood outplantings and the trees planted previously grow and mature.

Segment 1 Riparian Vegetation

The vegetation types in Segment 1 are among the driest within the basin. The average yearly precipitation is 9 to 12 inches. The river elevation rises from 270 feet to 520 feet above sea level, and the canyon walls rise to 1,600 feet above sea level. Most upland soils are stony and well drained, and hill slopes tend to be steep (35% to 70%).

Segment 1 lies entirely within the Columbia Basin ecoregion (Oregon Biodiversity Project 1998). Upland plant communities have been described as "dry grass" and "dry shrub" in ICBMP (Quigley and Arbelbide 1997). The plant communities are generally dominated by bluebunch wheatgrass on south-facing slopes and Idaho fescue on north-facing slopes. Where sagebrush grows, it is usually low sagebrush or Wyoming big sagebrush. Some of the historic bunchgrass communities are now occupied by cheatgrass, Russian thistle, fiddleneck, snakeweed, and shrubs such as gray rabbitbrush. The most common noxious weed species in this segment are knapweeds and salt cedar.

Riparian soils tend to be highly stratified river alluvium that deposits material from upriver or side canyons (USDA-SCS 1964,1977). The alluvial sources from further up the river tend to be silty and clayey, whereas material from side canyons is more silty and sandy soils mixed with gravel, cobble and boulders. Riverwash mainly consists of sand, well-rounded gravel, stones, and boulders, although varying amounts of silt and clay material may be present due to redeposition from cutbanks.

Riparian plant communities vary in Segment 1, due in large part to the variable ecological sites. The establishment and health of willows, sedges, and rushes depends greatly on the ecological site potential of any given location in a river segment (Appendix M of FEIS). Some areas that have received riparian-oriented management have developed dense stands of coyote willow, although natural forces (such as flooding, a mobile substrate, and ice flows) can have a retarding effect. Other locations have responded to riparian-oriented management with increased vigor and reestablishment of

sedge and rush communities. On other sites, however, no response has been detected. Future correlation is needed between the ecological site potential of any particular spot on the river and results of a monitoring study of that location. Photos 13 and 14 in Appendix M in the FEIS, taken at the mouth of Hay Creek in this river segment, illustrate variations in river flow between May and September.

The functionality of the riparian area in this segment was rated in 1997, using the Proper Functioning Condition Assessment method (USDI-BLM 1993, 1998c). The functional rating for Segment 1 was 'functional-at risk,' meaning the riparian zone is in a functional condition, but susceptible to degradation from significant natural events or excessive human-caused influences. The trend rating was 'upward,' which means the riparian area is improving in its overall condition.

The assessment found the riparian vegetation lacked in diverse age-class distribution and composition of vegetation. Plant species that indicate good riparian, soil-moisture-holding characteristics were well represented, but lacked continuity along the river to make this characteristic fully functional. In addition, this same lack of continuity existed with species that produce root masses capable of withstanding high flows. Also, there was a lack of vegetation cover present to protect banks and to dissipate flow energy during high water events. The riparian vegetation that is present exhibits high plant vigor. The PFC assessment is not designed to identify past causes of functional deficiencies in riparian areas, but to ascertain present functionality of the interaction among geology, soil, water, and vegetation. A particular rating is a product of human-caused influences (such as grazing and mining) and natural forces. In addition, the extent of future recovery hinges on management practices and ecological site potentials (Appendix M in FEIS).

Segment 2 Riparian Vegetation

Segment 2 annually receives an average of 11 to 15 inches of precipitation. The river elevation rises from 520 feet to 1,380 feet above sea level, and the canyon walls rise to 2,600 feet above sea level. Canyon slopes in this segment are extreme, often exceeding 70%.

Segment 2 lies within both the Columbia Basin and the Lava Plains ecoregions, with the break being near Butte Creek (Oregon Biodiversity Project 1998). The upland plant communities have been described by ICBMP as 'dry grass' and 'dry shrub,' with the 'cool shrub' type beginning at Butte Creek and progressing upstream (Quigley and Arbelbide 1997). Stiff sage communities become common on ridges. Sagebrush stands become denser on the hill slopes, and junipers form occasional, sparse stands in draws and on low terraces. An example of an increase in bunchgrass, on a riverine terrace site, is shown in Appendix M of the FEIS, Photos 23 and 24.

Riparian vegetation and soils are the same as those in Segment 1 (USDA-SCS 1964, 1970, and 1977). Two extensive willow surveys were completed on public land in this segment and Segment 3 in 1980 and 1995 (USDI-BLM 1996a). In Segment 2, *Salix exigua* (Coyote willow) increased from zero linear miles in 1980, to 9.50 miles in 1995, and the number of acres covered increased from zero to 22.69. Refer to Appendix L in the Record of Decision for a description of the willow increases on individual allotments in this segment. Examples of existing riparian sites are shown in Appendix M of the FEIS, Photos 1 through 12.

Functionality of the riparian area in Segment 2 was rated in 1997 using the Proper Functioning Condition Assessment (USDI-BLM 1993, 1998c). The functional and vegetation ratings were the same as Segment 1 (functional-at risk)(see Segment 1, Vegetation).

In 1992, due to a Farm Home Administration foreclosure, approximately 512 acres of land and 3 miles of west side river bank (RM 106 to RM 109), immediately downstream from the Clarno Bridge, were converted to public ownership. Grazing has not been authorized on the area since 1989. Unauthorized grazing was addressed with a fence on the east side of the river in 1996. The riverine terrace contains 232 acres of arable land with active water rights, of which 70 acres are currently in agricultural production.

Historical farming and grazing practices of the land adjacent to the river resulted in removal of the riparian vegetation. Bedload deposition has also occurred in the same general stretch of the river, causing lateral river channel movement. These situations have combined to create overall river bank conditions that have rapidly deteriorated in the last 15 years. Cut banks are extremely steep and high (up to 25 feet) in some areas. The areas most impacted have annual erosion approaching 20 feet per year. There has been limited natural recruitment and establishment of riparian vegetation (USDI-BLM 1996c). The meandering of the river could eventually remove the entire acreage of arable lands. It is unlikely that the eroding river banks would make any appreciable recovery without intervention. Resource concerns associated with the area include recreation, access, scenery, soils, fisheries and wildlife.

Segment 3 Riparian Vegetation

Segment 3 averages 11 to 15 inches of precipitation annually. The river drops from 1,640 feet above sea level to 1,380 feet above sea level, and the canyon walls rise to around 3,500 feet above sea level. Soils are generally a clay-loam type with interspersed areas of clay, gravel, and random basalt outcrops. The canyon wall slopes are similar to Segment 1 (35 to 70%), except for one section between RM 119 and RM 126, where the slopes can vary from 50 to 90 percent.

Segment 3 is entirely within the Lava Plains ecoregion (Oregon Biodiversity Project 1998). Upland plant communities have been described in ICBMP as "dry shrub" and "cool shrub" (Quigley and Arbelbide 1997). The vegetation communities are similar to Segment 1. Western juniper is scattered throughout the segment with dense stands occurring in some of the tributary drainages to the John Day River. The most common noxious weed species are diffuse, Russian and spotted knapweeds, yellow starthistle, and dense isolated stands of bull and Canada thistle.

The riparian vegetation and soils (USDA-SCS 1970) are also similar to Segment 1, with one exception; there appears to be an increasing amount of reed canary grass. This introduced species tends to outcompete native species, resulting in a monoculture and reduced habitat diversity. In addition, two extensive willow surveys were completed on public land in this segment and Segment 2 in 1980 and 1995 (USDI-BLM 1996a). In Segment 3, Salix exigua (Coyote willow) increased from zero linear miles in 1980, to 6.06 miles in 1995, and the number of acres covered increased from zero to 13.15. For a description of the willow increases on individual allotments in this segment, refer to Appendix L in the Record of Decision. An example of existing riparian vegetation on one of the main tributaries to the John Day River in this segment is shown in Appendix M, Photos 15 and 16.

The functionality of Segment 3 was rated in 1997 using the Proper Functioning Condition Assessment (USDI-BLM 1993, 1998c). The functional rating was "functional-at risk," meaning the riparian zone is in a functional condition, but susceptible to degradation from significant natural events or excessive human-caused influences. The trend rating was "upward," which means the riparian area is improving in its overall condition.

The assessment found that the riparian vegetation lacked in diverse age-class distribution and composition of vegetation. Plant species that indicate good riparian, soil-

moisture-holding characteristics were well represented, but lacked continuity throughout the segment to rate this characteristic fully functional. In addition, this same lack of continuity existed with species that produce root masses capable of withstanding high flows. Also, there was a lack of vegetation cover present to protect banks and to dissipate flow energy during high water events. The riparian vegetation that is present exhibits high plant vigor. (Appendix M of the FEIS)

Flow

Instream, Baseflows, Ground Water

The majority of water in the John Day Basin is derived from the upper watershed. As a result, water quantity and quality in the river below Kimberly at RM 185 are determined more by input from upper basin tributaries (such as the North Fork, South Fork and upper mainstem) than by inputs originating below Kimberly (OWRD 1986). Therefore, water quantity and quality has little opportunity to be influenced after entering the lower basin.

The flow regime affects the shape of the river channel, the ability of riparian sites to support vegetation, and the extent that recreationists can enjoy the river. For example, river flow affects water temperature, which has consequent effects on dissolved oxygen and the suitability and productivity of habitat for fisheries production.

Mean annual daily discharge is 2,103 cfs (Moffatt et al. 1990). During the summer months (approx. July to September) groundwater provides much of the base flow to the Lower John Day River. Natural flows in the summer months drop below 1000 cfs in July, and September base flows often drop below 250 cfs.

Flow levels are affected by weather, snowpack, rainfall, and water withdrawal.

Peak Flows

The annual water yield has shown multi-year cycles that generally follows state climatic wet-dry cycles. The 10-year moving average for annual discharge measured at McDonald Ferry peaked in the early 1920s at nearly 1.8 million acre-feet. It hit a low around 1940 at about 1 million acre-feet, and peaked again in the late 1950s at 1.8 million acre-feet. In the 1960s, it again hit a low near 1.2 million acre-feet.

Except for a few outliers, there seems to be a well defined linear relationship between peak flows at the McDonald Ferry (RM 21) and Service Creek (RM156) gaging stations. Linear regression of peak flows provided a best-fit line with a slope of approximately 0.95. This indicates that annual peak discharges at the Service Creek gaging station are, on average, approximately 95 percent of the peak discharge at McDonald Ferry gaging station. (Orth, 1998)

Incidence and Effect of Devastating Events

Several major flooding events have occurred within the John Day Basin within the century. The earliest historic flood listed in the stream-gage records for the John Day River occurred in 1894. The peak discharge for this flood was estimated to be 39,100 cfs at the McDonald Ferry gaging station (RM 21).

The 1964-65 storm consisted of three separate intervals of unusually high rainfall in Oregon, which took place in late December, early January, and late January. Only the first and last rainfall periods had a major affect on eastern Oregon. On the John Day River, discharge at the Service Creek gaging station (RM 156) was estimated to be 40,200 cfs on December 23, 1964. This December 1964 discharge is the largest

recorded historic flood on the John Day River. On January 30, 1965 the Service Creek station experienced another large peak of 38,600 cfs. In other areas of the basin, such as at the Monument gaging station on the North Fork of the John Day River, the late January peak exceeded the December peak.

A large flood also occurred on January 1, 1997, which discharged 35,400 cfs at the Service Creek gaging station. The cause of the 1997 flood was warm temperatures combined with a severe rain on snow event. (Orth 1998)

Water Velocities

Large flood events are part of the natural hydrologic processes, which form channels and mold landscapes. Shear stress on banks and submerged vegetation increase as water velocities increase. When the fluid mechanics create critical shear stress, substrate particles are dislodged. Substrate from the inside of a meander curve gets deposited on a downstream cobble bar. In the John Day, the large cobbles can rip up riparian vegetation and send tiny transplants down stream for regeneration.

Hydrologic Recovery

Flood events can scour deep pools, provide riparian areas with new genetic material, and recharge floodplains with nutrients and water. As time passes, the pools fill with sediment, the riparian areas diversify, and floodplains become reconnected with channel processes. Changes in channel morphology on the John Day River are in terms of geologic time.

Channel Morphology (Sediment)

Channel Geometry

There are no studies to reference the channel geometry of Segments 1, 2, and 3. Observations of BLM personnel have resulted in general conclusions about the channel geometry of the John Day River. Overall, the channel exhibits high width to depth ratios. High width to depth ratios contribute to elevated water temperature by reducing the depth of the water column and increasing the surface area exposed to solar radiation.

Bedload

There are no studies to reference the specific channel substrate parameters. Observations of BLM personnel have resulted in general conclusions about the channel substrate of the John Day River. The Lower John Day River substrate is primarily comprised of large cobble. Fine sediments supplied from upper watersheds are flushed out of the lower reaches of the John Day River. Lack of trapped fine sediments limits recovery of certain riparian species on some sites.

Improved erosion control measures on the dryland wheat fields across much of the lower watershed has reduced fine sediment delivery to the system. After the 1997 flood, area newspapers reported - 'most diversion ditches and level terraces in the Condon area held, but some broke under the pressure of accumulated water. A drive through the countryside will show water standing behind the many terraces and check dams constructed in and around field over the years to slow damaging run off of water and soil.'

Anthropogenic Influence on Parameters

Most water quality problems in the John Day Basin stem from historical mining and dredging, livestock grazing, cumulative effects of timber harvest and road building, and

water withdrawals (OWRD 1986, ODEQ 1988).

Existing cooperative and coordinated efforts will continue to contribute to increased water quantity and reduced introduction of sediment and other pollutants, and lower water temperature during warmer periods of the year.

Beyond cooperation and coordination, the BLM management can reduce water temperatures by affecting the limiting factors of flow and riparian vegetation.

Grazing

Grazing in Segment 1

Segment 1 contains 14 grazing allotments (see Map Plate 1 and Table 3-E). One allotment (#2597) continues into Segment 2. Public land acreage in allotments in this segment varies from 40 to 4,743 acres, and public land forage varies from 3 to 155 AUMs. There are approximately 29.6 river miles (59.2 river bank miles) in Segment 1, and about one-third of the river frontage is public land. For details regarding management of the allotments, refer to Appendix L in the Record of Decision.

Allotment evaluations have been completed for 11 of the 14 grazing allotments in Segment 1, and changes in grazing management have occurred on 8 allotments. The changes include moving grazing use from primarily grazing during the warm season (late spring and summer) to cool season grazing (winter or early spring) or exclusion of grazing in some cases. In addition, by limiting grazing to seasons where the river flow is high, the river serves as an effective barrier to the movement of cattle, promoting the growth of grazed vegetation. Previously, some riparian exclosure fences were rendered ineffective, because cattle from allotments on the other side of the river would simply wade across the river during the summer to graze on riparian vegetation supposedly protected by fences. (Photos 11-14 in Appendix M illustrate the differences in high and low flows in the lower John Day.) Riparian areas now fenced from uplands are not being grazed, whereas previously they were grazed by a neighbor's livestock.

Current grazing management practices were judged by a BLM interdisciplinary team to be appropriate for protecting and enhancing river values and water quality on 66 percent (12.7 miles) of the public river bank miles in segment 1.

Grazing in Segment 2

Segment 2 contains 16 grazing allotments. A portion of one allotment (#2597) continues into Segment 1. Public land acreage in allotments in this segment varies from 343 to 14,683 acres; public land forage varies from 6 to 789 AUMs. There are approximately 69.6 river miles (139.2 river bank miles) in this segment, almost 4/5 of which are on public land. For details regarding management of the allotments refer to Appendix L in the Record of Decision.

Allotment evaluations have been completed on all but four allotments in Segment 2, one of which has no active grazing. Grazing decisions have been awaiting implementation on three allotments (#2538, 2591 and 2619). Grazing management changes have occurred on 13 of the 16 allotments, emphasizing cool season grazing (winter or early spring) over warm season grazing (late spring and summer). As in Segment 1, limiting grazing to seasons when river flow is high promotes growth of grazed vegetation and enhances the river's ability to serve as an effective barrier to cattle movement.

Current grazing management practices were judged by an interdisciplinary team to be appropriate for protecting and enhancing river values on 98 percent (106.7 miles) of the

Table 3-E. Grazing Alternative Comparison, Segment 1 (Tumwater Falls to Cottonwood Bridge, 30 river miles)

Note: The Proposed Decision is underlined on this table.

	Alternative A Current Management			Alternative B Restricted Grazing		Alternative C No Riparian Grazing		Alternative D No Grazing			
						Required Actions		Required Actions			
Allotment Number & Name	Miles of River Bank private	public	Current Riparian Grazing Mgt.	Riparian Grazing Mgt.	Required Actions	Miles of Fence Pvt/Pub	Acres Excluded Pvt/Pub	Miles of Fence Pvt/Pub	AUMs Canceled	Acres Included Pvt	Pub
2617 Emigrant Cn	2.8	0.6	7	9, 2, 5	a, 0.7 miles fence	2.8/0.6	34/7	0.6/0.1	10	300	200
2604 Philippi	1.0	0.0	2, 5	2, 5	a	n/a		0.0/0.7	1	0	40
2648 Hartung	2.9	0.7	9	2, 5	a	2.9/0.7	35/8	0.0/3.7	13	40	560
2594 Morehouse	0.4	1.0	9	2, 5	a	0.4/1.0	5/12	0.5/0.3	3	200	65
2555 Hoag	0.3	1.0	9	2, 5	a	n/a		n/a			
2562 J Bar S	0.0	0.9	1, 2, 5	2, 5	a	0.0/0.4	0/11	0.0/1.0	4	0	120
2513 Big Sky	5.4	1.2	1, 2, 5	2, 5	a	2.1/0.7	12/3	0.0/3.3	30	580	680
2637 VO West	1.4	0.3	1, 5	1, 2, 5	a	0.4/0.3	2/2	0.0/0.5	12	30	160
2595 Morris	3.0	1.5	1, 2	1, 2, 5	a, 0.7 miles fence	1.4/1.3	8/8	0.5/0.7	14	100	440
2540 Persimmon	1.1	0.0	8, 9	same as existing		n/a		n/a			
2560 Baseline	3.0	1.6	1, 2, 3	1	1.1 miles fence	0.4/0.7	3/9	0.0/0.5	5	20	160
2598 Hay Crk	3.1	1.7	1, 2, 3	same as existing	pursue exchange	1.6/1.2	10/7	0.0/2.5	8	80	320
2520 Smith Point	1.5	4.0	1, 2	same as existing	1.8 miles fence	n/a		0.0/0.0	93	200	2596
2597 Murtha	7.0	4.2	1, 6	1, 2, 5, 6	a, 4.5 miles fence	6.3/2.8	80/36	1.8/1.0	99	1680	3560
unleased	5.9	1.9	n/a								
Totals	38.8	20.6	=59.4		8.8 miles fence	18.3/9.7	189/103	3.4/14.3	292	3230	8901

1. exclusion
2. spring
3. summer
4. autumn
5. winter
6. rotation
7. season long
8. no public land riparian area
9. voluntary non use

a. adjust the leases to confine grazing period, see Appendix L for greater detail.

public river bank miles in this segment. Implementation of grazing decisions resulting from this plan will enhance ORVs on the remaining 2 percent of the public river bank miles.

Grazing in Segment 3

Segment 3 contains 22 grazing allotments. Public land acreage in these allotments vary from 80 to 20,410 acres; public land forage varies from 3 to 1,020 AUMs. Approximately one-third of the 96 river bank miles are public land.

Allotment evaluations have been completed on all but two allotments (#2641 and #2649, neither of which include John Day River riparian areas). Allotment #2649 has public land within the WSR corridor, and #2641 has some private land and no public land in the corridor. Grazing management changes have occurred on 16 of the 22 allotments. The changes have reflected a move away from primarily warm season grazing (late spring and summer), to cool season grazing (winter or early spring) or exclusion in some cases. As in Segments 1 and 2, limiting grazing to seasons when the river flow is high promotes growth of grazed vegetation and enhances the river's ability to serve as an effective barrier to cattle.

Current grazing management practices were judged by an interdisciplinary BLM team to be appropriate for protecting and enhancing river values on 94 percent (30 miles) of public river bank miles in this segment. Implementation of grazing decisions resulting from this plan will enhance ORVs and improve water quality on the remaining 6 percent of the public river bank miles.

Effects of Grazing Systems

Some general information is available regarding impacts of different grazing strategies on riparian areas. However, after investigating grazing management strategies and techniques practiced on healthy riparian streams in Montana, Ehrhart and Hansen (1997) found that operator involvement was the magic bullet. 'We concluded ... that riparian grazing might be incorporated into each of the traditional grazing systems – except season-long - as long as the condition of the riparian zone itself remains of primary concern' (emphasis original). Management, not the system, is the key.

In reviewing impacts of various grazing strategies it has been noted that the most important aspect of an strategy, operator involvement and commitment to riparian recovery, is likely to vary amongst operators. As a consequence the level of riparian recovery has varied. Duff's study (1977) supports this by noting that "Positive habitat response achieved from 4 years of rest had been negated by six weeks intense livestock grazing" after a riparian exclosure fence was cut. Implementation of an 'appropriate' strategy without constant attention is bound to fail, whether the strategy is exclusion, total rest, or maximized use.

General information is presented below explaining probable results of grazing strategies or techniques commonly used within the John Day Basin. The information presented below (except where otherwise noted) is paraphrased from several documents which summarize experiments, observations and opinions regarding grazing in riparian areas, including Ehrhart and Hansen (1997), Elmore and Kauffman (1994), and Platts (1991).

Season of Use. One of the first steps to developing a riparian-oriented grazing system is determination of appropriate grazing seasons. Primary considerations include livestock behavior, response of plant communities and the degree of soil moisture on the site. Seasons are defined by growth stages in the annual growth cycle of native bunchgrasses. Early season runs from the beginning of growth in the spring to flowering. This corresponds to the period of highest river flow levels (see photos 11-14 in Appendix

M). Hot season runs from development of seeds to seed set and drying of vegetation. This corresponds to the period of quickly dropping river flow levels, during which the river ceases to act as an effective barrier to livestock movement. Late season runs from completion of annual life cycle, through the on set of fall rains, the development of next year's tillers and re-initiated photosynthesis. This corresponds with the lowest river flow levels and the gradual increase in flow associated with autumn. Dormant season runs from the drop in soil temperatures, which slows and eventually stops plant growth, to the increase in soil temperatures which allows plants to begin active growth. This corresponds to the period of rising river levels and ice flows.

Early Season (Spring) Use. Livestock are attracted to uplands by succulent upland vegetation while cool temperatures discourage cattle from loitering in the riparian zones. Much of the John Day River riparian zone is covered by water (see Appendix M, photos 11-14), so many of the riparian plants are ungrazed with early season use. Those plants that are available to livestock usually have sufficient soil moisture for regrowth following defoliation. Reduced grazing pressure on trees and shrubs is a typical result of early season use. Impacts on soil and banks depend on soil texture and soil moisture content. Much of the John Day River has riparian soils that are cobbly or sandy and are well drained. The opportunity for compaction and bank damage is limited on these soils.

Hot Season (Summer) Use. Livestock tend to remain in the riparian area due to high temperatures and low relative palatability of vegetation in the uplands. As waters recede, barriers to livestock movement (such as deep, flowing water, steep slopes or cliffs) can be circumvented, neutralizing the effect of pasture or allotment boundaries. Following defoliation there is less moisture available for regrowth and replenishment o carbohydrate reserves. Browse species (for example, willow and cottonwood) tend to become more preferred as herbaceous vegetation dries out or loses nutritional value. Hot season use, following the critical growing season of upland vegetation, may meet plant growth requirements if the intensity of management can be increased, such as regular herding, short grazing periods, or close monitoring of utilization levels. Soils are typically more stable at this time of year, so compaction and trampling is less of a problem if long periods of use are avoided.

Late Season (Fall) Use. Due to the palatability differences between dried upland vegetation and riparian shrubs and forbs, cattle will not be attracted to uplands unless cooler weather is accompanied by precipitation which stimulates cool season grass growth. As long as palatable herbaceous forage and offstream water is available and cool air pockets discourage livestock from loitering in lowlands, willow use should remain low. In the absence of precipitation, the relatively high protein content of shrubs and trees makes them attractive to livestock. For this reason, regular late season use on the John Day should be accompanied with close surveillance. While, young willow are particularly vulnerable to damage during late season grazing, mature stands of willow should not be affected. Herbaceous vegetation have completed their growth cycles and grazing should not affect plant development. If heavily grazed, the silt trapping properties of vegetation may be compromised (though the importance of this is under dispute, see Skinner 1998). Soils are usually dry and the probability of compaction and bank trampling is low.

Dormant Season (Winter) Use. When bottoms are colder than surrounding uplands, especially where south facing slopes are present, winter grazing can be an effective way to limit the time spent by livestock in riparian zones. Supplemental feeding well away from streams and offstream water developments will increase the effectiveness of winter grazing. Harsh winter storms, however, could encourage livestock to seek cover in riparian zones, allowing for rubbing and trampling damage. Herbaceous vegetation have no exposed growing points, so defoliation does little or no damage. Plants that are used have the entire growing season to recuperate. Grazing when soils are frozen is an

advantage on finely textured soils, however, in the John Day basin, few soils are finely textured and the majority of the winter is spent above the freezing level.

Season Long Use. Grazing throughout the growing season, livestock tend to congregate and loiter in riparian zones. Riparian zones provide convenient forage, water and cover for livestock. Overuse of riparian zones is possible even with low stocking rates. The availability of water allows for continuous regrowth throughout the grazing season and plants often are grazed numerous times in one year. If grazed heavily enough, carbohydrate reserves needed for dormant season respiration can become depleted and plants can lose vigor or die. Trampling damage, soil compaction and accelerated streambank erosion are likely.

Rotation Grazing. Rotation grazing systems were designed to meet the growth requirements of upland vegetation while allowing grazing to occur during periods when plants were sensitive to defoliation (Hormay, 1970). As long as the physiological needs of riparian species are known and taken into account, rotation grazing systems can be used to restore degraded riparian areas. Effects of grazing under a rotation system will mirror the effects described above for various seasons. The difference is that the effects will change from year to year depending on whether livestock are present in the spring, summer, fall or winter. Also, rotation systems often include periods of non-use for more than one calendar year. Rotation schedules vary in the number of pastures which are included in the rotation as well as the seasons which are included. Because of the variety of combinations available, effects on the riparian zone cannot be predicted without more information on the rotation system.

Livestock Distribution. Discouraging livestock from loitering in riparian zones is accomplished with a variety of techniques in addition to season of use. Offstream water has been shown to reduce the time cattle spend in riparian zones by as much as 90%. Other strategies include placing salt or mineral blocks over 1/4 mile from the target riparian zone; improving upland vegetation through proper management, burning or seeding; regular herding; selective culling of animals which linger in riparian zones; turning animals into a pasture at a gate far removed from the target riparian area; drift fences which prevent livestock from using the river as a travel corridor; and corridor fencing.

Livestock Exclusion. Livestock exclusion from a target riparian area can be achieved through construction of a fence which parallels the banks of the river, called a corridor. This strategy eliminates flexibility in the decision of whether to develop offstream water. With the riparian zone no longer accessible to livestock, alternative water sources must be developed. However, this strategy eliminates the impacts of livestock on soils and vegetation in and nearby the target riparian zone and allows the operator more flexibility when deciding how to graze the upland vegetation. With corridor fencing the uplands could, if grazed improperly, contribute to increased overland flow resulting in sediment loading of the water and riparian zone. Livestock impacts could be further reduced by elimination of grazing from an entire watershed.

The effectiveness of corridor fences determines the degree to which livestock continue to affect riparian resources once the project is implemented. Fences must be constructed so damage by floods is minimized and so the general public doesn't neutralize the effort through cutting fences or leaving open gates. Coordination with other land owners is also essential in determining corridor fence effectiveness. At low water, a neighbor's livestock can cross the river and graze a riparian zone otherwise excluded. Even on the same side of the river, if one neighbor's riparian zone is fenced and the other is not, fences leading down into the water on the land ownership boundary must be put up and taken down with variations in river flow levels. Otherwise, fences will be washed out by high water and a hole will allow livestock to penetrate at low water.

Constructing corridor fences over large sections of the river would require coordination among several landowners. Means for achieving cooperation could include interagency incentive programs and purchase of easements.

Agricultural Lands

Agricultural Use in Segment 1

In Segment 1, non-irrigated wheat production is the dominant agricultural use of this area, occurring on the plateaus outside of the river canyon. There are some privately owned irrigated fields, primarily used for pasture and hay production, along the river in this segment.

At approximately river mile (RM) 23, irrigated agriculture occurs on 8.7 acres of BLM-administered lands. This land is managed as part of an adjacent privately owned field. This field is located on the adjacent terrace, parallels approximately 1,650 feet of the John Day River, and is separated from the active flood plain by an access road. There are 0.22 cfs of water rights associated with this land.

Agriculture Use in Segment 2

In Segment 2, non-irrigated wheat production, the dominant agricultural use of this area, occurs on the plateaus outside of the canyon. Irrigated agriculture occurs along the terraces of the John Day River, primarily in the vicinity of Cottonwood Bridge, Butte Creek, and Clarno. Alfalfa hay is the most common irrigated crop grown along the river.

Segment 2 contains about 278.5 acres of public lands with water rights parallel to approximately 2.5 miles of the John Day River. These lands are associated with or adjacent to private agricultural lands. Activities include leased commodity production, riparian tree and shrub propagation and restoration, wildlife food and cover weed control, and non-use (Table 2-U reprinted below from FEIS-June 2000). About half of the leased area is used for alfalfa hay, and the other for specialty seed crops such as carrot, onion, coriander, or beans.

Water rights associated with these lands are limited to 1/40 cfs per acre or less, and total use is not to exceed 5 acre-feet per acre during the irrigation season. However, actual use generally falls below the limits, depending upon actual precipitation and crop type. Table 2-U shows estimated use for 1998.

Table 2-U. Estimated Public Agricultural Land Water Use in Segment 2 (1998)

Location River Mile (RM)	Non-use/Instream (acre/cfs)[1]	Restoration/Enhancement (acres/cfs)	Lease (acres/cfs)	Total (acres)
RM 106.5 - 109.5	107.1/2.7	65/1.6	60/1.5[2]	232.1
RM 101.5	0	0	43/1.0	43
RM 98.75	0	0	3.4/0.8[3]	3.4
Total	**107.1/2.7**	**65/1.6**	**106.4/2.6**	**278.5**

[1]Approximate maximum potential water withdrawal based on 1/40 cfs per acre.
[2]Ten acres of a 70-acre lease retained for wildlife food and cover in coordination with ODFW.
[3]Recently discovered incidental agricultural use associated to private land agriculture production.

Agriculture Use in Segment 3

Agriculture is an important economic use of Segment 3. Hay is the primary crop grown in the cultivated fields along the river, which are irrigated with water drawn from the river.

Segment 3 contains approximately 97 acres of public lands with water rights (see Table 2-X, reprinted below from FEIS-June 2000)). These lands are adjacent to approximately 0.75 miles of the John Day River. Ninety five acres are leased for production, generally alfalfa and oat hay. Two acres are utilized for production of cottonwood trees for restoration purposes. Twenty-six acres are scattered parcels incorporated into private agriculture lands and are separated from the river by private property. Approximately 71.5 acres are subject to BLM imposed irrigation restrictions that require terminating irrigation when John Day River flows drop below 390 cfs at the Service Creek Gauging Station (USDI-BLM 1996d).

Using Ecological Sites to Assess Condition

Data Gaps

A complete and accurate condition assessment is an excellent way to assess condition and progress towards water quality standards. Several water temperature models were examined for use in this plan, such as BasinTempã, GIS Automated Shade Model from Siuslaw, the shadow model by Park, and others. Every model requires a GIS coverage that is currently unavailable. The most important layer for the condition of shade is a vegetation layer. Although eastern Oregon is currently examining the feasibility of creating a detailed vegetation layer, no data is currently available. Hoping to use an existing model to at least characterize topographic shading, the possibility of using Digital Elevation Models (DEMs) was discussed. Unfortunately, the Prineville hydrography layer and the Prineville DEMs do not line up. This results in the river channel occasionally being displayed on canyon walls. Although alignment is better for wider portions of the river, this would not provide for a complete and accurate analysis of topographic shading.

A technical memo from the Umatilla TMDL Technical committee discusses the use of available data and best professional judgement to predict site potential stream cross sections and riparian vegetation characteristics. The group primarily characterized site potential potential (which they defined as being the highest ecological status attainable

Table 2-X. Estimated Public Agriculture Land and Water Use for Segment 3 (Clarno to Service Creek) - 1998

Location River Mile (RM)	Acres per cubic feet per second (cfs)			
	Non-use and/or Instream	Restoration and/or Enhancement	Lease	Total Acres
RM 112	0	0	15.3/0.38	15.3
RM 119	0	0	10.3/0.25	10.3
RM 136	0	0	23.4/0.58	23.4
RM 137	0	2/0.05	46/1.15	48.0
Total	**0**	**2/0.05**	**95/2.36**	**97**

Approximate maximum potential water withdrawal based on 1/40 cfs per acre.

without social constraints) to evaluate channel cross section and riparian vegetation. Potential vegetation was either expected to occur or historically occurred in the basin. They encouraged further monitoring to refine this estimate of site potential vegetation height, width and density. They also envisioned that future iterations of the Umatilla TMDL will be based on more informed estimations of site potential and that the current approximation serves as an appropriate working target, given the project scale, the necessity to tie goals to water quality endpoints and the limited available vegetation data.

A similar approach of using available data to assess condition based on ecological sites has been used in the John Day Plan.

Riparian Ecological Site Description

Ecological Site descriptions are a particular or unique kind of land with specific physical characteristics that differs from other kinds of land in its ability to produce a distinctive kind and amount of vegetation. Ecological site (potential vegetation) is a function of soil, parent material, relief, climate, biota (animals), and time for the biotic community to approximate a dynamic equilibrium with soil and climate conditions.

Along the John Day River, there are several ecological sites that have distinct potential plant communities. Some of these sites have potential for certain riparian plant communities and others do not. On the John Day River system, seven riparian ecological sites have been described which support distinct potential plant communities. The sites vary greatly in their ability to support riparian vegetation. The site types are Basalt Cliff, Colluvium, Cobble Bar, Terrace, Non-Riparian Terrace, Alluvial Fans, and Hillslope.

Analysis

Draft plant lists have been developed for the riparian ecological site types. Riparian monitoring proposed in this plan will enhance the knowledge of riparian species in the various ecological sites.

A letter report for the USFS/BLM Riparian cottonwood/Willow Restoration Program discusses restoration for Cottonwoods and Willows in the Lower John Day River Canyon. This report used geomorphic descriptions similar to the Riparian Ecological site Descriptions to discuss potential for recruitment and growth of cottonwoods and willow. The report suggested that cottonwoods could be established on alluvial fans along the corridor.

Maximum Potential

Desired Future Conditions for Riparian Restoration will be attained when:

> Riparian areas and stream habitat conditions have improved as a result of protection and management. Watersheds are stable and provide for capture, storage, and safe releases of water appropriate to soil type, climate, and landform. Most riparian/wetland areas are stable and include natural streamflow and sediment regimes related to contributing watersheds. Soil supports native riparian/ wetland vegetation to allow water movement, filtration, and storage. Riparian/ wetland vegetation structure and diversity are significantly progressing toward controlling erosion, stabilizing streambanks, healing incised channels, shading water areas, filtering sediment, aiding in floodplain development, dissipating water energy, delaying floodwater, and increasing recharge of ground water appropriate to climate, geology, and landform. Stream channels are narrower, water depth and channel meanders are increasing, and floodplains are developing. Stream

channels and floodplains are making significant progress in dissipating energy at high-water flows and transporting and depositing sediment as appropriate for geology, climate and landform. Riparian/wetland vegetation is increasing in canopy volume (height and width) and in healthy uneven-aged stands of key woody plants, increasing in herbaceous ground cover, and shifting toward late succession. Surface disturbances inconsistent with the physical and biological processes described above have been reduced. Disturbances from roads, dispersed campsites, and inappropriate livestock use are decreasing as vegetation and soils recover naturally. There is no downward trend in riparian condition and function.

Desired Future Conditions for Water Quality:

Instream flows meet interim minimum flow goals or a level (determined through further analysis) sufficient to support outstandingly remarkable values and accommodate beneficial uses. Water quality meets state standards or is determined to be in balance with basin capabilities, satisfies obligations of the Clean Water Act, and is adequate to protect and enhance ORVs, especially the beneficial use of anadromous salmonids.

Element #4 - Goals, Objectives, and Management Actions

ESA, CWA, ICBMP, Land Management Plans, ODA WQMPs, 4180 Plan

Endangered Species Act, Clean Water Act (CWA), and the Two Rivers Resource Management Plan (RMP)

The Endangered Species Act (ESA) and the Clean Water Act (CWA) are two federal laws that guide public land management. These laws are meant to provide for the recovery and preservation of endangered and threatened species and the quality of the nation's waters. The BLM and USFS are required to assist in implementing these two laws. They provide the overall frame of reference for federal land management policies and plans pertaining to water quality and endangered species

The Two Rivers RMP provides guidelines for the management of public lands is a mechanism for the BLM to implement CWA and ESA. The RMP encompasses segments 1 , 2 and 3 in its planning area. The John Day Wild and Scenic River Plan amends the Two Rivers Resource management plan.

Interior Columbia Basin Management Plan (ICBMP)

The Federally administered lands in the Lower John Day Basin are designated as Broad Scale High Restoration Priority lands. Appendix 14 of Volume 2 of the ICBMP Draft EIS describes the types of activities that could be most effective in areas with different emphases or priorities. For the Lower John Day Subbasin, this means that "management activities would focus on restoration of (1) old forest and/or rangeland source habitats, (2) aquatic and riparian habitats, and (3) water quality and hydrological processes; and on providing economic benefits to isolated, economically specialized communities. A coordinated emphasis on all types of restoration activities (timber harvest and silvicultural treatments, altered livestock grazing management strategies, noxious weed control, reducing adverse road effects, prescribed fire, and aquatic-riparian condition/hydrologic processes) probably would be required in these subbasins."

The Interior Columbia Basin Final Environmental Impact Statement Proposed Decision calls for development and implementation of water quality restoration plans, such as this one, for impaired water bodies on lands administered by the Forest Service and BLM.

The scales and time frames for completing these processes should complement state processes and schedules for total maximum daily load development and implementation (R-O32 ICBMP Proposed Decision, p. 101).

WQRP Goals/Objectives

Goals: Guided by the relevant laws, policies, and plans as described above, there are two goals for this WQRP:

- Protect existing areas where water quality meets standards and avoid future impairments.
- Restore existing areas that do not currently meet water quality standards.

Objectives: The following WQRP objectives result from the laws, policies, and plans described above, as well as the analysis of the individual water quality limited parameters as described at the beginning of this document. Following is a summary of these objectives:

Protective Objectives:

- Minimize management actions in corridor upland areas that negatively impact water quality
- Minimize management actions in riparian areas and streams that negatively impact water quality

Restorative Objectives:

- Reduce water temperature

Management Actions - River Plan Actions

Cooperation and Education

Implementation of additional coordination between John Day River watershed stakeholders will increase the likelihood that additional water could be made available for instream beneficial uses while still meeting the off stream needs of agricultural users. This will encourage watershed stakeholders to better identify pollutant sources and pool resources to implement land management practices that protect and enhance instream water quantity and quality. Such combined efforts will ultimately contribute to increased water quantity and reduced introduction of sediment and other pollutants, and lower water temperature during warmer periods of the year.

In the future, specific attention to water quality and quantity issues at user sites along river could lead to behavior modifications that lead to an increase in water quality and water quantity. Continued work with all user groups to educate and become more involved with water quality and water quantity management will increase water quality and water quantity in proportion to the amount of education and application of water quality and water quantity enhancing management actions.

Implementation of the restoration actions for Grazing and for Agricultural Lands require that the BLM continue to actively manage much of the BLM land adjacent to the river. By protecting and enhancing river values while employing specific management techniques appropriate for specific sites, the BLM will continue to influence private land management by both example and by participation in watershed councils and other cooperative management opportunities. When coupled with management of BLM lands, the likelihood of significant improvement in instream condition will be increased compared to relying simply on management of BLM lands to improve water quantity and quality within the designated Wild and Scenic River.

If the BLM were to eliminate grazing, it would no longer 'share' the same set of issues with other landowners who continue to graze cattle within the river corridor. In addition, the BLM would lose the opportunity to demonstrate within the river corridor how riparian-oriented grazing can protect and enhance ORVs and water quality, but still provide economic benefits equal to or better than other land management techniques. A special study type in the Monitoring Plan has been formulated to monitor the results of cooperation in the watershed.

Grazing

The goal of grazing management is to protect and enhance river values and improve water quality. This goal will be achieved by further restricting grazing practices and by applying a series of immediate, mid-term and long-term standards for verifying the protection and enhancement of river values.

The restoration activities include the following measures:

1. A special seasonal limitation to grazing will be established. To protect public land riparian areas, grazing in pastures where livestock have access to river bank will be limited to periods when river flows at the USGS Service Creek gauging station are at least 2,000 cubic feet per second (cfs). This strategy relies on several factors including cool air drainage, higher relative palatability of upland vegetation and inundated riparian areas. At 2,000 cfs and higher, water covers much of the riparian vegetation, particularly herbaceous vegetation, thereby protecting it from livestock grazing. The cool air and palatability factors further discourage livestock from lingering near the river, and they promote grazing of upland vegetation. In combination, these factors provide effective protection from livestock grazing without the use of riparian fences.

    a. This special seasonal limitation to grazing is intended to restrict rather than lengthen the existing grazing season. For example, if grazing is currently restricted to March and April, this limitation will not extend authorized use into May. Pastures authorized for grazing during lower flows will shift to high flow seasons. Season of use changes from winter to spring will not be authorized in Wilderness Study Areas until an analysis of impacts is completed.

    b. For pastures with authorized winter grazing, the flow level restriction will be an interim measure until recovery monitoring established that recovery was occurring at acceptable rates (for further detail see the monitoring section at the end of this chapter).

    c. Special seasonal limitation to grazing will not apply to scattered tracts of public land (all of Allotment 2656, the Rayburn Pasture of Allotment 2584 and the Sherman Pasture of Allotment 2598, a total of approximately 5 river bank miles).

2. Monitoring of compliance with authorized grazing schedules will be increased over normal frequencies.

3. Levels of grazing or browsing use on important vegetative components of the riparian ecosystem will be monitored.

4. Increased vegetation and river channel monitoring will be established on grazed and non-grazed areas in order to verify that recovery rates are equal. In the event the above measure is not met, appropriate action will be taken as described in the monitoring section.

Changes in management from the current situation and some direct impacts of those changes are detailed in Appendix L in the Record of Decision.

The grazing season in pastures where livestock have access to river banks will be restricted by the special seasonal limitation to grazing, described above. In some cases, this is a restriction or a shift in the grazing period, typically away from hot season or season long grazing. In many cases, the current authorized grazing season is winter and/or spring. The associated action will be limited to modifying the terms and conditions of the lease to establish the new grazing season. These actions will establish a relatively standard grazing period for the public lands along the river. A uniform season, during which river flow levels are sufficient to permit the river to be used as a barrier to livestock movement, reduces the incidence of trespass from livestock which, during low flows, are able to travel up and down the river banks and freely cross the river (See Appendix M of the FEIS, photos 11-14).

In Segment 1, pasture division fences will create riparian pastures on Allotments 2595 and 2597. Grazing on the new riparian pastures will be limited to winter and/or spring, with grazing occurring most often in March and April. On Allotment 2597, a large pasture will be divided into four smaller pastures, restricting access to the river from three of the pastures and allowing a rotation grazing system to be implemented. Fence construction on Allotment 2617 will create a riparian pasture with a higher percentage of public land than exists in the current pasture. That new pasture will be rested for three years. Fence construction on Allotments 2520 and 2560 will exclude grazing from public land river bank. In Allotment 2598, two corners of public land extend across the river and occupy 0.7 river bank miles in a pasture which is dominated by private land. This land will be difficult to manage efficiently and is recommended for exchange for other lands within the Wild and Scenic River corridor.

In Segment 2, approximately 4.9 miles of fence will be built to exclude livestock from popular campsites in Allotments 2597, 2619, 2538 and 2623. In Allotments 2629 and 2619, pastures (River B and Hoot Owl) containing popular campsites will be closed to grazing. A pasture division fence will create a riparian pasture on Allotment 2591. Following three years of rest, grazing on the new riparian pasture will be limited to winter and/or spring, with grazing occurring most often in March and April. One mile of fence will be built in Little Ferry Canyon, on Allotment 2509, the Gooseneck and the mouth of Little Ferry will be rested for three years. On Allotments 2538 and 2619, small gap fences will bridge steep cliffs to restrict livestock access from 1.3 and 3.5 public land river bank miles respectively. In Allotments 2518 and 2609, the Pine Hollow and Big Gulch pastures, will be rested for three years and subsequently grazed only during the winter. In Allotment 2584, scattered tracts lie on or near river bank in a pasture dominated by private land. This land will be difficult to manage efficiently and is recommended for exchange for other lands within the Wild and Scenic River boundaries.

In Segment 3, approximately 4.3 miles of fence will be built to exclude livestock from popular campsites in Allotments 2633, 2512, and 2533. An additional 1.9 miles of fence will be constructed in Allotment 2512, creating a new pasture with a high proportion of public land and 3.4 miles of river bank. The new pasture will be rested for three years. In Allotments 2512 and 2588, about 0.8 miles of fence and 0.3 miles, respectively, will be placed to prevent livestock from entering an isolated terrace along the river where they tend to remain. The 0.6 miles of fence on Allotment 2630 will create a riparian exclusion fence for the entire length of the allotment. The riparian pasture in Allotment 2624 will be rested for three years, after which it will return to the present early spring grazing for two weeks every other year.

The changes in grazing management is an improvement over the existing management, because some allotments under existing management do not have managed grazing

consistent with protecting and enhancing outstanding recreational values. Because of the mixture of managed grazing and physical exclusion from riparian areas managed grazing under the previously described restoration activities, we are able to restore riparian vegetation as well would occur with riparian exclusion through fences and natural barricades on BLM-managed lands or corridor exclusion. However, this same benefit will occur at lower cost to taxpayers because fewer fences and fewer water developments will be constructed and maintained than would be needed under riparian exclusion or corridor fencing. Where riparian-oriented grazing has been implemented on the John Day River, the BLM has documented improvement in vegetative conditions. As this continues to occur and riparian oriented-grazing is implemented on additional allotments, we expect that monitoring associated with our Water Quality Restoration Plan will find that inputs into the John Day River off BLM-managed lands will improve. We are mindful, however, that our management decisions in this plan cover about 2 percent of the land in the John Day Basin. It is for this reason that cooperative planning and management is emphasized to protect and enhance water quantity and quality. We must encourage and cooperate with the land managers of the 93 percent of the John Day Basin not managed by the BLM to manage their lands in a manner that promotes good instream habitat and, consequently, will continue to support river values and improve water quality.

The BLM has also concluded that, at least in one sense, riparian areas will have a greater level of protection under the proposed decision. Alternative approaches are much more likely to involve grazing on uplands and private lands adjacent to riparian areas. The dependence of alternative approaches on fencing would also make them more subject to breaks in fences and cattle circumventing fences by entering the river during low water periods. The restoration actions for grazing emphasize riparian oriented grazing that will greatly reduce the possibility of inadvertent trespass throughout the year.

Agriculture

The BLM restoration of agricultural field will influence two conditions, which influence water temperature: flow and shade. Eliminating all public land commodity production will provide more water for instream use since less will be needed for commodity production. Less water will be removed from the stream during low flow periods; this is projected to increase water quantity and quality during low flow periods. This restoration activity will also eliminate the pesticide and fertilizer inputs to the watershed that are associated with commodity production.

The BLM will dispose of public parcels and associated water rights that constitute a portion of a larger agricultural field owned by a private party and which do not have reasonable access by public road or river. Such parcels will be disposed of through the land exchange process for lands of equal or greater value within the designated WSR boundary. Implementation of the exchange will be pursued as soon as possible. A conservation easement in exchange for these parcels can also be pursued if the opportunity arises. Currently, known parcels are in Segment 3 and include RM 112; T8S, R19E, Section 4, SE/14 (15.3 acres) and RM 119; T8S, R19E, Section 25, NW1/4 (10.3 acres). Pending any exchange, these lands will continue to be leased.

Stipulations that will be applied to agriculture permits in the Wild and Scenic River corridor will include, but not be limited to:

1. **Water Rights**
   Irrigation of all commercial agriculture fields that are entirely publicly owned and managed by the BLM will be terminated on August 15 to protect adult steelhead immigration. On non-commercial fields where the BLM is in the process of establishing perennial vegetation (which includes tree and shrub propagation,

cottonwood galleries, and upland grasses and forbs), the August 15 termination date will not be implemented to aid in the establishment perennial vegetation. Where perennial vegetation is being established this extension of irrigation will be short lived and only occur until perennial vegetation is established successfully. Cottonwood galleries used for outplanting may require small amounts of annual irrigation (typically less than 1 cfs) after the termination date. Wildlife food and cover plots will fall under this stipulation.

Entirely publicly owned agriculture fields affected by the August 15 termination date include the following: 1) 182.4 acres of agriculture land currently leased for commodity production. This total does not include the 25.6 acres described above that are identified for disposal or the 8.7 acres in Segment 1 and the 3.4 acres in Segment 2 that will be excluded with the selected alternative. The 37.7 acres listed above are excluded because they are identified for disposal and/or constitute a portion of a larger agriculture field that is privately owned and operated and irrigation system design make it infeasible to implement irrigation stipulations, and 2) 164.1 acres of BLM agriculture land that is currently not in commodity production and where perennial vegetation is not being established.

2. **Herbicides**
   The permittee shall comply with all applicable State and Federal laws and regulations concerning the use of pesticides (including insecticides, herbicides, fungicides, rodenticides and other similar substances) in all activities and operations under the permit. The permittee is prohibited from using any herbicides, except as approved by the Authorized Officer and within the provisions of the BLM Prineville District's Integrated Weed Management Program.

3. **Buffer Strips**
   Where leased agricultural lands along the river terrace are immediately adjacent to the active floodplain, a buffer or filter strip between the agriculture field and the active floodplain will be maintained by the permittee. The buffer or filter strip may be planted along the edge of the field adjacent to the active floodplain, or may occur as perennial vegetation that naturally occurs between the field and the active floodplain. The minimum strip width shall be 20 feet and will be determined by multiplying the appropriate LS factor (LS=Length-Slope value) from the Revised Universal Soil Loss Equation (RUSLE) by 10 (USDA-NRCS, 1998).

4. **Rehabilitation**
   The Authorized Officer, prior to cancellation or abandonment of the permit must, approve a rehabilitation plan.

Public land commodity production will be phased out. Emphasis will be placed on wildlife habitat enhancement. Activities will include tree and shrub propagation (such as cottonwood, willow, aspen), establishment of perennial vegetation (native and/or desirable non-native grasses, forbs, shrubs and trees) that does not require irrigation after establishment, and establishment of wildlife food and cover plots. Species selection will be made to benefit wildlife habitat and will require species able to compete with noxious weeds. When establishing perennial vegetation, native species are preferred over non-native species. However, situations may occur where desirable non-native species may be used.

Removing the existing 195 (221 acres minus 26 acres identified for disposal) from commercial agriculture production will be accomplished within 10 years according to the following phased process:

Segment 1 - RM23 - One tract of 8.7 acres within 5 years.

Segment 2 - RM98.75- One tract of 3.4 acres within 8 years.
RM101.5 - One tract of 43 acres within 8 years.
RM 107 - One tract of 70 acres within 5 years.

Segment 3 - RM136 - One tract of 23.4 acres within 10 years.
RM 137 - One tract of 46 acres within 10 years.
(Two tracts totaling 26 acres in Segment 3 are identified for disposal.)

A phased process is required because of expected funding levels for implementation and to continue weed control during the process. This schedule is considered a realistic and cost-efficient strategy; however, it may be adjusted by availability of additional funds, contributions, cooperative agreements or termination and/or abandonment of leases by lessees ahead of the BLM schedule.

The opportunity to convert a small portion of the 43-acre field in Segment 2 and 46-acre field in Segment 3 to perennial vegetation will be pursued before the scheduled phase-out period to provide dispersed camp sites. Approximately 60 acres (in Segments 2 and 3) of the total agricultural lands will be kept in wildlife food and cover crops in the long term. Food and cover crops are cultivated annual crops that are specifically designed to provide food for terrestrial wildlife, especially upland and non-game birds. Plant species (such as wheat, sunflower, sorghum, milo, and millet) are commonly used for food and cover crops. These crops require conventional cultivation practices and irrigation to be successful. The cultivation practices associated with growing these crops are also used in part to control noxious weeds. In the long term, the 60 acres of food and cover crops that will be maintained would be irrigated starting at the time of seeding in April or May of each year and stopped by August 15. Total maximum allowable use for all 60 acres will be 1.5 cfs. In some years with higher than average spring rainfall, no irrigation will be needed.

Any BLM-managed land on which unauthorized agriculture is discovered in the future will be managed in a manner consistent with this description.

As tracts are converted to perennial vegetation, and irrigation is no longer required for establishment, their irrigation will cease. Beneficial use will be maintained and associated water rights will be leased or transferred instream in cooperation with the OWRD.

This restoration provides the opportunity to provide much of the water now diverted for irrigation on public lands for instream uses. The decision to dispose of 26 acres of land that are intrinsic parts of private agricultural fields will eliminate an inconsistent use of BLM-managed lands and provide a partial basis for the acquisition of lands that will serve to protect and enhance river values and water quality.

Riparian and Aquatic Restoration

To move towards restoration of water quality in the John Day River, the BLM will continue existing management for riparian and aquatic habitat restoration. Riparian and aquatic habitat restoration includes direct actions such as bioengineering, the introduction of large woody material or other structural materials to improve riparian or instream habitat, and the outplanting of riparian shrub and tree species into compatible locations.

The current program of riparian outplanting will continue. The BLM maintains a cottonwood stock nursery in the Clarno area where seed stock from throughout the basin have been planted and cataloged. Each year, cuttings from this stock are taken for planting in suitable areas throughout the basin to enhance riparian productivity, diversity and structure, and to eventually provide a seed source for natural propagation

of cottonwood throughout the basin. In addition, other species of riparian shrubs and trees are planted throughout the basin with the same goals and objectives.

This decision, when combined with the other management decisions and applied on all lands throughout the watershed, will achieve our desired future conditions for riparian and aquatic habitat. Desired future conditions for aquatic habitat will ensure that water temperature does not exceed 17.8° C in segments where salmonid fish-rearing is a designated beneficial use.

Effect of River Plan Actions on Water Temperature

Any activities involving ground disturbance require further consultation with the ODFW, Oregon Division of State Lands, and OPRD, State Scenic Waterways Division. There are no specific projects of this type planned or described in this plan.

Vegetation

Management of vegetation through management of grazing, cultivated agriculture, and restoration activity has the potential to impact water quantity and water quality by altering the ability of the land to, as described by Bedell and Borman (1997), capture and store water and as a result to delay and spread, over time, the release of water. These functions are achieved by increasing infiltration of moisture, reducing overland flow in response to precipitation, and increasing the time and amount of water temporarily stored in the ground. Lowarnce (1985) has demonstrated that the greater the percentage of ground covered by native grasses the more infiltration into the ground occurs and the less overland flow occurs. As a result the contribution of groundwater to stream flow increases but is delayed when compared to overland flows, thus increasing the amount and duration of flow during natural low flow periods (summer and fall) when compared to flows occurring when lower levels of native perennial grasses are present.

Most desirable non-native species have roots systems similar to native species. When both native and non-native species are planted on sites that are dominated by noxious weeds, annual vegetation and/or reduced perennial vegetation, and other disturbed sites, an increase in watershed functions as described above will be observed.

Management actions such as excluding grazing from riparian areas, limiting duration and season of use in riparian areas, rangeland seeding of perennial vegetation, and creating riparian buffers between cultivated lands and the river increased upland and riparian vegetation retain more sediment than lesser amounts of vegetation. Retaining sediment consequently builds up streambanks, thereby creating narrower and deeper stream channels. Because retained sediments are not available for suspension in the river turbidity levels are reduced and the amount of sediment available to precipitate to the bottom of the channel also decreases. Thus not only does retention of sediment build up streambanks but it also reduces the tendency of streams that would otherwise have a high sediment load to build up layers of sediment on the bottom of the channel and thus decrease depth and spread out water over a wider area. Because of a smaller capacity to absorb energy narrower, deeper rivers are cooler than wider, shallower rivers (all conditions otherwise being equal).

The effects of producing and outplanting cottonwoods and other riparian tree or shrub species were covered in the Native Hardwood Supplementation Project Environmental Assessment (#OR-054-95-004). The activities are expected to increase the long-term sustainability of riparian species through the re-introduction of native genetic stock onto suitable habitats throughout the John Day River basin. This is expected to decrease the isolation of existing populations and increase the likelihood of successful sexual reproduction. Breadth, density and diversity of riparian plant communities is expected to

increase. Changes resulting from the activities would include a long-term stabilization of river and stream banks due to increased root mass, an increase in the amount of shade, and an increase in the recruitment of large woody debris into the river and tributaries. However outplantings are small in scope and extent and make up a very minor percentage of actual public riparian corridor miles. Measurable differences in riparian conditions would be limited to specific sites with the potential to support such vegetation.

The effects of construction and maintenance of minor structures for the protection, conservation, rehabilitation and enhancement of fish and wildlife habitat would be subject to site specific analysis. Generally, actions taken to stabilize river banks or to add aquatic structure to the river may result in short-term reductions in or disturbances to riparian or aquatic vegetation. Longer term, the activities would likely increase the available habitat for riparian and aquatic species.

In summary, any action that will promote appropriate upland and riparian vegetation will be likely to delay runoff, increase summer and late season flow, and decrease water temperature during the summer and turbidity during high flow periods.

Flow

Management actions such as excluding grazing from riparian areas (by fencing and creating water developments away from the river), limiting duration and season of use in riparian areas, rangeland seeding of perennial vegetation, and creating riparian buffers between cultivated lands and the river) (USDI-BLM 1993, 1998) have been demonstrated to increase water tables and subsequently increase late summer instream flow (Barber 1988; Elmore 1998; Elmore and Beschta 1987; Jensen et al. 1989).

Groundwater contributed to the stream channel in summer stream is generally cooler than surface water. Therefore, increasing groundwater flow can increase vegetation, which can reduce the temperature of instream flows. Improving watershed health and improving the riparian vegetation will increase the contribution of flow from the hyporeic zone into instream flow later in the year when flow is a limiting factor for water temperatures.

Eliminating all public land commodity production, as described in the agricultural restoration, will provide more water for instream use since less will be needed for commodity production. Less water will be removed from the stream during low flow periods, this will increase water quantity and quality during low flow periods. This will also eliminate the pesticide and fertilizer inputs to the watershed that are associated with commodity production.

Milestones

Improvements in grazing management have been assigned milestones. If the ODEQ develops a model to explain the affects of changing flow levels on water temperature, the BLM may be able to use that model to quantify the benefits of converting agricultural fields.

Long-Term Conditions: If grazing is determined to be the cause of non-riparian recovery, the grazing schedule will be altered. Such alteration may include long-term rest for riparian recovery.

Compliance Standard for Authorized Grazing

The objectives of the compliance standards will be to identify cooperation problems that are likely to lead to an inadequate recovery determination (see below) and to resolve the

problems before degradation occurs. Livestock operator compliance with the authorized grazing use will be monitored throughout the year, every year. All cooperating state, federal and tribal personnel on the river in an official capacity will be trained to identify and document livestock trespass. All incidence of trespass will be documented and recorded in an evaluation file. Agency procedures for resolving unauthorized grazing are detailed in 43 CFR 4150 and 4160.

Riparian Use Standards for Authorized Grazing

The objective of the use standards will be to permit unimpeded succession of riparian plant communities and unimpeded functioning of riparian areas. Use will be monitored in a pasture every year until the recovery determination is completed (see below) and a determination is made that no further adjustments in grazing system are needed. Incidence of use on woody riparian species will be less than 25 percent. Monitoring procedures will include visits prior to and immediately following authorized use to establish the amount of use that is attributable to livestock. Stubble height prior to high river flows (pastures grazed during winter) will be at least four inches for wet colonizer and bank stabilizer herbaceous species. Stubble height will be at least six inches at the end of the grazing season for pastures grazed during the growing season. An evaluation of the cause of use standard exceedence (for example, drought, grazing season, animal number, trespass) will determine the appropriate management remedy (such as rest and change in authorized use season or number of livestock).

Recovery Standard for Authorized Grazing

The objective of the recovery standard will be to verify that grazing authorized within the Wild and Scenic River boundaries is having no detectable impact on rates of vegetative community succession and channel development. Areas of use will be compared to areas of non-use. Only areas of similar ecological potential (riparian ecological sites) will be compared. Monitoring techniques will be quantitative, where possible. Where quantitative techniques are inappropriate or unavailable, qualitative techniques will be used. Monitoring techniques will be appropriate to land form. For example, techniques will differ between upland and riparian vegetation, between South Fork and mainstem channel form. Monitoring studies are described later. Monitoring studies will be installed within one year of the Record of Decision on winter-grazed pastures, and within two years of the Record of Decision on spring-grazed pastures. Scattered tracts of public lands will be exempt from this standard.

A final determination of the similarity of the changes between use and non-use areas will be made after a period of time sufficient to allow ecological processes to become expressed (10 years for winter pastures; and 11 to 15 years for spring grazed pastures, with the 4-year period allowing for the volume of work that is anticipated). In use areas demonstrating change that is not different from change found in non-use areas, the evaluation will find that the standard has been met and no adjustment in authorized grazing will be necessary. In use areas demonstrating change that is different (less desirable) from change in non-use areas, the evaluation will find that the standard has not been met. The evaluation will determine the probable cause of non-attainment. If non-attainment is due to livestock, use will be canceled in that portion of the pasture that did not meet the standard. For example, if riparian areas did not meet the standard and upland areas did meet the standard, a remedy similar to that described in Grazing Alternative C will be implemented. In some cases, this will mean construction of water developments and fences; in other cases, this will mean canceling use in a pasture. If both riparian and upland areas did not meet the standard, a remedy similar to that described in Grazing Alternative D of the FEIS will be implemented. This will require elimination of grazing within that portion of the pasture within the boundaries of the Wild and Scenic River.

Interim Targets

The restoration actions for grazing management are based on analysis of numerous published scientific experiments, extensive experience in western arid ecosystems and results of current monitoring studies in the John Day River basin. Cool season grazing has been assessed in scientific publications, in extensive experience throughout western arid ecosystems and within the John Day. Furthermore, it has been demonstrated that John Day River riparian areas respond dramatically to cool season grazing. The Wild and Scenic River Plan describes the grazing adjustments which have been made since the river was designated. In 1986, less than 8 percent of the public land riverbank miles were in exclusion or riparian oriented grazing management. With the implementation of this the Wild and Scenic River Plan, over 98 percent of the public land riverbank miles will have had the needed adjustments for rapid riparian recovery (figures are for entire river).

However, given the political sensitivity of grazing within Wild and Scenic Rivers, it is necessary to verify, on a site-specific basis, that the fastest rates of recovery possible (assumed by many to occur under no grazing) are in fact occurring. Therefore, the results of implementation and effectiveness monitoring (see section on Monitoring) will be reviewed at interim validation. Interim validation will occur on the riparian pastures within 15 years. Summaries of data will be presented in an allotment evaluation or similar document. These summaries will provide the Authorized Officer information needed to determine attainment of equal rates of restoration. In the event that the riparian pasture is not progressing at a rate equal to a non-grazed pasture, a determination of cause will be made and appropriate action taken as soon as practicable. If the riparian pasture is not recovering at equal rates because of non-compliance on the part of the grazing operator (for example, trespass, failure to maintain facilities, or other violations of the grazing regulations or permit conditions/stipulations, such as the allotment management plan), appropriate action will be taken in accordance with 43 CFR 4150 and 4160.

Mid-term determinations of the similarity of the changes between use and non-use areas will be made at Years 3 and 7 for winter pastures, and during Years 5 and 6 for spring-grazed pastures. If the standard is being met for winter-grazed pastures during Year 3, the 2,000 cfs restriction will be lifted for those pastures. If the standard is not being met in Year 3, the 2,000 cfs restriction will remain until the Year 7 determination and a solution will be pursued. The fallback solution will be to implement a spring rotation grazing system, one year on the riparian pasture, and one year off the riparian pasture. If the standard is being met in Year 7, the 2,000 cfs restriction will be lifted and the grazing system could be readjusted. If the standard is not being met in Year 7, the 2,000 cfs restriction will remain until year 10 and a solution will be pursued. The fallback solution will be the same as described above. For spring-grazed pastures, the 2,000 cfs restriction will remain in place indefinitely. Mid-term determinations for spring-grazed pastures will proceed as described for winter grazed pastures.

Element #5 - Timeline for Implementation, Cost, Funding

Priorities for Correct Cause of Problems

Effective Restoration treatment does not merely add structures or otherwise attempt to salvage the worst degraded or most visibly damaged areas. Instead, it changes the underlying processes that cause habitat deterioration. (Williams 1997)

The Lower John Day Basin is not scheduled for TMDL development until 2005. By proceeding with restoration actions prior to TMDL implementation, BLM may be able to

restore impaired waters of the John Day River sooner than the restoration actions in a comprehensive 2005 Water Quality Management Plan.

Cost/Funding Identify Sources of Funding

DEQ 319: The 319 program provides formula grants to the states and tribes to implement non-point source projects and programs in accordance with section 319 of the Clean Water Act (CWA). Non-point source pollution reduction projects can be used to protect source water areas and the general quality of water resources in a watershed. Examples of previously funded projects include installation of best management practices (BMPs) for animal waste; design and implementation of BMP systems for stream, lake, and estuary watersheds; basin wide landowner education programs; and lake projects previously funded under the CWA section 314 Clean Lakes Program.

Challenge Cost Share: Challenge Cost Share Projects (CCS) are partnerships with other government agencies, private organizations, institutions, Share corporations, etc., working together to accomplish common objectives. To qualify as a CCS project, BLM must be using CCS base funding for the project and one or more partners must be providing in-kind-support or funds. Under the provisions of P.L. 104-208, the Federal share of funding for a CCS project does not necessarily have to be on public lands, but must directly benefit public land resources or public land management.

Wyden Amendment: In 1995, the National Fish and Wildlife Foundation approached Senator Ron Wyden with a suggestion to develop legislation that Amendment would permit the Bureau of Land Management (BLM) to fund restoration work on private lands. The 1997 Omnibus Consolidated Appropriations Act, Public Law 104-208, Watershed Restoration and Enhancement Agreements, dated September 30, 1996, was placed into law. The legislation allowed the BLM to enter into cooperative agreements with willing private landowners for restoration of fish, wildlife or other biotic resources on public and/ or private land that benefits these resources on public lands within the watershed.

Restoration Planning Opportunities

ODA WQMPs: Senate Bill 1010 directs the Oregon Department of Agriculture (ODA) to deal with agricultural water quality problems in Oregon. Through a Water Quality Management Plan, ODA will propose new rules to deal with the prevention and control of water pollution from agricultural activities and soil erosion in Lower John Day River management areas. The plans will be developed by a local advisory. ODA will hold public hearings for public comment on the adoption of rules for implementation of the Agricultural Water Quality Management Area Plan.

The BLM will look to these AgWQMPs for new information or technology, which would further enhance ORVs and water quality. New opportunities for accomplishing implementation may arise from this process.

TMDL Development: When the ODEQ creates a TMDL for the Lower John Day Subbasin in 2005, there may be more information available for analysis. Any new data collected to supplement TMDL development may enable the BLM to create a model of water temperature or more accurately assess the affects of the restoration activities on water temperature.

Implementation Timeline

This decision may be implemented no sooner than 30 business days after the date of publication of the Notice of Decision in the Federal Register. The BLM hopes to implement the changes in grazing management in three to five years. While many

changes will be effective this year, all changes in agricultural management will be complete in 10 years.

Element #6 - Responsible Parties

Land Included in WQRP

The scope of the WQRP is the scope of the John Day Wild and Scenic River Plan (JD River Plan) for Segments 1, 2, and 3. It is developed to provide management direction to public lands on the federally designated Wild and Scenic River segments, specifically Segments 1, 2, and 3.

Parties Responsible for Plan Implementation

Regarding BLM's lead role in the John Day River management planning and actions, the use of "BLM" in discussion of the proposed decision reflects the fact that Congress, the courts, the public, and the planning partners ultimately hold the BLM responsible for planning and implementation. For example, the courts held the BLM responsible for meeting planning deadlines. The tribes, the state and the counties, though essential participants in the planning process, were not mandated to meet court ordered timetables in the John Day Wild and Scenic River Planning Process. Given the importance of the tribes to the process, the BLM has and will continue to encourage their participation in the planning process as well as other federal agencies, the state, and local government. It is likely that agreements with the Tribes, State, and local governments will be employed to implement some proposed decisions.

For these reasons, the use of the term 'BLM' instead of planning partners reflects the ultimate legal responsibility of the 'BLM' to implement the plan rather than the exclusion of planning partners. Implementation of any of the proposed decisions would not usurp the statutorily defined responsibilities of any other federal, tribal, state, or local government.

Section 105(a)(2) of Public Law 100-557 refers to required consultation and entering into cooperative management agreements (CMAs). CMAs are vehicles that allow the BLM and other partners to direct resources, including monetary obligations, towards specific on-the-ground activities for which the partners share common goals or objectives. In achieving a shared vision, partners in collaboration can influence, and be influenced by, each other while retaining their respective decision making authorities. The BLM has the ultimate legal responsibility to develop and implement the Wild and Scenic River Plan, which include the restoration activities discussed in this WQRP.

Element #7 - Reasonable Assurance of Implementation

Funding

This WQRP provided the foundation for requesting the increased funding for the management and monitoring of this special area in 2001. Cooperative efforts can be used for implementation of monitoring. The BLM will encourage our cooperators to participate in implementation and monitoring. One means of achieving this is through the development of Cooperative Management Agreements.

The BLM is aware of concerns about future funding levels. This is one reason that these restoration actions were selected during the John Day River Wild and Scenic River Plan planning process. Implementation, monitoring, and maintenance of the

hundreds of miles of fence and hundreds of water developments demanded in other alternative restoration actions considered would have taken funding levels that are considerably higher than current levels.

Responsible Federal Officials

The proposed action, when considered separately from all other management activities in the John Day Basin, is expected to have a beneficial, but not measurable, effect on water quality in the John Day River. Therefore, the FEIS does not state that the proposed action will result in meeting all Oregon state water quality standards. The BLM lands within the planning area constitute less than 2 percent of the land with in the basin. Because of its limited scope compared to the total area of the John Day Basin the proposed restoration are not expected to have a measurable effect on water quality in the main stem of the John Day River. However, if the restoration activities of the BLM are combined with similar restoration activities on other lands within the basin, there would be a measurable improvement of water quality.

The proposed restoration complements other agency efforts that have the potential to measurably improve water quality in the river. In addition to the proposed action, the BLM and Forest Service will be applying the *Protocol for Addressing Clean Water Act Section 303(d) Listed Waters* (Protocol, May 1999) to review listed waters and determine if agency action is necessary to restore upland and riparian conditions in order to meet Oregon Department of Environmental Quality (ODEQ) water quality standards. If action is necessary these agencies will develop Water Quality Restoration Plans (WQRPs) that must be submitted to ODEQ. WQRPs will develop a monitoring strategy, including time lines and spatial guides, sufficient to address affects of permitted uses on water quality. The FEIS will provide a framework for developing a WQRP and the WQRP will be an appendix to the *Record of Decision* for the *John Day River Management Plan.*

This WQRP and others developed by the BLM and Forest Service, as well as Agricultural Water Quality Management Plans being developed for private lands by the Oregon Department of Agriculture (ODA) as required by State Senate Bill 1010, will be forwarded to ODEQ. ODEQ will use this information to create a comprehensive Water Quality Management Plan for the various sub-basins of the John Day River. The Oregon Department of Environmental Quality is required to complete Total Maximum Daily Loads (TMDL) and companion Water Quality Management Plans (WQMP) for the John Day sub-basins in 2003 (North and Middle Fork), 2004 (Upper John Day), and 2005 (Lower John Day).

Problems with Implementation

We recognize that many uncertainties involving natural and human-caused changes in the coming decades could affect how well we realize the long-term promise of the John Day River. Yet unless we act now, we will lose an important opportunity to achieve many of our goals for the Wild and Scenic and other reaches of the John Day River.

Element #8 - Monitoring and Evaluation

Current Monitoring

Water quality and quantity monitoring has been incorporated into the BLM's current monitoring program. Within the John Day River basin the BLM currently operates a gaging station, 27 peak crest gages, and 66 temperature monitoring sites. Results of

monitoring show that water quality is impaired before it reaches Wild and Scenic designated portions of the river.

Monitoring for Restoration

Purpose and Need: Regulations require the BLM to monitor land use plan decisions (43 CFR 1610.4-9) and to adopt a monitoring program for any mitigation incorporated into decisions based on environmental impact statements (40 CFR 1505.2(c)). In addition, a core tenet of the Wild and Scenic Rivers Act is protection and enhancement of river values. In order to verify the trend of river resource conditions and to guide future management decisions, it is necessary to systematically sample public land, file the data in an organized fashion and provide for periodic evaluation of the information obtained. This plan will aid in the standardization, scheduling, budgeting and reporting of such a process.

Monitoring Area

The area encompassed by this Water Quality Restoration Plan includes all land in Segments 1, 2, and 3.

Objectives of Monitoring Plan

The objectives of this monitoring plan are to:

- Outline minimum standards of information needed to satisfy the Clean Water Act and Endangered Species Act.
- Provide for systematic study and evaluation of each grazing allotment to determine if the resource objectives are being met.
- Provide a way to anticipate and plan for future funding needs.
- Provide for systematic study and evaluation of rate of change to ecological and social conditions due to human factors.

Interdisciplinary Process

One important key to a successful monitoring and evaluation program is committed involvement of all affected resource programs. This includes involvement in determining resource objectives, the studies needed to measure change toward or away from these objectives, and involvement in the evaluation process whereby study results are reviewed, causes for trends are established, and a course of action for future management is charted.

Priorities and Intensities of Monitoring

Public lands are located throughout the watershed and are interspersed with varying amounts of private land. Deciding where to monitor public land will depend in part on the proportion of public to private land, in part on the location of sensitive resources, and in part on other logistical factors such as access.

Data Collection Methods

This monitoring plan provides the framework for tracking the course of action put forth in the WQRP and FEIS. The methods used need to be able to document if restoration actions were accomplished, if restoration actions had effects and if those effects met the objectives of moving the environment towards the desired conditions.