Part 2

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Final Plan • August, 2000

Wetland/Riparian Habitat and Bull Trout Restoration Plan

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CSKT ARCO-SETTLEMENT ID TEAM

Confederated Salish and Kootenai Tribes

Executive Summary

Introduction

Since 1876, the Atlantic Richfield Company (ARCO) or its predecessors have been releasing hazardous materials into the Upper Clark Fork River Basin (UCFRB). These releases caused, and continue to cause, extensive injury to the natural resources in the UCFRB. In 1998, ARCO agreed as part of a legal settlement to pay the Confederated Salish and Kootenai Tribes $18.3 million to restore, replace, and/or acquire the equivalent of Tribal treaty-protected resources that were injured by the release of hazardous substances in the UCFRB.

Under the terms of the legal settlement, the Tribes are to complete a Wetlands and Riparian Habitat Restoration Plan and a Bull Trout Restoration Plan. The Tribes are committed to a holistic resource management approach and so have chosen to combine these two plans into a single, two-part plan. Together, Parts 1 and 2 provide long-term guidance for restoring the resources and services injured by the release of hazardous materials from mining and ore-processing activities. The two parts contain policies for making restoration decisions and describe methods for implementing restoration activities. Part 1 provides an overview of the planning process and a general description of the legal methods the Tribes will use to restore, replace, and/or acquire wetlands, riparian areas, and bull trout habitat. Part 1 also describes the lands that will be considered for protection or acquisition, emphasizing the target or focus area — the Jocko Watershed. A general schedule for the process is also presented. Part 2 describes the Jocko Watershed in more detail, lists the specific restoration and enhancement methods to be used, and estimates the costs of those activities. Part 2 also presents an action plan and describes the provisions for plan amendment and monitoring.

Implementation

The basic goal of watershed restoration is to reestablish the natural processes that existed before the watershed was disturbed. Because the Tribes believe a broad, comprehensive approach has a greater chance of succeeding, the goal includes reestablishing natural linkages between the terrestrial, riparian, and aquatic parts of the ecosystem. The focus, however, will be on the protection and restoration of riparian and wetland areas because they have the greatest influence over the health of the watershed. The goal also includes keeping the Tribes' acquisitions of lands consolidated in order to maximize their habitat value and improve management efficiency. The watershed restoration process the Tribes have chosen involves four key steps:

1. Assessment

Determine the watershed's environmental history. Identify the areas with restoration potential and the activities that led to the degraded conditions.

2. Protection

Identify the best available remaining habitats and protect them. Protection of intact ecosystems is typically less expensive and is often of greater importance to the overall restoration effort than restoring degraded systems.

3. Passive Restoration

Modify the activities that are causing the degradation or that are preventing the ecosystem from recovering. Many riparian areas are capable of rapid recovery with a modification of land use.

4. Active Restoration

In some situations, the impacts to an ecosystem have been so great that simply modifying or stopping the damaging activity is not enough. Without some kind of active restoration the ecosystem will remain degraded indefinitely.

The Tribes will also employ a strategy called adaptive management. Adaptive management simply means planning and implementing management activities to the best of our abilities while at the same time remaining open to new information and monitoring the results of our actions to see if we are actually meeting our goals. If our original approach proves inadequate, adaptive management requires changing the strategy in order to increase the chances of reaching the goals.

Legal Methods

The legal means that the Tribes will use to protect restored wetlands, riparian areas, and other habitats in perpetuity include the following:

Legislative Enactments of the Tribal Council

The Council may adopt appropriate legislative enactments committing the Tribes to protecting restored wetlands, riparian areas and other habitat in perpetuity.

Contracts

The Tribes may choose to structure the acquisition of certain parcels of land that are suitable for restoration as wetlands, riparian areas, or other habitat pursuant to contracts for deed.

Easements

The Tribes may choose to convey an easement for fish, wildlife, wetlands, and/or riparian conservation purposes to the federal government or a conservation organization on lands acquired and restored by the Tribes. Alternatively, the Tribes may choose to contract with an existing landowner who does not want to sell his parcel for the right to restore natural resources on that landowner's parcel and then concurrently acquire an easement from the landowner in the name of the federal government or a conservation organization for fish, wildlife, wetlands, and/or riparian conservation purposes.

Restrictive Covenants

The Tribes may choose to convey a restrictive covenant to the federal government or a conservation organization preventing any uses of a Tribally-acquired restoration site that are incompatible with use of the site as a restored wetlands, riparian area, or other habitat in perpetuity.

When selecting one of the above-identified methods for protecting restored natural resources in perpetuity, two primary considerations will be: (1) preservation and promotion of Tribal self-government and Tribal jurisdiction over Tribal natural resources; and (2) avoidance of the creation of any restrictions on the title of a parcel for acquisition that would be an impediment to the placement of such title into trust status.

Location of Projects

Six watersheds located within the Clark Fork River Basin were considered for restoration activities. These watersheds include: Flathead River, Little Bitterroot, Crow, Mission, Camas, and Jocko. All contain natural resources equivalent to those injured in the Upper Clark Fork River Basin, specifically: (1) similar species of resident nonnative/hatchery stock salmonid fish, including: brook trout, brown trout, and rainbow trout; (2) similar species of historic resident native stock fish, including: bull trout, cutthroat trout, mountain whitefish, peamouth, squawfish, and suckers; (3) similar watershed geography and hydrology; (4) similar riparian and wetland vegetative types including plants of importance for the practice of traditional cultural ways; (5) similar wetland types, particularly side-channel wetlands and stream-confluence wetlands which provide critical rearing habitat and summer thermal refugia for native species; and (6) similar species of native aquatic and terrestrial wildlife species. The Upper Clark Fork River Basin, particularly Silver Bow Creek, was not considered because it is unlikely that remediation and restoration efforts in this area will create conditions suitable for

widespread restoration of native fish populations in the near-term and perhaps in the long-term. However, conducting restoration actions within the six watersheds identified above is appropriate to protect, preserve, and enhance their resident native species as genetic stock for restoration of UCFRB native species should the opportunity present itself in the future. Additionally, protection and enhancement activities within these six watersheds will function to concomitantly protect and preserve treaty-protected Tribal traditional uses of these resources within the treaty-designated homeland of the Tribes.

The Target Area: The Jocko Watershed

Of the six watersheds just described, the Jocko is the most similar in terms of size, streamflow, and hydrology to Silver Bow Creek, the primary area of injury in the Upper Clark Fork River Basin. The Jocko River watershed encompasses 385 square miles, Silver Bow Creek 394 square miles. The two streams are also hydrologically similar in that both have areas of ground-water upwelling. Zones of ground-water upwelling provide important habitat for bull trout. Ground-water interactions support streamflows in segments of the river and also support floodplain open-water features and floodplain spring channels along segments of the Jocko River. Channelization, floodplain constriction, and riparian land uses which simplify the overall channel environment have reduced the quality of, or eliminated, much of the floodplain habitat along the Jocko River. The Jocko Watershed is also the most similar to Silver Bow Creek in its species composition and traditional cultural use. In addition, the watershed encompasses the greatest potential for wetland and riparian area restoration and is the most valuable bull trout tributary habitat on the Reservation.

The Jocko River drainage was defined as a "core area" for bull trout in the Middle Clark Fork River Drainage Status Review by the Montana Bull Trout Scientific Group. Core areas are considered to be strongholds for bull trout. They provide significant spawning and rearing areas and are considered important in the overall recovery of the species within Montana. Bull trout were listed as threatened under the Endangered Species Act in June of 1998.

Unfortunately, the Jocko Watershed as it now exists is also the most susceptible to development. The Tribes control more of the land within the Jocko Watershed, which means they will have greater control over landuses within the watershed than they would elsewhere. This should greatly enhance protection efforts. Greater Tribal control also means that there is a better chance that the protection and enhancement activities undertaken will preserve treaty-protected Tribal traditional uses in perpetuity. It also makes more sense to concentrate wetland and riparian restoration activities where they will best support the Tribes' bull trout restoration efforts, which will occur primarily in the Jocko Watershed. For all of these reasons, the Jocko Watershed has been selected as the target area for restoration activities, including protection of these habitats in perpetuity.

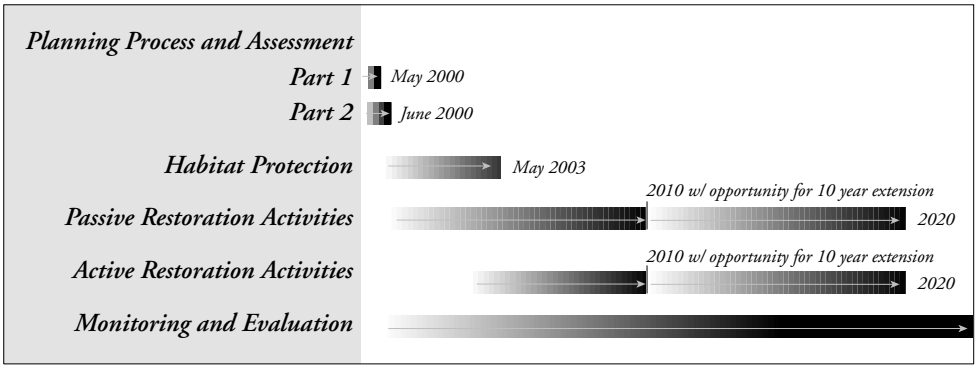
Jocko Watershed Assessment

The overall ecological health of the Jocko River Watershed is good to fair in the upper reaches (above the confluence with Finley Creek) and poor in the lower reaches. Wetlands and riparian areas in the South Fork, the North Fork above the Tabor Feeder Canal, and the Middle Fork are in good condition. Currently, livestock grazing and forestry are the dominant land uses in the upper reaches. Forestry, especially the roads associated with timber harvesting, have had some impact on the upper watershed; however, the impacts from livestock grazing in the upper watershed have not been as significant because the morphology of the stream channel tends to be resistant to the kinds of disturbances typically associated with livestock grazing. But downstream of Finley Creek, the river enters a broad valley floor with a much wider floodplain. The gradient flattens, and the river becomes more sinuous and less confined. These lower reaches have suffered a loss and/or degradation of wetland and riparian habitats, water courses have been channelized, water quality degraded, and flows altered. Adding to these impacts are problematic irrigation diversions. The Finley Creek drainage is considered highly impaired. It has been impacted by transportation corridors, agricultural development, forestry practices, and rural development. The Valley Creek drainage is considered moderately impaired. Forestry practices and livestock grazing are responsible for the primary impacts.

Introduced fish species in the Jocko Watershed pose a threat to bull trout and westslope cutthroat trout. In the lower reaches of the mainstem river, rainbow trout and brown trout predominate. Perhaps the most impaired subwatersheds are those of Finley and Valley creeks. Here, bull trout have essentially been extirpated and replaced by brook trout. Westslope cutthroat trout persist only in the highest reaches of the drainage. Though the upper reaches of the Mainstem, North, Middle, and South Forks of the Jocko are less impaired, the same trend can be seen. The subwatershed that is least impaired by human disturbances, the South Fork of the Jocko, holds the healthiest populations of native salmonids.

Schedule

The schedule below provides an overview of the planning and implementation process.



The Action Plan

The action plan is broken into five periods: immediate actions will take place over the next year, short-term actions will take place between years 2 and 3, midterm actions between years 3 and 5, long-term actions between years 5 and 10, and extension years between years 10 and 20. Annual work plans prepared by an interdisciplinary team and annual progress reports will document the work that occurred in the preceding year.

Year One: Immediate Actions

The first two steps in our watershed restoration planning process are planning and protection. Planning involves (1) filling data gaps in our knowledge of the watershed, (2) identifying the activities that degraded the watershed, and (3) developing a comprehensive, ecologically based restoration strategy. The planning actions proposed in Part 2 will help to identify and prioritize areas with restoration potential and the measures necessary to restore those areas. Protection actions involve protecting the intact portions of the watershed through acquisition and other measures.

Years Two to Three: Short-term Actions

Assessment work will continue into years two and three, although the primary activities will be acquisition and passive restoration. Passive restoration involves the modification of the activities that are causing the degradation or that are preventing the ecosystem from recovering.

Years Three to Five: Midterm Actions

Most of the major assessment work should be completed by year three. Some acquisition work will continue, although the focus will shift to passive restoration activities. Some active restoration work will begin.

Years Five to Ten: Long-term Actions

Most of the acquisition work should be completed by year five, although it is likely some key parcels and conservation easements will remain unsecured. Passive restoration work will continue, although the focus will begin to shift to active restoration activities. The monitoring and evaluation of specific restoration and enhancement measures will begin.

Years Ten to Twenty: Extension Years

With court approval, there will be an opportunity for a ten-year extension for wetland and riparian habitat restoration (but not bull trout habitat restoration). If this occurs, the actions outlined for the long-term (5-to-10-year) period will continue. Upon expending all of the funding and/or completing the restoration plan and with the concurrence of the Fish and Wildlife Service, the Tribes will have met their restoration obligation to the court. At that point in time, the Tribes intend to steward the lands as part of the Tribes' homeland for the purpose of protecting treaty-reserved resources in perpetuity.

Restoration Measures

In addition to the legal methods described earlier, restoration measures will include passive restoration measures such as site-specific habitat management plans, riparian and wetland area fencing, off-site water development, transportation system improvements, controlling the spread of nonnative species, changing fishing regulations, and improved public education on land stewardship. Restoration will also involve active restoration measures such as fish screens, fish habitat improvement projects, the removal and suppression of introduced fish species, reintroduction of bull trout where extirpated, stream channel restoration, wetland and riparian habitat restoration and enhancement, and irrigation and agricultural water treatment.

Plan Amendment and Monitoring

All actions implemented as a part of this plan will be monitored and evaluated on an on-going basis. If the monitoring and evaluation data suggest a need to change significant portions of the plan or if substantially new issues surface that suggest changes are needed in the plan a Tribal interdisciplinary team, in consultation with the U.S. Fish and Wildlife Service (USFWS), will be convened to review the plan. The team may recommend further assessment measures or amendments to the plan. Summaries of this review and any analysis will be appended to this plan.

The USFWS will monitor the Tribe's implementation of the Plan through quarterly activity reports, annual budget and expenditure reports, planning meetings, on-site inspections, and a completion report.

Table of Contents

Chapter 1

Introduction

This restoration plan provides long-term guidance for restoring the natural resources and functions injured by the release of hazardous materials.

Since 1876, the Atlantic Richfield Company (ARCO) or its predecessors have been releasing hazardous materials into the Upper Clark Fork River Basin (UCFRB). These releases caused, and continue to cause, extensive injury to the natural resources in the UCFRB. In 1998, ARCO agreed as part of a legal settlement to pay the Confederated Salish and Kootenai Tribes $18.3 million to restore, replace, and/or acquire the equivalent of Tribal treaty-protected resources that were injured by the release of hazardous substances in the UCFRB.

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which is this document, describes the Jocko Watershed in more detail, lists the specific restoration and enhancement methods to be used, and estimates the costs of some of the activities. Part 2 also presents an action plan and describes the provisions for plan amendment and monitoring.

An old campsite in a riparian area.

Chapter 2

Jocko Watershed Description

Three headwater tributaries — the North, Middle, and South Forks — join to form the Jocko River. Valley Creek and Finley Creek, the river's two other main tributaries, flow into the river below Arlee. In all, the river drains a watershed area of 246,263 acres.

Physical Geography

The Jocko River drainage basin is the second largest tributary watershed of the lower Flathead River in the Clark Fork River Basin. At its mouth, the Jocko has an annual average discharge of 238 cubic feet per second (USGS 1998). The Jocko River drains a watershed area of 246,263 acres, with approximately 5% of the drainage under irrigation (Flathead Agency Irrigation Division 1990). The watershed (figure 2.1) includes the South Fork of the Jocko Primitive Area, the Pistol Creek Mountains, the Ninemile Divide area from Evaro to Valley Creek, and the communities of Arlee, Ravalli, and Evaro.

Three headwater tributaries — the North, Middle, and South Forks — join to form the Jocko River. Below the confluence of the three forks, the river flows west to the town of Arlee. Above Arlee, it cuts through a confined valley and is high gradient, typical of mountain streams. Below Arlee, the Jocko flows north through the Jocko Valley and becomes less confined, flowing through a broad valley of forest, wetlands, and agricultural land. Finley and Valley Creeks flow into the Jocko below Arlee.

Geology

Headwater areas in the Jocko Valley are underlain by Pre-Cambrian, Belt Supergroup sediments. These very resistant metasediments range from Helena Forma-

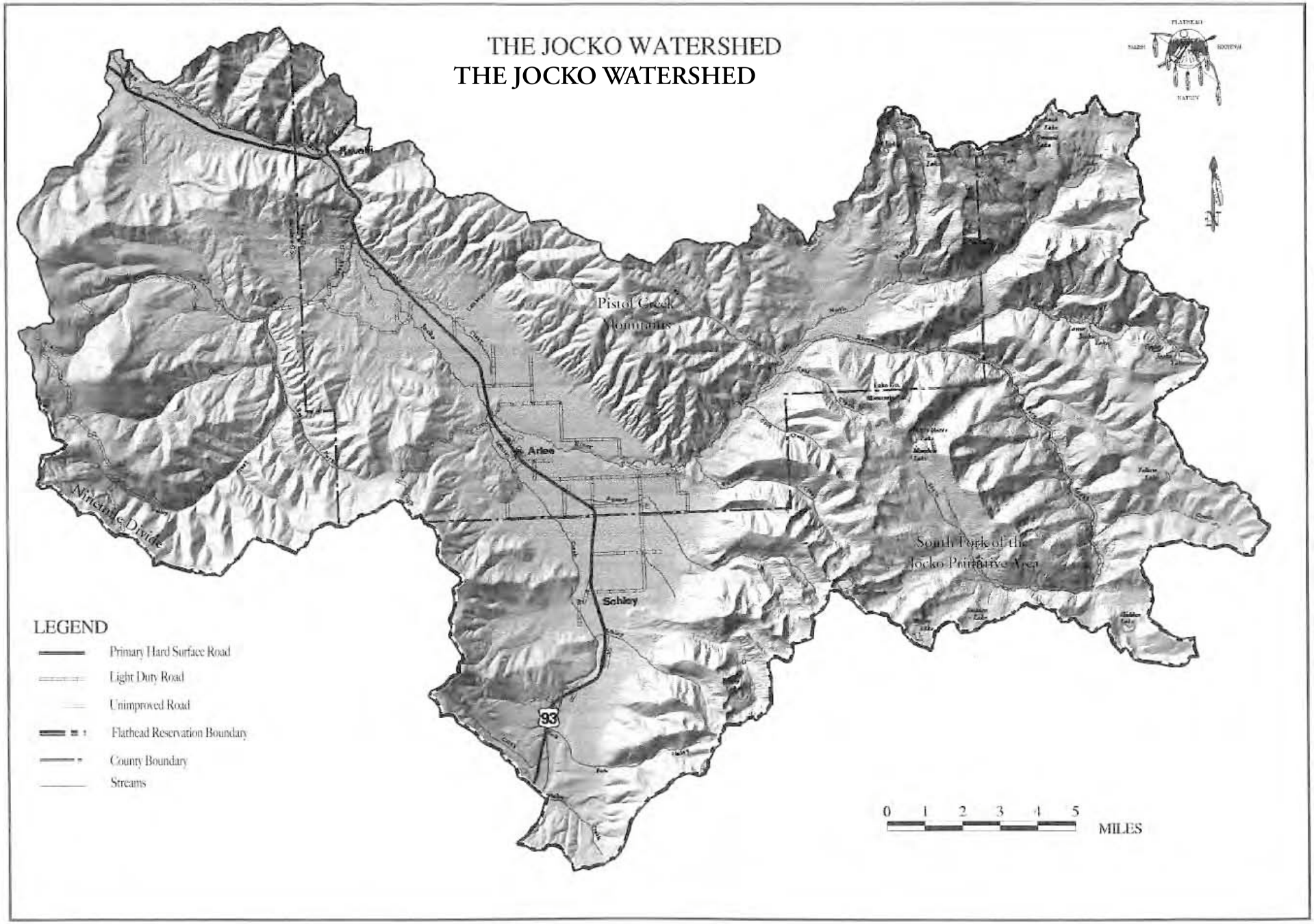


Figure 2.1. The Jocko Watershed.

tion carbonates to coarse reddish sandstones of the Mt. Shields Formation. The Jocko Fault line trends up the Jocko canyon. Unnamed range-bounding fault lines are mapped along the foothills of the Rattlesnake Range and along the west face of the Pistol Creek Range.

Rocks of the Helena Formation. The Helena is primarily dolomite with some limestone. It is medium to dark gray when freshly exposed and tan when weathered.

Headwater areas throughout the Jocko drainage were glaciated during the Pleistocene and well preserved alpine glacial features are visible in tributaries. The most prominent valley-floor deposit is the Jocko Fan, a large glacial outwash deposit underlying the Arlee area. The Agency Fan, south of Arlee, is a large, complex fan deposit comprised of unconsolidated sediments more than 800 feet thick. To the north of Arlee, glacial Lake Missoula sediments fringe the valley margins, and recent alluvial material, deposited by the current Jocko River, underlays the valley axis.

Land Ownership

The Confederated Salish and Kootenai Tribes, own 182,624 acres within the Jocko River Watershed, roughly three quarters of the acreage contained therein. The United States holds legal title to these lands on behalf of the Tribes. The percentage of Tribal land along the mainstem Jocko River decreases from the "K" Canal diversion to the mouth. Other landowners include the State of Montana, private individuals (allotted and fee-simple), and the federal government (figure 2.2). Table 2.1 shows land ownership (in percentage) for lands within one-half mile of the Jocko River.

Table 2.1. Approximate land ownership percentages within a one-mile-wide Jocko River corridor.

Location	Tribal (%)	Alloted (%)	Federal (%)	State (%)	Fee (%)
Mainstem	36	9	8	1	46
Middle Fork	95	0	0	5	0
Norh Fork	96	2	0	>1	1
South Fork	89	0	0	11	0
Valley Creek	9	0	0	0	91
Finley Creek	17	21	3	1	58

Land Use

Agriculture

There are approximately 10,700 federally irrigated acres and 1,000 privately irrigated acres in the Jocko Valley (Makepeace 2000a). Pasture and range lands within forested and non-forested areas make up nearly 60 percent of the watershed. Irrigated and non-irrigated croplands account for approximately five percent of the landbase.

Range

Approximately 86,000 acres of Tribal land within the Jocko Watershed is designated as range units (table 2.2).

Table 2.2. Range unit descriptions for the Jocko Watershed

Location	Range Unit #	Approx. Acreage	Permitted Stocking (head)	Permitted Season of Use	Permitted AUM
Valley Creek	18	31,600	660	5/15 - 10/15	3,300
Lower Finley Creek	19	8,600	95	6/1 - 9/30	380
Frog Creek	20	2,500	50	6/1 - 11/1	250
Upper Finley Creek	21	11,000	90	5/15 - 10/15	450
Jocko	22	32,300	400	6/1 - 10/15	1,800
Totals		**86,000**	**1,295**		**6,180**

A total of 1,295 head of cattle is permitted under the established grazing seasons shown in table 2.2. Some heavy grazing within riparian areas occurs (Montana Riparian Association 1993 -1997). Pasture rotations are in place for the upper Finley Creek area and Valley Creek. The Frog Creek unit (Frog Creek is a tributary to Finley Creek) has not been grazed for approximately 15 years, but is heavily used by recreationists, and weeds are firmly established. Riparian conditions for selected sub-basins in the watershed are shown in tables 3.3 and 3.4.

Croplands

The Jocko Watershed encompasses over 8,800 acres of croplands. The majority, 70 to 80 percent, is used for the production of forage crops, primarily alfalfa and tame grass mixtures of timothy, orchard grass, and brome grass. Small grains such as wheat, barley, and oats are grown on the remaining cropland.

Irrigation

Some private irrigation began in the mid 1800s, and many private ditches are still in use today. The Flathead Agency Irrigation Division (FAID), approved in 1908, encompasses over 104 miles of irrigation canals and significantly influences the Jocko watershed. In the past, segments of the river below Big Knife Creek were completely dewatered for irrigation purposes (Pajak et al. 1986). In 1986 and 1987, instream flows were instituted for the Jocko River and its tributaries. Non-point source pollution due to irrigation is a concern in the Jocko (Pajak et al. 1986).

Pesticides/Weed Management

The Tribes have an integrated weed management plan and since 1994 have treated over 4,660 acres of weeds within the drainage with 2,4-D and Tordon. The Lake County Weed Control District also assists in weed control in the Jocko Watershed. The County Weed District sprays the right of way of all of the county roads. The predominant chemical used in 1999 was *Hi-dep*, a broadleaf weed spray. Chemicals used on roads in prior years were predominantly 2,4-D and *Vanquish*. The County also sprays private lands upon request. Chemicals used on

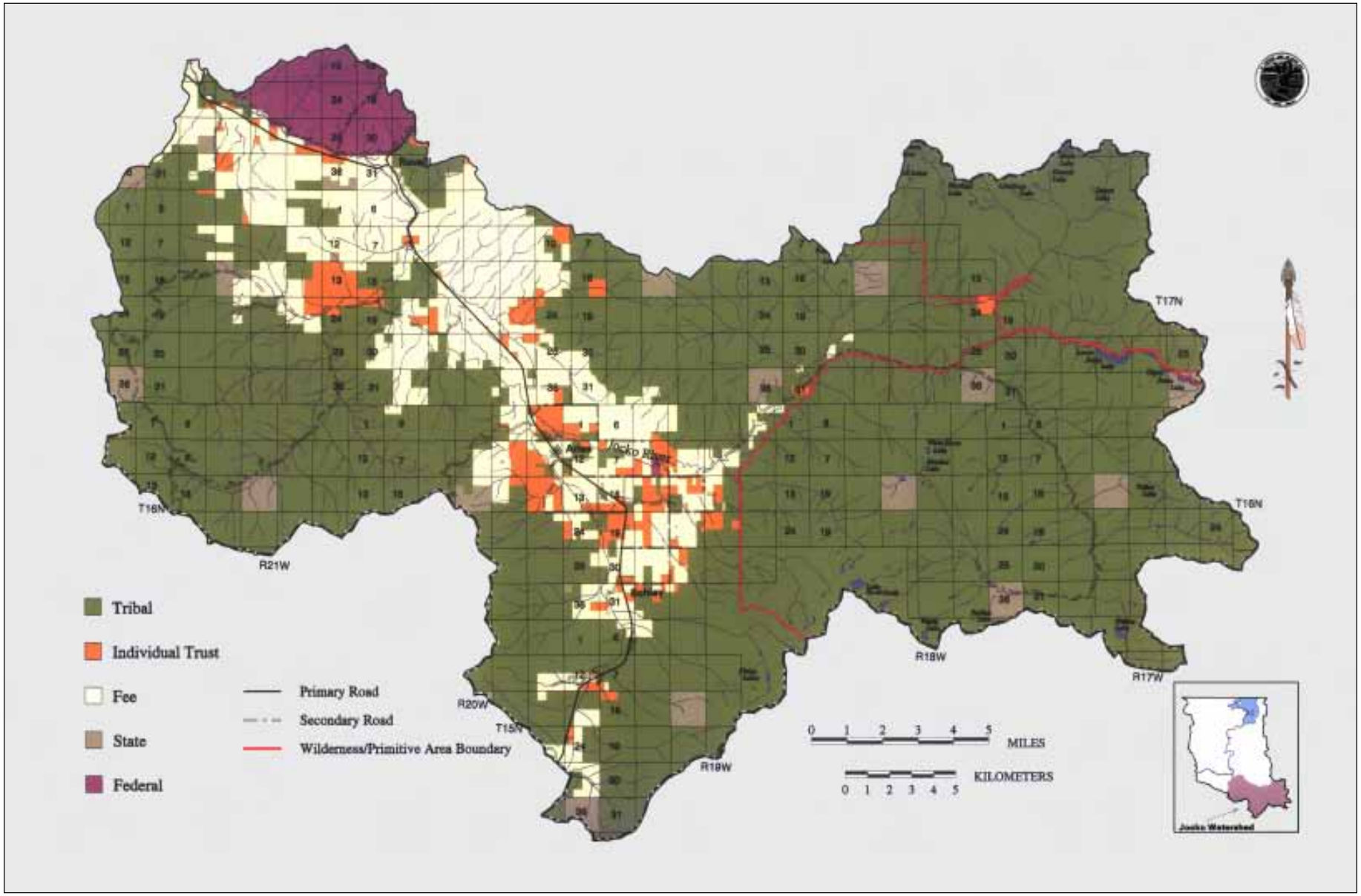


Figure 2.2. Land ownership in the Jocko watershed

private grounds vary but include Hi-dep, 2,4-D, Tordon, Vanquish, and Escort. All weed sprays used by the County Weed Control District are labeled for use around water (Cote 2000). Approximately 104 miles of FAID irrigation canals exist in the Jocko Watershed. Weeds in the majority of those canals are controlled with mechanical equipment. Approximately 15 miles of canals are managed with chemical pesticides on an as-needed basis. Canals are burned and then aquatic Rodeo is applied. This assists in keeping the grasses and weeds stunted to reduce water delivery impedance. FAID also controls weeds in their gravel pit, where 2,4-D is the treatment and in their equipment yard, where they use Treflan (Courville 2000). The Montana Department of Transportation and Montana Rail Link Company also control weeds along their rights of way.

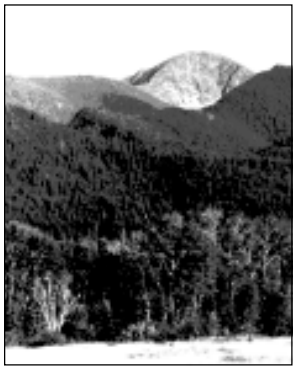
Significant portions of the Jocko Watershed fall within the "available" acreage base. Forest lands classified as Available Acres can receive the full range of harvest treatments, as long as those treatments are appropriate for the sites involved.

Forestry

Table 2.3 shows how the forested acres in the Jocko Watershed are classified for forestry purposes. Available Acres can receive the full range of harvest treatments that are appropriate for the sites involved. Restricted Acres includes streamside management zones, areas available for roadless harvest, and other areas where the Tribes have established specific management objectives that limit harvesting options. Unavailable Areas include primitive and wilderness areas, roadless areas unavailable for harvest, and other areas where forest management activities are not permitted.

Table 2.3. Classification of forest acres in the Jocko Watershed.

Available	Restricted	Unavailable	Total
79,188	8,793	37,128	125,109



Portions of the Jocko Watershed fall within the Unavailable Acreage base where logging is prohibited. The South Fork of the Jocko Primitive Area, set aside for Tribal members and their families, is used for recreational and cultural pursuits.

Past logging and fire exclusion practices have caused significant changes in the watershed's vegetation. These changes are summarized below.

- Forests have expanded into areas that were previously grasslands. The net result has been an overall increase in total forest acres and a corresponding decrease in forest-grassland habitats. The trees in this "new forest" zone are often densely stocked and vulnerable to extreme drought stress, insect and disease attacks, and stand-replacing fires. At the same time, the productivity of many seral herbs, shrubs, and aspen stands has declined due to the absence of fire.
- Forest communities have become more uniform. Gone is the quilt-work of pre-European times, a mosaic that contained a tremendous diversity of forest habitats.
- Seral species have lost ground to climax species. Over the past 50 to 100 years, climax species like Douglas-fir have increased at the expense of seral species like ponderosa pine. The trend is most apparent at lower elevations and concerns foresters because Douglas-fir is more susceptible than ponderosa pine to a variety of insect pests and diseases.

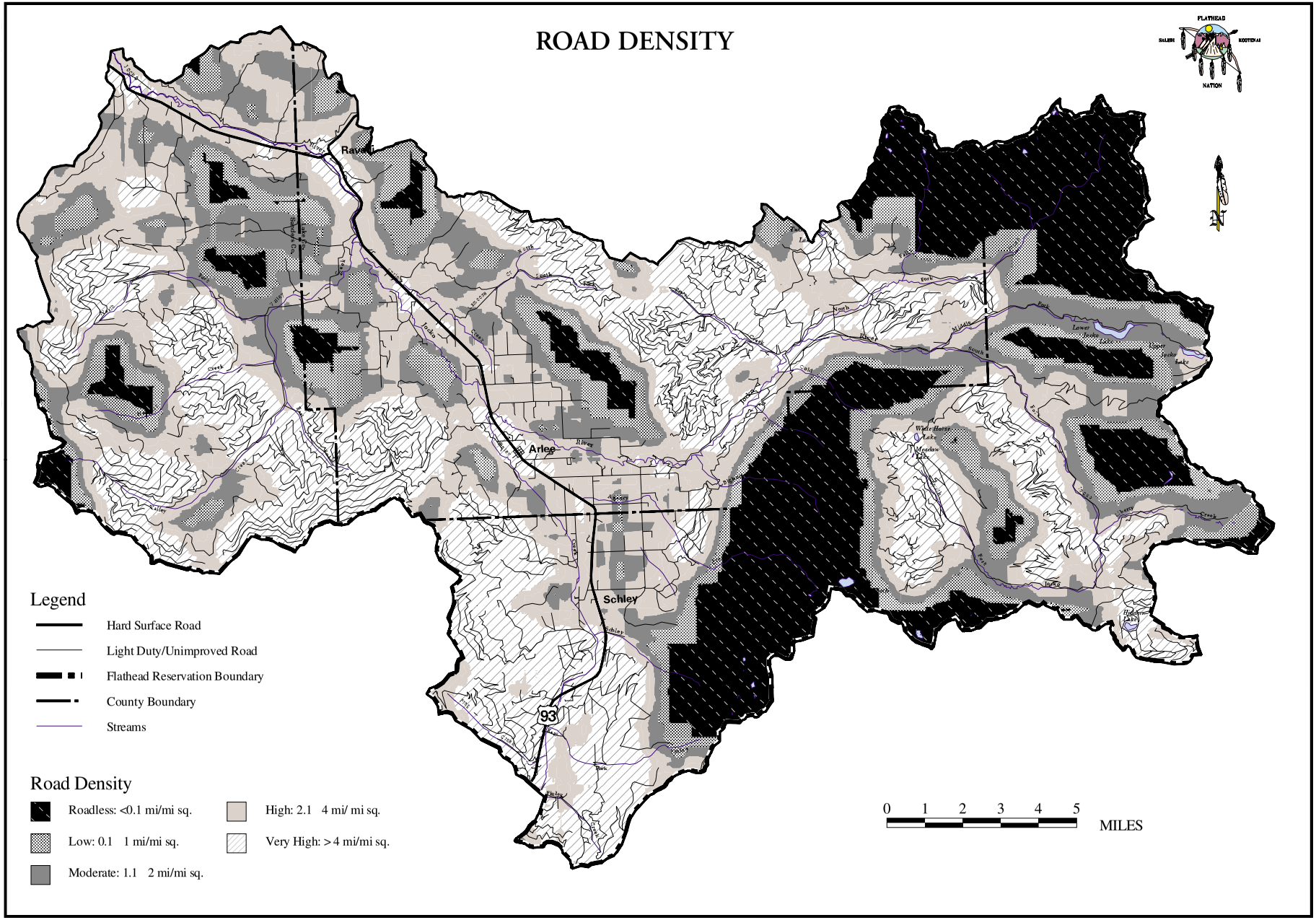


Figure 2.3. Road density in the Jocko Watershed.

- Stands in low-elevation forests that during pre-European times were park-like have become more crowded and multi-layered.
- The average age of trees has changed. During pre-European times, lower elevation forests were dominated by large, old growth pines. Today almost all of these stands have been replaced by younger trees.
- Road density, or the miles of roads per square mile, has increased dramatically to serve logging and fire-control purposes (figure 2.3).

Overall, forest health in the Jocko area is poor due to past logging, grazing, and fire exclusion practices. The result is large stands with heavy accumulations of dead woody material and unnatural fuel arrangements, structures, and compositions. Mistletoe infestations and root rot — two forest diseases — are also contributing to the amount of fuel. Crown-fire potential and overall fire risk is moderate to high because of the steep topography, above average fire occurrence, fuel buildups from fire exclusion, and continuous fuel beds. Future wildfires will tend to be larger and more severe than in the past.

Socioeconomic Conditions and Outlook

Cultural Resources

The Jocko River Watershed is an important cultural resource to members of the Confederated Salish and Kootenai Tribes. It serves as a place to hunt, fish, harvest food and medicinal plants, and conduct many other traditional practices. In 1974, the South Fork of the Jocko Primitive Area was set aside by the Tribal Council as a recreational and cultural use area. In 1979 use of the area was restricted to Tribal members and their families. In 1990, South Fork of the Jocko Primitive Area was expanded to include several drainages to the northwest. Logging is no longer permitted in the area. The Jocko Range, which includes a portion of the South Fork of the Jocko Primitive Area and which borders the federally designated Rattlesnake Wilderness, contains one of the largest roadless tracts on the Reservation. The mountains are crossed by a series of backcountry trails that lead to high mountain lakes. The entire area is valued for its pristine environment and opportunities for solitude. Recent natural resource mitigation awards from the relicensing of the Kerr Hydroelectric Facility and ARCO afford the opportunity to protect and enhance this critical watershed for native species so that future generations of Tribal members may enjoy it as well.

The Arlee Celebration Grounds, located just outside of Arlee, is the site of the annual Fourth of July Powwow Celebration, one of the largest cultural events on the Reservation.

Urbanization

U.S. Highway 93 divides the principal residential areas of the Jocko Valley — Arlee, Ravalli, the scattered community north of Evaro, the Schley homesites, and Jocko

Hollow. Arlee and Ravalli provide local services such as post offices, churches, and gas and grocery stores. Arlee, the largest of these communities, is unincorporated and serves the population of the Jocko Valley. The population density in Arlee is reported at greater than 1,000 people per square mile (Lake County 2000). Currently the community does not have a municipal sewer system, however engineering design is near completion for a municipal facility to serve the community (Billmayer Engineering 1999). This may spur accelerated growth in Arlee and the Jocko Valley. Arlee does have primary and secondary schools, a volunteer fire department, a pharmacy, two senior citizens' centers, a college classroom building, a daycare center, some recreation facilities, and a state fish hatchery. Both Arlee and Ravalli also have some light industry. A railroad, irrigation canals, and major power and telephone transmission lines bisect the valley in the vicinity.

Upland habitats of the Jocko Watershed provide important habitat for elk and deer.

Population densities vary across the valley floor. A noticeable increase occurs south of the Jocko River, where densities range from 100 to 200 people per square mile (Lake County 2000).

The population in Lake County grew by 22 percent for the first eight years of the 1990s — double the average state of Montana for the same period and greater than Flathead, Sanders, and Missoula Counties, which border Lake County (Lake County 2000). Growth in the Jocko Valley matched or exceeded that of Lake County and the Reservation as a whole (Camel 1996). The rapid growth appears to be related to expanding job markets in Lake County, and the valley's proximity to the Highway 93 corridor and Missoula (Camel 1996).

Recreation

The watershed offers a variety of quality recreational opportunities. Anglers fish the Jocko River and some of its tributaries. Hunters pursue waterfowl and pheasants along the lower Jocko River. Wildlife viewers and sight-seers also frequent the river. Two developed sites provide access: one next to the State Fish Hatchery near Arlee, and the other a few miles west of Ravalli. The river is also accessible at dozens of undeveloped sites.

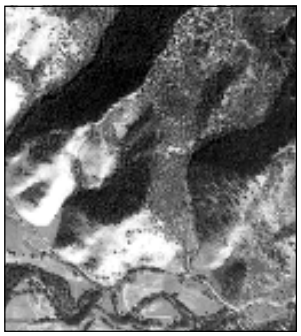
The South Fork of the Jocko Primitive Area (59,169 acres) has been set aside for Tribal members for cultural and recreational purposes. Much of the mountain country on both sides of the Jocko Valley is crossed by backcountry trails that lead to roadless country and high mountain lakes. They are among the major recreational attractions in the valley.

Transportation

U.S. Highway 93, which stretches from Canada to southern Arizona, is the principal north-south highway in western Montana. Approximately 19.5 miles of this transportation corridor fall within the Jocko River Watershed. The highway parallels the river from the base of Ravalli Hill to Arlee. According to the Montana Department of Transportation, average daily trips through Arlee in 1990 were 5,280 for all vehicles and 828 for commercial vehicles (Camel 1996). The

number of daily trips has probably increased significantly in subsequent years (Camel 1996).

Vegetation



Once the river leaves the Jocko Canyon, the vegetation changes from forest to a mix of grassland and open forest communities.

Non-forest

Native non-forest vegetation within the watershed is typical of the Rocky Mountain region and Palouse Prairie bunchgrass type. Grassland plants include various wheatgrasses, fescues, blue grasses, needlegrasses, forbs, and sedges. In the lowlands, riparian areas support black cottonwood, quaking aspen, paper birch, water birch, willow, alder, chokecherry, serviceberry, dogwood, wild rose, and snowberry. Cattails, meadow grasses, and sedges dominate the wetlands.

The introduction of large numbers of livestock during the early 1900s upset the balance of native plant communities on the Reservation. In the valley bottoms and on the foothills, continuous, season-long grazing, over-stocking, and fire exclusion policies caused bunchgrasses to decline and undesirable shrubs, weeds, and grasses to increase. Exotic species such as timothy, redtop, smooth brome, blue grasses, and orchard grass — planted originally for hay and pasture — replaced native rangeland vegetation in many areas. The primary weed species are knapweed, sulfur cinquefoil, goat weed, thistle, and hounds tongue. Leafy spurge, dalmation toadflax, and oxeye daisy also infest many areas, especially at lower elevations. These weeds occur on thousands of acres within every part of the watershed. Several community-based weed-control projects have been implemented, and the Tribes have treated over 4,660 acres of weeds within the drainage with 2,4-D and Tordon.

Forest

Approximately 73% of the Jocko River Watershed is forested. The communities are typical of the northern Rocky Mountains. Ponderosa pine, Douglas-fir, western larch, lodgepole pine, grand fir, Engelmann spruce, subalpine fir, whitebark pine, and alpine larch are the most common trees. Common shrubs include snowberry, spiraea, and ninebark. Wheatgrasses, fescues, pine grass, and introduced bluegrasses are the most common grasses. The river floodplain within the forest supports ponderosa pine, Rocky Mountain juniper, Douglas-fir, western redcedar, quaking aspen, black cottonwood, water birch, willow, alder, chokecherry, serviceberry, dogwood, wild rose, and snowberry. Willows, cattails, meadow grasses, and sedges dominate wetlands.

The South Fork of the Jocko Primitive Area is composed of multi-storied, mature and old subalpine fir, lodgepole pine, Engelmann spruce, and timberline whitebark pine forest types. Forests across the rest of the watershed are composed of a mature timber mix of seral lodgepole pine, multi-storied mixed seral types (at lower elevations) and climax types (at upper elevations and on north and east slopes). This forest cover is broken by narrow, well-defined riparian corridors and

various patches of clearcuts, sod, talus, brushfields, and wetlands. Figure 2.4 shows the general distribution of the tree species found within the watershed.

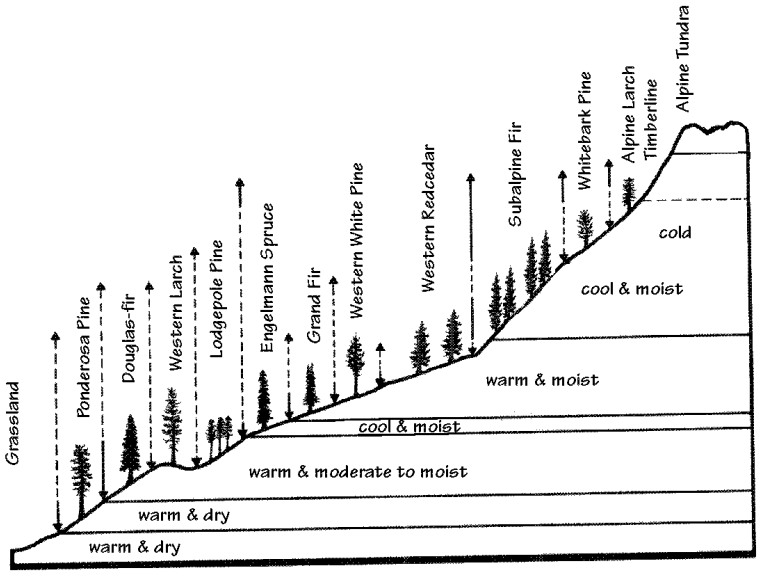


Figure 2.4. Generalized distribution of trees in the Jocko Watershed (Pfister et al. 1977). The arrows show the relative elevational range of each species; the solid portion of each arrow indicates where a species is the potential climax, the dashed portion where it is seral.

Wetlands and Riparian Areas

The National Wetland Inventory (NWI 1992) mapped approximately 2,218 acres of wetlands within the Jocko River Watershed. The dominant wetland classes are Palustrine Emergent and Palustrine Scrub-Shrub. Wetlands in forested areas, although known to occur, were almost completely missed by the NWI. The forest canopy obscures most wetlands in forested areas from identification through traditional aerial photo-interpretation techniques. Consequently, forested wetland complexes are greatly under-represented on NWI maps for the Flathead Indian Reservation. Table 2.4 gives the results of National Wetlands Inventory for the Jocko Watershed. Figure 2.5 shows the distribution of wetlands in the watershed.

The following list identifies the dominant species occurring in wetlands and riparian areas of the Jocko River Watershed (Montana Riparian and Wetland Association 1993 - 1997). Dominant does not necessarily mean desirable; an objective of this plan is to, where feasible, shift the wetland/riparian plant community back to the native species.

- **Tree Species**
  Quaking aspen, black cottonwood, Douglas-fir, Engelmann spruce, western redcedar, and grand fir.

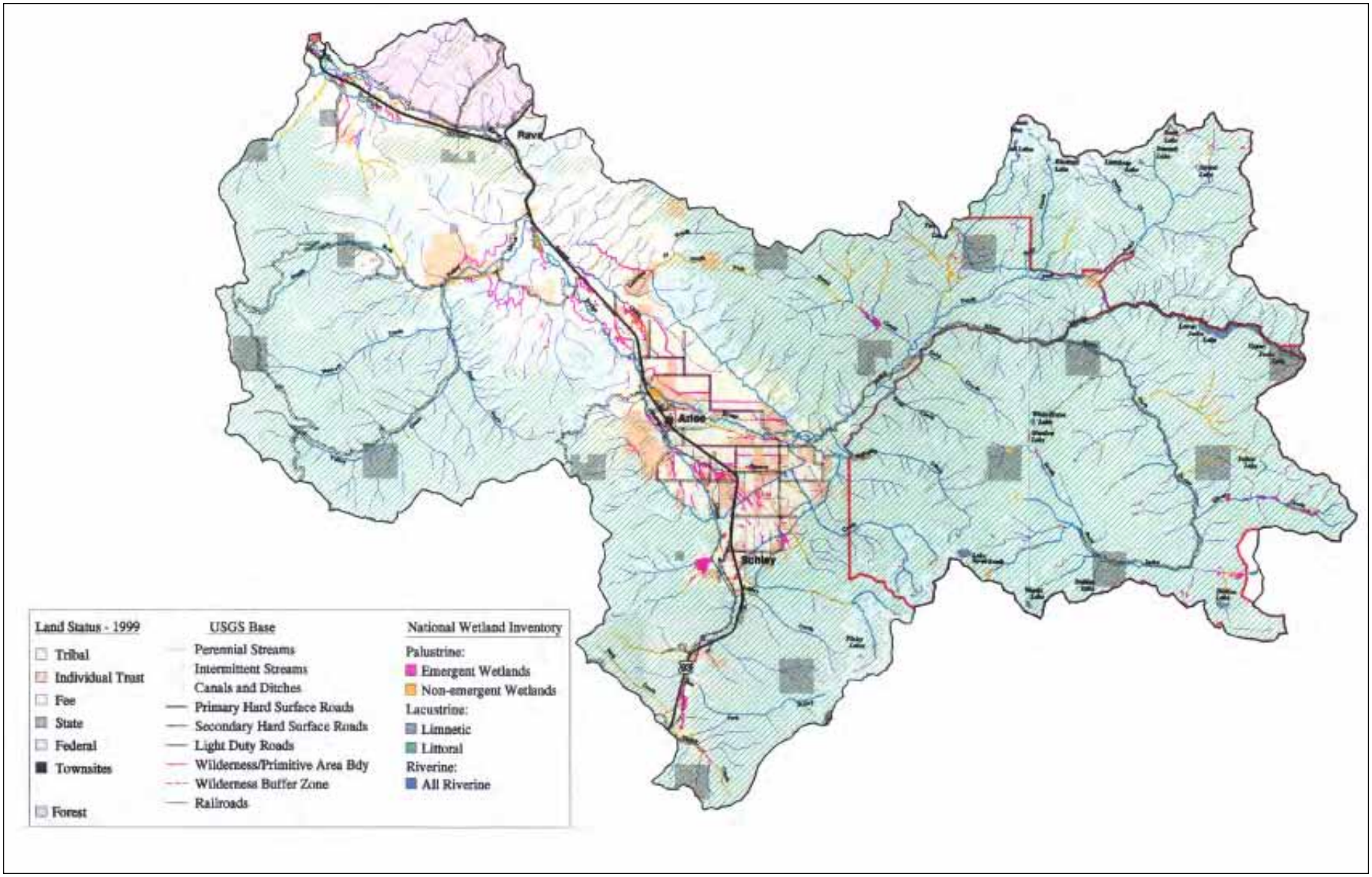


Figure 2.5. The distribution of wetlands in the Jocko Watershed

Typical riparian habitat of the upper mainstem Jocko River.

Table 2.4. National Wetlands Inventory results for the Jocko River Watershed[1]

Wetland Type	North Fork	Middle Fork	South Fork	Main-stem[2]	Valley Creek	Finley Creek
Palustrine Emergent	38.5	11.6	165.7	343.0	46.3	519.4
Palustrine Scrub-Shrub	91.0	17.7	133.4	317.3	19.4	211.3
Palustrine Aquatic Bed	40.9	4.0	99.3	59.2	7.4	17.1
Palustrine Forested	--	--	--	11.6	--	--
Palustrine Unconsolidated Bottom	6.5	1.0	2.4	4.4	--	9.5
Palustrine Unconsolidated Shore	--	--	1.1	0.1	--	--
Lacustrine Littoral	--	9.8	30.0	--	--	--
Total Wetland Acreage	**176.9**	**44.1**	**431.9**	**735.6**	**73.1**	**757.3**
Lacustrine Limnetic (deepwater habitat)	50.0	165.4	126.9	22.0	--	25.7
Riverine Lower Perennial (in-channel habitat)	--	--	--	100.3	--	24.5
Riverine Upper Perennial (in-channel habitat)	75.6	25.3	72.5	206.9	58.8	17.9
Riverine Intermittent (in-channel habitat)	41.4	1.3	44.6	155.8	44.1	134.3
Total Deepwater (Non-wetland Aquatic) Habitat Acreage	**167.0**	**192.0**	**244.0**	**485.0**	**102.9**	**202.4**

[1] *The National Wetlands Inventory for the Jocko River Watershed is based on 1982-84 aerial photography of the Flathead Reservation.*

[2] *Mainstem below confluence of the Middle Fork and South Fork.*

- **Shrub Species**
  Mountain alder, sandbar willow, common snowberry, red-osier dogwood, Bebb willow, and water birch.

- **Grass Species**
  Kentucky bluegrass, redtop, Bluejoint reedgrass, reed canarygrass, beaked sedge, and orchard grass.

- **Forb Species**
  Canada thistle, plantain, teasel, clover, and common cattail.

North, Middle, and South Forks of the Jocko River

Wetland-riparian complexes within these high elevation subwatersheds occur along the margins of cirque basins, along narrow, well-defined riparian corridors, and at numerous seeps and springs. Beavers have built dams behind major slope breaks in forested drainages, notably the Pistol Creek, South Fork, and Big Knife Creek drainages. Forested riparian habitat types include subalpine fir/twinflower, subalpine fir/queen's cup beadlily, western red cedar/queen's cup beadlily, grand fir/twinflower, grand fir/queen's cup beadlily, spruce/queen's cup beadlily, and black cottonwood/ponderosa pine.

Finley Creek

The Finley Creek subwatershed contains the highest density of wetlands within the Jocko River Watershed. A large wetlands-riparian complex dominated by cottonwood, willow, and sedge grasses is concentrated along the valley floor where there is a complex pattern of surface water and ground water interactions. Beavers have built dams behind major slope breaks in forested drainages. Wetland and riparian habitat types include subalpine fir/twinflower, subalpine fir/queen's cup beadlily, grand fir/twinflower, grand fir/queen's cup beadlily, spruce/queen's cup beadlily, and black cottonwood/ponderosa pine.

Valley Creek

The Valley Creek subwatershed contains wetland-riparian complexes at headwater cirque basins, along high-, mid-, and low-elevation streams, and at numerous seeps and springs. A headwater wetland complex at the East Fork of Valley Creek contains aspen and willow thickets and sedge grasses. It is a critical area for storage and slow release of water supporting stream flows during late summer periods. Forested riparian habitat types include subalpine fir/twinflower, subalpine fir/queen's cup beadlily, western hemlock/queen's cup beadlily, western redcedar/queen's cup beadlily, grand fir/queen's cup beadlily, spruce queen's cup beadlily, Douglas-fir/snowberry, and black cottonwood/ponderosa pine. Relic beaver dams remain behind major slope breaks and support mountain alder and black cottonwood/red osier dogwood habitat types.

Mainstem of the Jocko River

The mainstem Jocko River floodplain supports deciduous riparian/wetland complexes characterized as a black cottonwood/red-osier dogwood habitat type. Early seral stages are present on alluvial bars and transition to mid-seral and late-seral stages on relatively undisturbed sites. The cottonwood gallery forest is heavily interspersed with emergent and shrub wetlands of varying degrees of saturation or inundation. Emergent wetlands are dominated by common cattails, sedges, rushes, or other hydrophytic grasses and forbs. Shrub wetlands are dominated by black cottonwood saplings, red osier dogwood, willow, mountain alder, and water birch. The aquatic-bed wetlands are typically dominated by watercress and duckweed.

Culturally Important Plants

Plants that were important to the Salish and Kootenai people of ancestral times continue to be used for cultural practices and other uses by present-day Tribal people. All plant species that have been Federally listed under the Endangered Species Act and all plants that are considered culturally important by the Salish and Kootenai Culture Committees and Tribal Ethnobotanist are classified as Tribal Plants of Special Concern. The Tribes maintain a Tribal Ethnobotanical database that currently lists 158 vascular and non-vascular species classified as Tribal Plants of Special Concern. Twenty-seven of these species have been listed as Cultural Plants of Priority Concern. Many more species, both vascular and non-vascular,

are undergoing analysis for cultural relevance and incorporation into the Tribal database.

In addition, the Tribes have established a Tribal registry of significant plants which groups plants into the following categories:

The headwater tributaries of the Jocko River provide important huckleberry harvesting areas for Tribal members.

- **Tribal Plants**
  All plant species, including exotics, used by the Tribes and found within the Reservation boundaries and aboriginal areas;

- **Tribal Plants of Special Concern**
  Plant species determined to be critically important as food or medicine, or that are of spiritual importance. This includes species found in traditional harvest areas not accessible to tribal harvesters due to land status.

- **Tribal Plants At Risk**
  Plant species determined to be threatened biologically by land development activities, commercial harvest, timber sale activities, herbicide treatment activities, agriculture practices, over harvest, and other environmental degradation.

- **Tribal Watch Plants**
  Plant species identified by cultural elders that are in need of botanical taxonomic identification. Many of these species or the communities in which they occurred are potentially extirpated.

Threatened and Endangered Plant Species

The Federal Register lists threatened and endangered plant species. In addition the Montana Natural Heritage Program provides yearly updates on the status of hundreds of vascular and non-vascular plant species. A wetland/riparian area plant list is provided in Appendix B. On the Flathead Reservation eighteen plant species have been identified as Plant Species of Special Concern by the Montana Natural Heritage Program. A few of them have been surveyed on Tribal lands and continue to be monitored. Others have not been seen in recent years, and there is a high probability that some of these have been extirpated.

The U.S. Fish and Wildlife Service (USFWS) has proposed listing Spalding's campion, also known as Spalding's catchfly, as threatened pursuant to the Endangered Species Act. The species is currently known from a total of 52 populations, nine of which are in western Montana. It is threatened by a variety of factors including habitat destruction and fragmentation from agricultural and urban development, grazing and trampling by domestic livestock and native herbivores, herbicide treatment, and competition from nonnative plant species.

A wetland plant, water howellia, is listed as threatened by the USFWS pursuant to the Endangered Species Act. Howellia grows in firm, consolidated sediments associated with glacial potholes and former river oxbows that flood in spring but

usually dry out by late summer. Populations of this plant are found in Lake and Missoula counties. Water howellia is threatened by loss of wetland habitat and habitat changes due to timber harvesting, livestock grazing, residential development, and competition from introduced plant species.

Wildlife and Fish

The Jocko River Watershed provides a wide diversity of habitats from its source to its mouth. These habitats, in turn, provide niches for a wide and diverse array of birds, mammals, amphibians, and reptiles. Approximately 265 species of birds, 69 species of mammals, 8 species of amphibians, 9 species of reptiles, and 23 species of fish occur in the watershed (Appendix A).

The watershed supports a diversity of mammalian species ranging in size from small mammals like voles and bats to elk and grizzly bears.

Each of the vegetative communities within the watershed provides habitat for numerous species of migratory birds, including passerines, raptors, shorebirds, waterfowl, and upland gamebirds. The diversity of habitats offers niches for several species of each of these major avian groups.

The watershed also supports a diversity of mammalian species ranging in size from small mammals such as shrews, mice, voles and bats to larger species, including deer, elk, and grizzly and black bears. Some are limited in their movements by habitat factors, others are wide-ranging and occur throughout the watershed.

Amphibians — frogs, toads and salamanders — are present in many of the wetter parts of the watershed. Most are associated with wetland and riparian habitats. Reptiles in the Jocko Watershed are limited to six species of snakes, two species of lizards, and one species of turtle.

Figure 2.6 shows the areas of special concern for wildlife in the Jocko. This map is not inclusive, however. Wetlands, stream corridors, and riparian areas are important for wildlife but could not be effectively mapped at this scale. In addition, there are many other unmapped dispersed or local sites on forested and open lands that are valuable wildlife habitat. Zone 1 habitat for grizzly bears (a federally protected species listed as threatened under the Endangered Species Act) constitutes critical habitat and recovery areas for the grizzly bear. Zone 2 habitat, areas occupied by grizzly bears with the potential to be relcassified to Zone 1, lies immediately adjacent.

The Jocko River fishery is characteristic of many western Montana developed watersheds. The river has been influenced by rural developments such as irrigation, agriculture, and transportation corridors. Past fisheries management practices — namely the introduction of nonnative species — have altered the ecology of the river. Twenty-three species now occur in the watershed. Historically, the only salmonids in the river were mountain whitefish, bull trout, and westslope

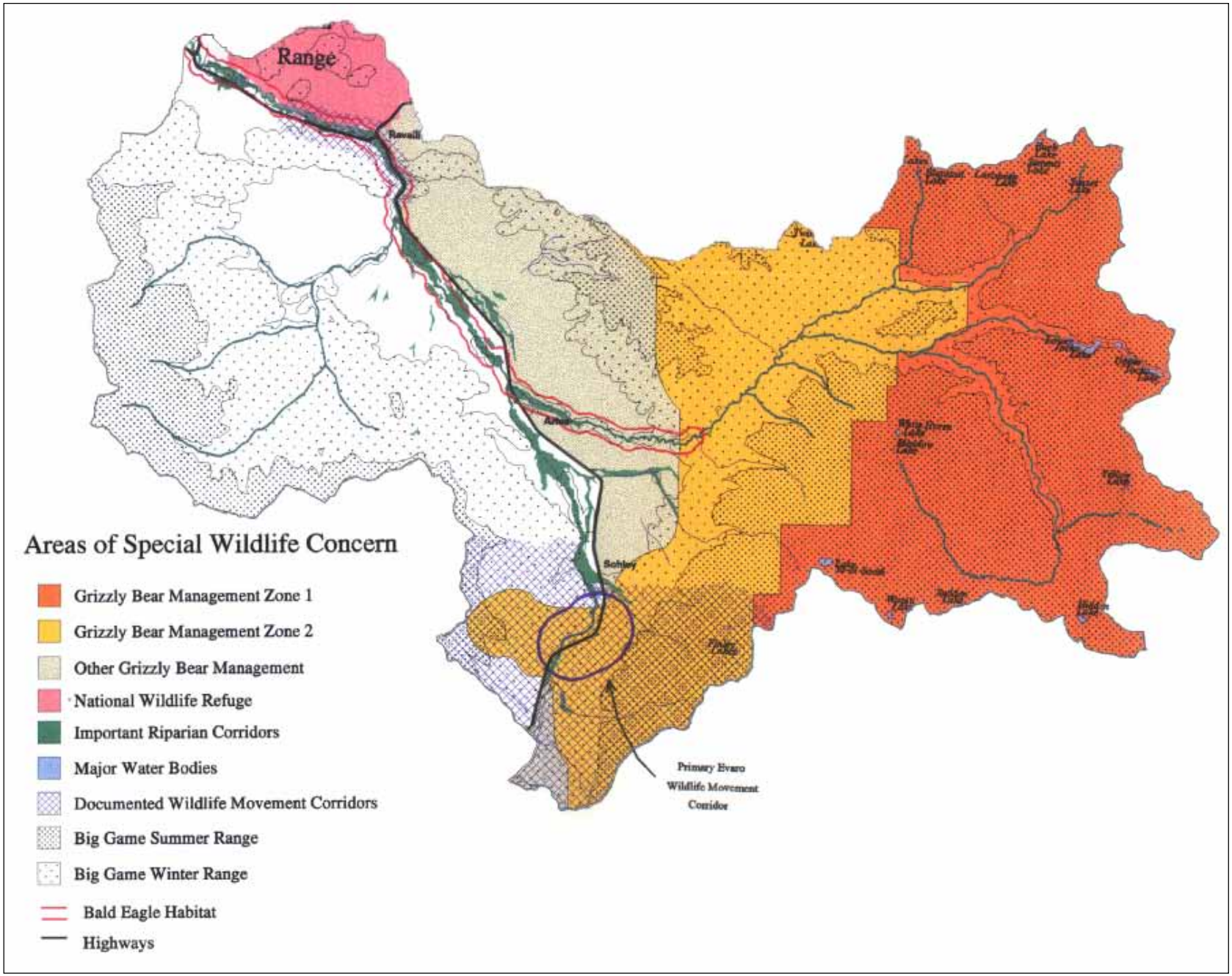
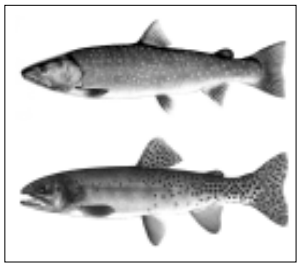


Figure 2.6. Areas of special concern for wildlife in the Jocko Watershed

cutthroat trout. The current fish distribution is the result of habitat alterations and fish introductions — rainbow, brown, and brook trout have been stocked and are now naturalized. The Jocko River is the predominant spawning and rearing tributary for salmonid species in the lower Flathead River (DosSantos et al. 1998). It also supports a resident and migratory salmonid population.



The upper three forks of the Jocko River are considered the strongholds for the two native trout species — bull trout (top) and cutthroat trout (bottom).

Table 2.5 describes mainstem Jocko River fish habitats. The lower reaches of the Jocko River (below Finley Creek) harbor a relatively productive rainbow trout and brown trout fishery. The native trout are at low densities, but mountain whitefish are fairly abundant. The upper reaches of the Jocko become higher gradient and anthropogenic impacts are less noticeable. Here the native trout species are more abundant than brown or rainbow trout, however brook trout are present. The North, Middle, and South Forks of the Jocko River are considered the native species strongholds, although brook trout are abundant in these reaches and compete for space and food with native trout.

Table 2.5. Jocko River fish habitat units by reach.

Habitat Units	Percent occurrence of habitat unit by reach[1]				
	1	2	3	4	5
Pools	2%	1%	2.5%	3%	2.5%
Riffles	10%	7.5%	2.5%	10%	5%
Runs	85.5%	91.5%	95%	87%	57.5%
Pocket water	2.5%	0%	0%	0%	35%
Average for reaches 1 - 5	Pools 2.2%	Riffles 7%	Runs 83.3%	Pocket water[2] 7.5%	

[1] *Reaches are shown in figure 3.1 and described in table 3.1.*
[2] *Reach 5 contains spaced accumulations of boulders which create pocket water. Boulder accumulations are not observed in downstream reaches. Source: DosSantos, et al. 1988.*

Threatened and Endangered Wildlife and Fish Species

Wildlife

The terrestrial wildlife species that occur in the Jocko Watershed include three federally listed species. The grey wolf is listed as endangered; the grizzly bear and Canada lynx are listed as threatened. The peregrine falcon was recently removed from the Endangered and Threatened Species List due to recovery, and the bald eagle is proposed for removal.

Grey wolves have been reported in the upper portions of the watershed, in Valley Creek, and adjacent areas. However, no recent denning activity by wolves has been documented in the drainage. Maintaining healthy prey populations by protecting wildlife habitat within the watershed will help wolves return. If packs become established, more direct management, such as the protection of denning and rendezvous sites, may be needed. Otherwise, most management for wolves would occur through the management of big game populations.

Grizzly bear activity occurs in the upper portions of the drainage and in the Ravalli area. The upper reaches of the Jocko River form the majority of the Rattlesnake Grizzly Bear Management Unit, but there has been only one observation (in 1998) of a female with cubs in the upper Jocko. Grizzly bear management is primarily focused on reducing human-bear conflicts, minimizing bear mortality, and providing secure high quality habitat for bears. Human-bear conflicts are currently the leading cause of bear mortality. Fire exclusion policies have caused an increase in forest canopy and a decrease in the quantity and productivity of berry fields and deciduous seep wetlands, which has resulted in a decline in overall habitat quality for bears.

Bald eagles occur regularly along the Jocko River during the winter months.

Bald eagles appear regularly during the winter along the Jocko River from Jocko Canyon to the mouth of the river and may eventually nest there. The Montana Bald Eagle Management Plan (MBEWG 1994) lists specific objectives for eagle habitat. Eagle habitat consists of three major components: nesting, roosting, and foraging habitat. Important nesting habitat consists of large open-canopied trees adjacent to large water bodies. The nesting period is critical for eagle productivity. Resource extraction activities need to be well planned to avoid interference with nesting and disruptions that could endanger future nesting. Foraging habitat consists of an adequate fish prey base and large, tall trees and snags for perching. Roosting habitat consists of mature forest with moderate to closed canopies. Human activities like logging, highway construction, and mining can disrupt the use of these habitats and force eagles to abandon areas. Resource management or construction activities need to consider impacts to bald eagles to maintain or increase existing eagle populations and eagle habitat.

Peregrine falcons currently pass through the area as spring and fall migrants. The species was once more common in the watershed, but habitat destruction and the widespread use of DDT and other pesticides have substantially reduced numbers. Two reintroduction sites were established on the Reservation in the early 1990s. Reintroduction has been successful at one of these (Becker 2000). Managing for peregrine falcons involves protecting nesting falcons from disturbances and maintaining an avian prey base. Potential disturbances include logging, explosives, and general construction activities.

Lynx occur in small numbers in the upper portion of the watershed. Lynx require a mosaic of different forest successional stages to satisfy their foraging, traveling and denning habitat needs. They prefer subalpine fir and lodgepole pine habitats that occur at higher elevations over the drier ponderosa pine and Douglas-fir habitat types. Subalpine fir habitats provide both foraging and denning habitat. These sites also provide a home for the primary prey of lynx, the snowshoe hare. Decades of fire suppression and timber harvesting have resulted in a forest mosaic that provides lower quality habitat for lynx.

Fish

Bull trout are currently listed as threatened under the Endangered Species Act. The Jocko River drainage was defined as a "core area" for bull trout in the *Middle Clark Fork River Drainage Status Review* by the Montana Bull Trout Scientific Group (MBTSG 1996). Core areas are considered to be strongholds for bull trout because they provide significant spawning and rearing areas (MBTRT 1998). Because it is a core area, the Jocko River is considered important in the overall recovery of the species within Montana. Bull trout occur primarily in the upper reaches of the Jocko River above the confluence with Finley Creek. Although bull trout inhabited both Finley and Valley creeks, they appear to have been extirpated from those tributaries.

Westslope cutthroat trout are currently not protected under the Endangered Species Act, however, the USFWS is currently reviewing their status. The Jocko River supports a relatively healthy population of westslope cutthroat trout. Numerous pure strain populations (i.e. populations that have not hybridized with rainbow trout) have been identified above barriers in headwater streams of the Jocko River (Evarts 2000).

Sensitive Species

The Tribes classify 39 terrestrial, vertebrate wildlife species on the Reservation as sensitive (Appendix A). Most of these occur in the Jocko Watershed. All are considered sensitive due to low populations, threats to their habitats, or highly restricted distributions. These species do not have legal protection but are considered sensitive to human activities and attention to their habitat and population needs may be warranted during the planning of resource management activities. The status of many of these species is not known because there have been few population or habitat studies.

Surface Water Quantity And Quality

Surface Water Quantity

Winter snowpack accumulation occurs across much of the forested landscape in the watershed (forests make up roughly three-fourths of the Jocko). The melting of this snowpack during the spring and summer months produces a characteristic "snowmelt hydrograph."

The flow regime for the Jocko Watershed can be depicted through use of a streamflow hydrograph, which plots the change in mean daily discharge over time. Figure 2.7 is a streamflow hydrograph for two measurement stations: one at the headwaters of the South Fork of the Jocko River, and another near the mouth of the mainstem at Dixon.

Three points are highlighted relative to the streamflow regime for the Jocko River.

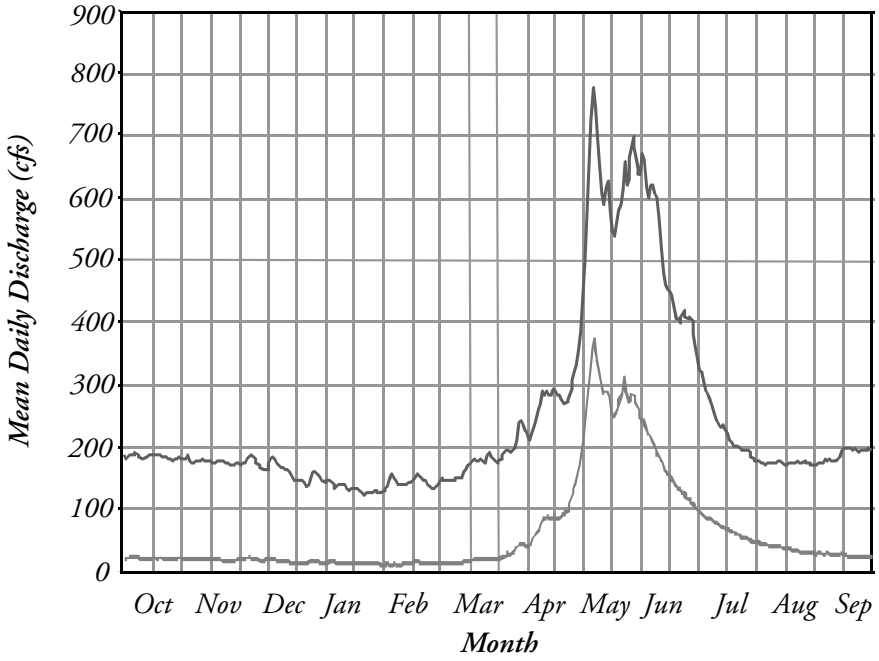


Figure 2.7. Mean daily streamflow hydrograph for the 1991 - 1997 period. Jocko River at Dixon – USGS station number 12388200 (shown as the upper line darker gray), and South Fork Jocko River at mouth – USGS station number 12381400.

- The ratio of mean annual discharge to drainage area for the 1991 to 1997 period is 1.1 for the South Fork and 0.6 for the Jocko River at the mouth. This is the expected trend, and this trend demonstrates that, per unit of land area, more runoff is produced in the headwater basin.
- The ratio of peak flow to low (wintertime) flow or base flow for the 1991-1997 period is 39 for the South Fork and 6 for the Jocko River at the mouth. This demonstrates that groundwater inflow sustains winter streamflows in the lower Jocko River and that similar inflows do not exist in the headwater drainages.
- Throughout the watershed, the shape of the hydrograph is characteristic of a snowmelt hydrograph. The Middle and North Forks are significantly depleted for irrigation purposes, and the spring runoff pattern visible at the mouth is, in large part, maintained by the unregulated South Fork of the Jocko River.

Two reservoirs are located in the headwaters of the Middle Fork: a transbasin diversion from the Clearwater River into the Jocko River and a transbasin diversion from the Jocko River into the Mission Valley. Several run-of-the-river irrigation withdrawal facilities are also located on the mainstem and tributaries of the Jocko River. The largest diversion point is located at the "K" canal. For the 1992 through 1996 period, the average annual diversion at this point was 31,000 acre-feet of water (CSKT 1999a).

In 1986 and 1987, a set of interim instream flow points were established at key stream-canal intersection nodes to ameliorate impacts from irrigation dewatering. The FAID is required to maintain either interim instream flow levels, or natural inflows at interim instream flow points (BIA 1987; Flathead Agency Irrigation Division 1990). Table 2.7 shows the location and magnitude of the interim instream flow points. There are no required minimum reservoir pool levels for the two headwater reservoirs (Bureau of Indian Affairs 1987).

Table 2.7. Location of instream flow points and required minimum (interim) instream flow for each.

Location	Instantaneous Streamflow (cfs)
MF Jocko River below Tabor Feeder Canal	20.0
NF Jocko River below Tabor Feeder Canal	18.0
Jocko River below Jocko S Canal	36.0
Jocko River below Lower S Canal	43.0
Jocko River below Lower J Canal	76.0
Jocko River at Mouth	96.0
Big Knife Creek below Jocko S Canal	2.0
Agency Creek above Jocko S Canal	2.0
East Finley Creek below N Canal	8.0
Agency Creek below Upper J Canal	8.0
Finley Creek below E Canal	7.5
Finley Creek at Mouth	8.5

Surface Water Quality

Headwater tributaries and lakes in the Jocko Watershed are classified with a water quality standard of A-1. All other tributaries and surface waters are classified with a water quality standard of B-1 (CSKT 1995). The goal of both standards is to maintain high water quality.[2] Overall, information suggests that designated beneficial uses are not impaired by instream water quality conditions, except water temperature. Downstream increases in water temperature in the mainstem of the Jocko River may influence the fish assemblages observed in the river and detrimentally affect aquatic life (CSKT 2000).

Major ion chemistry data for the Jocko Watershed indicate the river and tributaries are dominantly a calcium to magnesium-bicarbonate water type (CSKT 2000). Dissolved solids concentrations are greatest near the mouth of the Jocko River. Suspended solids information indicates that concentrations increase as discharge increases. Data from Finley Creek suggest that human activities are contributing sediment to the river. Nutrient concentrations, turbidity values, and water temperatures increase as one moves downstream, but the magnitude of these increases, at least with respect to nutrients and turbidity, is low relative to other streams on the Reservation.

Ground Water Quantity And Quality

A number of alluvial, valley-floor aquifers underlie the Jocko Valley (Makepeace and Goldbach 1994). The most productive valley-floor aquifers are located along the Jocko River and Finley Creek, in the vicinity of Arlee. The groundwater flows from the south to the north, and groundwater flow paths that lie to the south converge toward the Jocko River, indicating that there is significant interchange between surface and ground waters (Makepeace 1989). Figure 2.9 shows the principal valley aquifers in the Jocko Watershed. Figure 2.10 shows the water table contours for valley aquifers.

When viewed across the entire Jocko Watershed, groundwater quality is high. However, in the vicinity of Arlee, there are notable increases in nitrate, phosphate, and chloride concentrations (Billmayer 1999). Additionally, approximately 30 percent of wells sampled in Arlee had detections of fecal coliforms (data summarized in Billmayer 1999). Contaminant concentrations do not exceed Safe Drinking Water Act standards (MCLs), but indicate that on-site septic disposal practices in Arlee are loading the underlying aquifer with pollutants. The presence of these septic-related pollutants indicates that the aquifer is at significant risk from land uses. As the community develops and stormwater runoff and uncontrolled discharges increase, significant pollution prevention measures will be required to maintain the existing ground water quality.

Surface Water-Ground Water Interactions

From where the Jocko River emerges from the Jocko Canyon below the confluence with Big Knife Creek to the mouth of the river, there is a significant seasonal interchange between surface water and alluvial ground water. Upstream of the confluence, surface and ground water interaction is restricted.

Below Big Knife Creek, three segments of the river show distinct patterns of surface and ground water interaction: the Jocko River from Big Knife Creek to the confluence with Finley Creek (~ 5.3 river miles); the Jocko River from the confluence of Finley Creek to the confluence of Valley Creek (~6.7 river miles); and the river downstream of Valley Creek to the mouth (~11 river miles).

In the first segment, the Jocko River overlies an unconfined, outwash aquifer that exhibits seasonal fluctuations in water table elevation in excess of 50 feet (Makepeace 1989). When water tables elevations are at their highest level during July, August, and September, the river gains the greatest volume of ground water. During January through May, when water table elevations are low, the upper section of this reach loses water to the aquifer. When viewed on an annual basis, the Jocko River in this segment gains over 18,000 acre-feet of groundwater per year.

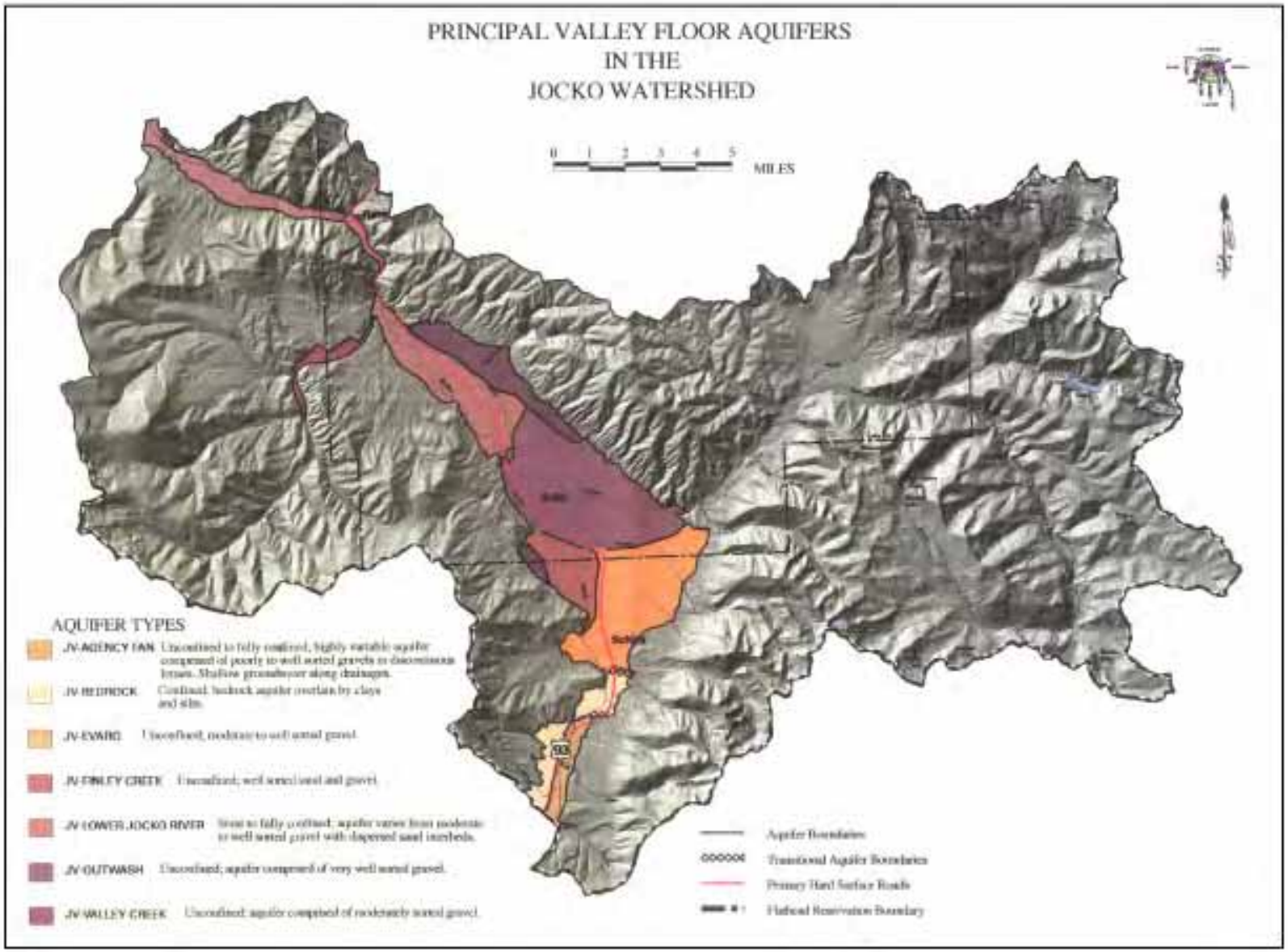


Figure 2.9. Principal valley aquifers in the Jocko Watershed

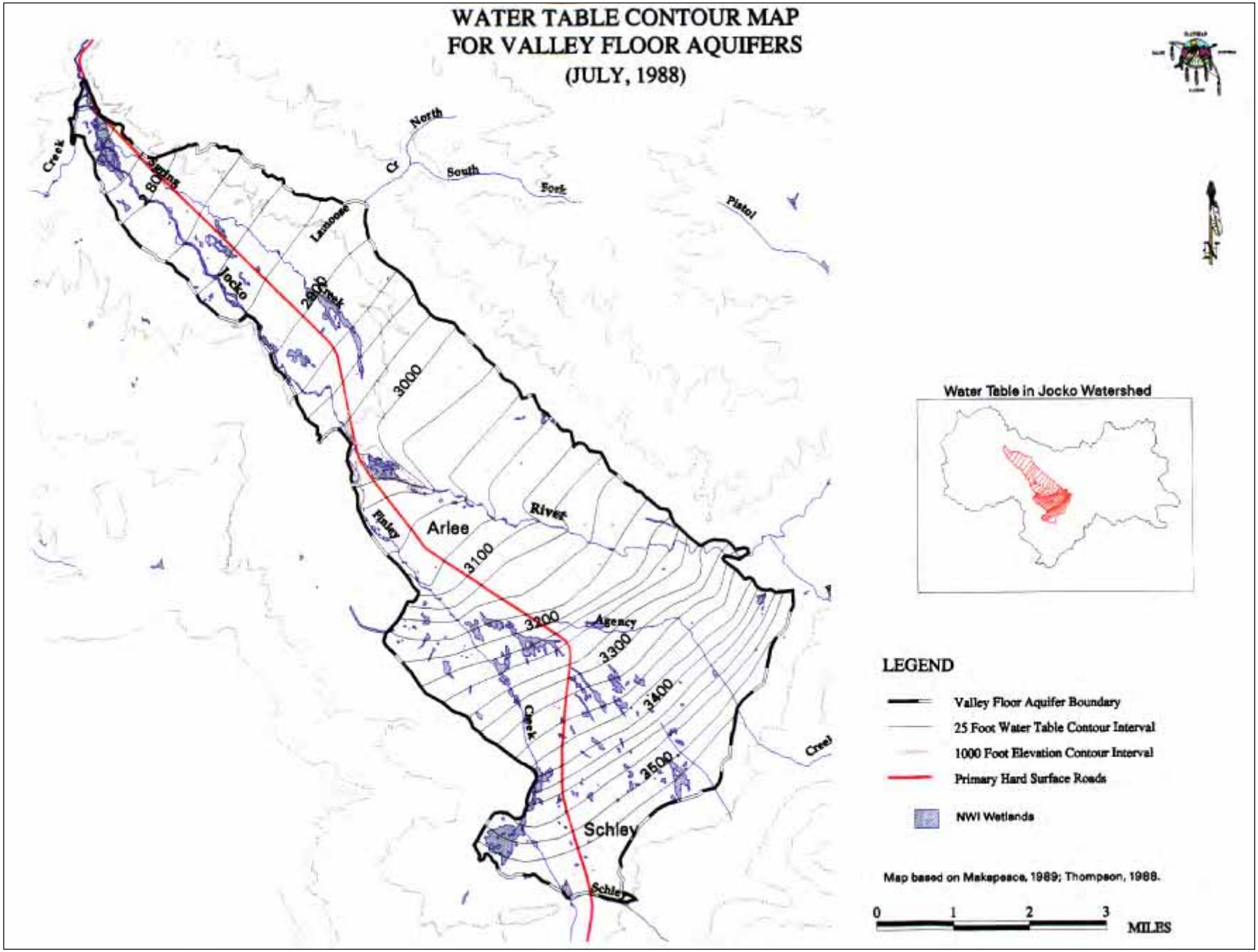


Figure 2.10. Water table contours, Jocko Watershed

In the second segment, the Jocko River overlies a shallow confined aquifer. The river gains ground water during all twelve months of the year. On an annual basis, this reach gains approximately 26,000 acre-feet.

In the lowermost segment, the river generally flows through a restricted alluvial valley with a more limited aquifer system. The river gains in this reach, but the magnitude of gain is on the order of 3,000 to 5,000 acre-feet.

The bitterroot harvest.

Chapter 3

Jocko Watershed Assessment

Seven sub-basins makeup the Jocko Watershed. Two of these — the upper mainstem and lower mainstem — are further divided into seven reaches.

Introduction

For assessment purposes, we have divided the Jocko River Watershed into seven sub-basins: Upper Mainstem, Lower Mainstem, North Fork, Middle Fork, South Fork, Finley Creek, and Valley Creek. The Upper and Lower Mainstem are further divided into seven reaches (table 3.1, figure 3.1).

Table 3.1. Mainstem river reaches.

Sub-basin	Reach Number	Description
Lower Mainstem	Reach 1	Mouth to Spring Canyon (Bison Range)
	Reach 2	Spring Canyon to HW 200
	Reach 3	HW 200 to Valley Creek
	Reach 4	Valley Creek to Finley Creek
Upper Mainstem	Reach 5	Finley Creek to K Canal
	Reach 6	K Canal to North Fork of the Jocko River
	Reach 7	Jocko River to Middle and South Fork Confluence
North Fork	Reach 8	North Fork of the Jocko River
Middle Fork	Reach 9	Middle Fork of the Jocko River
South Fork	Reach 10	South Fork of the Jocko River

While there have been significant hydrologic data gathered for the Jocko River Watershed, less information is available for wetland and riparian habitats. Forested wetlands were almost completely missed by the Nation Wetlands Inventory. Approximately 73% of the Jocko River watershed landbase is covered by coniferous forest. Data on wetland and riparian condition are also lacking for many non-forest wetlands in the Jocko. Filling this wetland/riparian area data gap is one of the

highest priorities for the action plan. Still, even with limited data, it is possible to make some general characterizations about the ecological condition of watershed.

Overview

The overall ecological health of the Jocko River Watershed is good to fair in the upper reaches (above the confluence with Finley Creek) and poor in the lower reaches (Evarts 2000). Wetlands and riparian areas in the South Fork, the North Fork above the Tabor Feeder Canal, and the Middle Fork are in good condition. Currently, livestock grazing and forestry are the dominant land uses in the upper reaches. Forestry, especially the roads associated with timber harvesting, have had some impact on the upper watershed. However, the impacts from livestock grazing in the upper watershed have not been as significant because the morphology of the stream channel tends to be resistant to the kinds of disturbances typically associated with livestock grazing. But downstream of Finley Creek, the river enters a broad valley floor with a much wider floodplain. The gradient flattens, and the river becomes more sinuous and less confined. These lower reaches have suffered a loss and/or degradation of wetland and riparian habitats, water courses have been channelized, water quality degraded, and flows altered (CSKT 2000; Evarts 2000). Adding to these impacts are problematic irrigation diversions. The Finley Creek drainage is considered highly impaired (CSKT 1999b). It has been impacted by transportation corridors, agricultural development, forestry practices, and rural development. The Valley Creek drainage is considered moderately impaired (CSKT 1999b). Forestry practices and livestock grazing are responsible for the primary impacts. Table 3.2 shows the results of a Montana Riparian and Wetland Association assessment of riparian condition for different parts of the Jocko Watershed.

Table 3.2. Montana Riparian and Wetland Association riparian condition results for various sites within the Jocko Watershed.

Location	Date	Riparian Condition
Middle Fork Jocko below Reservoirs	1993	Functioning At Risk
Middle Fork Jocko at Tabor Feeder diversion	1994	Proper Functioning Condition
North Fork Jocko at mouth	1993	Functioning At Risk
Jocko River below North Fork	1993	Functioning At Risk
Jocko River below Big Knife Creek	1993	Functioning At Risk
Lower Jocko River near mouth	1995	Functioning At Risk
Pistol Creek	1995	Proper Functioning Condition
Jocko Spring Creek	1994	Functioning At Risk
Selow Creek	1993	Functioning At Risk

Source: Montana Riparian and Wetland Association 1993 - 1997

Introduced fish species in the Jocko Watershed pose a significant threat to bull trout and westslope cutthroat trout. Research has shown that artificial or human-caused habitat disruptions increase the vulnerability of indigenous fish assemblages

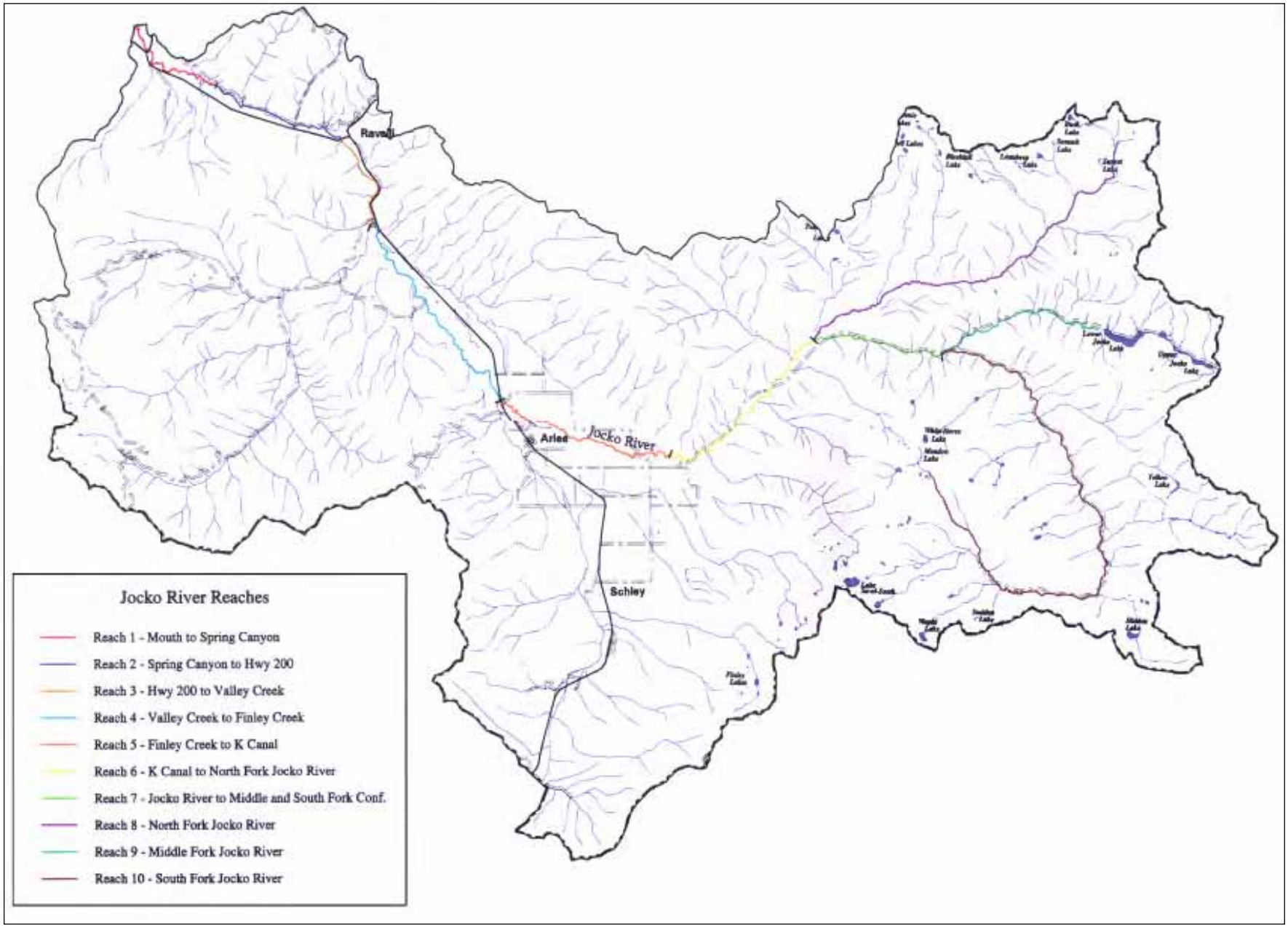


Figure 3.1. Jocko River reaches.

to invasion by introduced fishes (Baltz and Moyle 1993; Moyle and Stato 1991). This is especially true for cold-water, salmonid-dominated assemblages when the invading species evolved in warmer thermal regimes and are more tolerant to fine sediment inputs. Research has also shown that brook trout are more widely distributed and bull trout less abundant in the more heavily impacted drainages (Clancy 1993; Frissell et al. 1995; Huntington 1995). The Jocko River Watershed fits this pattern (figure 3.2). In the lower reaches of the mainstem river, rainbow trout and brown trout predominate. Perhaps the most impaired subwatersheds are those of Finley and Valley Creeks. Here, bull trout have essentially been extirpated and replaced by brook trout. Westslope cutthroat trout persist only in the highest reaches of the drainage. Though the upper reaches of the Mainstem, North, Middle, and South Forks of the Jocko are less impaired, the same trend can be seen. The subwatershed that is least impaired by human disturbances — the South Fork of the Jocko — holds the healthiest populations of native salmonids.

From a wildlife perspective, the overall ecological health of the Jocko River watershed is good to fair in the upper reaches (above Finley Creek) and fair to poor in the lower reaches.

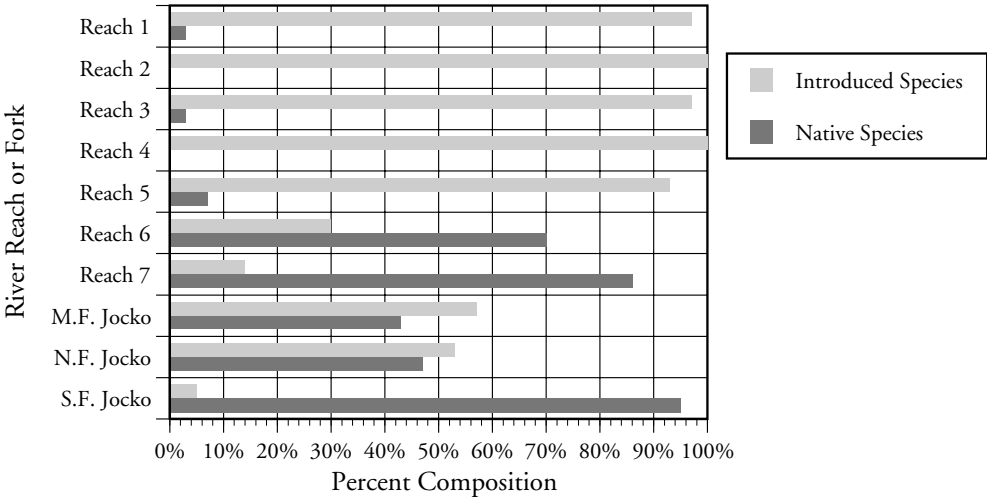


Figure 3.2. Jocko River fish species composition, native vs. introduced species

The paragraphs that follow include an assessment of the geomorphology, floodplain characteristics[3], and ecological health of each sub-basin.

Sub-basin Assessments

South Fork of the Jocko River

At 40,395 acres, the South Fork of the Jocko subwatershed drains the largest area of the three-headwater tributaries. The drainage basin is heavily glaciated. The river flows through hillslope or glacially derived boulder clusters with pockets of finer-grained, stream-reworked cobbles and gravels. It is a cascade, or step-pool stream with steps formed of boulder clusters or large wood accumulations. The South Fork of the Jocko River is generally fully confined between canyon walls or high terrace surfaces. Near the mouth, the channel is laterally less confined and there is an increase in sinuosity and alternating pools and riffles.

The entire South Fork drainage lies within the South Fork of the Jocko Primitive Area. The primitive area designation now restricts land use and management activities. Logging, for example, is prohibited, although the area was logged extensively in the past. The road system, which receives minimal maintenance, is deteriorating and contributing an increasing amount of sediment to streams.

Wildlife habitat in the South Fork is in good condition. Riparian and wetland habitats are largely intact and functioning well. Diversity of cover types and layers provide rich habitat conditions for a wide variety of birds, mammals, and amphibians. Reptiles are limited due to the particular local habitats present. Issues of concern include:

- Abandoned roads
- Current maintenance of road system
- Absence of wildfires due to fire exclusion policies

In some segments of the North Fork below the intersection with the Tabor Feeder Canal there are floodplain beaver-dam complexes.

North Fork of the Jocko River

The North Fork Jocko subwatershed is the second largest of the three headwater tributaries. It encompasses 25,213 acres. Like the South Fork, the North Fork flows through a heavily glaciated basin. Upstream from the intersection of the North Fork and the Tabor Feeder Canal, the channel contains a high density of hillslope and glacially derived boulders with pockets of cobble and gravel materials. In this reach, the stream is fully confined and is a cascade or step-pool stream.

Downstream from the intersection with the Tabor Feeder Canal, the channel remains a step-pool stream, but increasingly the steps are formed of large woody debris and the pools are longer and contain more stream-reworked gravels. The channel is confined by low terrace surfaces in this reach, and in some segments there are floodplain beaver-dam complexes and interconnected overbank areas.

The upper reaches (above Tabor Feeder Canal) of the North Fork are largely within the Mission Mountains Tribal Wilderness Area, and the riparian ecosystem and wildlife habitat conditions are considered to be in excellent condition. The riparian area of the North Fork below the Tabor Feeder canal has been logged, and is affected by irrigation (both water withdrawals and an altered hydrograph). It is also open to unrestricted riparian grazing. The most recent logging in the riparian zone, which reduced the amount of large woody debris in the stream channel, occurred in the early 1900s.

The Tabor Feeder canal diverts 24,000 acre feet annually from the North Fork Jocko River. This has created a conduit for mixing of fish species between the Middle Fork and the North Fork and potentially the Mission Valley. The diversion has also altered the timing and frequency of channel-maintenance flows. The impacts from this altered flow regime are unknown. This portion of the Jocko River drainage below the Tabor Feeder Canal is grazed as a range unit, and

the impacts to the riparian ecosystem have not been quantified. However, grazing of the riparian area is unrestricted, and portions of the drainage have been significantly impacted. The situation results in decreased habitat diversity and fewer niches for a wide variety of riparian-dependant wildlife, including deer, small mammals, birds and amphibians. Issues of concern include:

One of the more common birds seen on the headwater reaches of the Jocko River is the dipper, which forages underwater for aquatic insects.

- Unrestricted grazing of riparian and wetland habitat
- Irrigation impacts (altered hydrograph)
- Historic riparian logging

Middle Fork of the Jocko River

Draining approximately 9,885 acres of land, the Middle Fork Jocko subwatershed is smallest of the Jocko River headwater tributaries. The basin was glaciated, but the overprint of glaciation is masked by two headwater reservoirs. Between the reservoirs and the intersection with the Tabor Feeder Canal, the stream is a confined step-pool system. In this reach, the Middle Fork has been impacted by reservoir operations, and there are significant fine-gravel accumulations that cause the channel to be unstable. Downstream of the intersection with the Tabor Feeder Canal, the river is a steep, fully confined step-pool stream with steps formed mainly of boulder clusters.

The entire area south of the Jocko road, including the Middle Fork River is within the South Fork of the Jocko Primitive Area. The riparian corridor was logged in the early 1900s and was open to unrestricted grazing until 1997. The riparian zone is currently recovering, however large woody debris is lacking because of the logging that occurred earlier.

The FAID operates two storage reservoirs and two transbasin canals that affect the Middle Fork drainage. The most significant impact on stream ecology is the altered flow regime imposed by the FAID, which diverts 450,000 acre feet annually from the Middle Fork, altering the timing and magnitude of channel-maintenance flows. In addition, the stream channel is used within the FAID's water conveyance network. The specific impacts associated with the altered flow regime have not been quantified.

Wildlife habitat throughout much of the Middle Fork is in good condition. Logging in some areas has added diversity, while in other areas it has adversely impacted wildlife. Past grazing activities have degraded riparian habitats, but grazing practices have changed, and these areas are now recovering. The two large irrigation storage reservoirs inundated valuable riparian areas and adjacent wildlife habitats for big game, bears, small mammals, birds and amphibians. These impacts cannot be mitigated for on-site. Portions of the river channel and its floodplain have been adversely affected by heavy grazing (Trosper 2000). Issues of concern include:

- Irrigation impacts (altered hydrograph and reservoirs)
- Historic riparian logging
- Unrestricted grazing of riparian and wetland habitat

Upper Mainstem Jocko River - From the confluence of the Middle Fork to Finley Creek (Reaches 7 to 5)

In these reaches the Jocko River flows through unconsolidated, glacial outwash materials that form high terrace surfaces adjacent to the active channel and limit the development of a wide floodplain. Outwash materials contain a high density of large boulders. These have been transported to the river and deposited as grouped clusters or as individual boulders. There has been some lateral migration of the river within the confines of outwash terraces and the channel alternates between a pool-riffle and step-pool geometry. Large woody debris accumulations are limited, due in part to high outwash surfaces adjacent to the active channel. Banks along the lower sections have been disturbed to a significant degree.

The Upper Mainstem subwatershed includes the river below the confluence of the Middle and South Forks to Finley Creek (Reaches 5 through 7), approximately 15.6 miles of river.

The most significant impact is livestock grazing in riparian and wetland habitats. In some locations grazing has resulted in limited regeneration of riparian plants. As a consequence, overall habitat diversity and the ability of some sites to serve as functional riparian habitat has been degraded. Other human activities in the river corridor have dramatically altered wildlife habitats and limited productivity for many of the riparian-area wildlife species, including deer, small mammals, birds, and amphibians.

Reach 7

This reach runs from the confluence of the Middle and South Forks to the North Fork confluence (approximately 3.75 miles). It includes the Upper Jocko "S" canal, which has been an effective fish barrier since the 1920s. The fish barrier is perhaps the most defining feature of the reach because it has effectively stopped the advancement of rainbow trout into the Middle and South Forks of the Jocko. Genetic research on the westslope populations above the "S" canal has shown these populations to be pure strain westslope cutthroat trout (CSKT 1999b). Eastern brook trout, however, have invaded the river above the "S" canal, and they pose a significant risk to westslope cutthroat trout and bull trout. Grazing in the riparian area is currently unrestricted. But for geomorphological reasons, the channel through this reach is fairly resistant to livestock impacts. The effects of logging on large woody debris need to be evaluated. Issues of concern include:

- Unrestricted grazing of riparian and wetland habitat
- Irrigation impacts (fish passage)

Reach 6

Reach 6 extends from the confluence with the North Fork Jocko River to the Jocko "K" canal, a distance of 4.3 miles. Here the river is still high gradient and the watershed is forested. Land uses include forestry and grazing, but little is known about the impacts associated with these uses. Pistol Creek enters the Jocko River about midway through the reach. Tribal range managers are concerned about grazing impacts at Skunk Meadow. The impacts to Pistol Creek from unregulated and uncontrolled private water diversions are more obvious but are not quantified. The Jocko "K" canal headworks was a seasonal fish barrier that diverted fish until 1996 when a fish screen was constructed and passage provided.

Reach 5

Reach 5 encompasses approximately 6.9 miles of the river between the Jocko "K" canal and Finley Creek. In this reach the stream corridor is forested. The river remains confined in a canyon and is relatively high gradient. Impacts associated with individual private land holdings are readily apparent. Some landowners have livestock and some have logged their land. While impacts are somewhat masked by stream channel morphology (high gradient, large substrate), differences in landuse are apparent. The lower end of Reach 5 has been channelized and diked in the vicinity of the Arlee hatchery. Areas within this channelized stretch have become unstable and are actively eroding. The Arlee hatchery undoubtedly has some impact, but this remains unquantified. Issues of concern include:

- Rural development
- Hatchery influences

Lower Mainstem Jocko River - From the confluence of Finley Creek to the Mouth (Reaches 4 to 1)

For the most part, the mainstem of the Jocko River downstream of Finley Creek flows through materials that have been reworked by the stream. Throughout the reach the river flows within a gravel-bedded, pool-riffle channel. Diverse floodplain wetlands, spring channels, and interconnected river-floodplain features can be found in unconfined sections. Instream accumulations of large woody debris are limited, although there are segments where the wood-loading potential from adjacent riparian areas is high.

With the exception of the Ravalli Canyon area, the river was laterally unconfined throughout this reach in its pre-disturbed condition. A large delta complex where the Jocko River historically migrated across a wide area is situated near the confluence with the Flathead River. In its current state, the reach has been significantly altered by channelization and bankside disturbance activities. Cumulative levels of disturbance are summarized for the entire lower river in table 3.3.

Table 3.3. Summary of Disturbances in the Jocko River Corridor[1]

Type of Disturbance	Length of Stream Disturbed	Percent of River Disturbed
Floodplain Encroachment	12,970 feet	13 %
Channelization	40,060 feet	39 %
Bank Erosion	41,160 feet	41 %
Vegetative Conversion	57,385 feet	57 %

[1] *Percentages add to greater than 100% because disturbances can overlap. Source: CSKT 1999a.*

As the Jocko River turns north near the town of Arlee, it becomes less confined. As the valley bottom opens up, impacts from transportation corridors, agricultural practices, and rural development become major influences. Of all the reaches on the mainstem, those in this stretch are the most impacted. Over 50% of the stream channel and floodplain has been channelized or diked. Agricultural impacts, primarily from irrigation and livestock grazing, have taken their toll as well. In addition, impacts occurring upstream, in the other subwatersheds, affect this part of the river.

Wildlife habitat conditions vary. Some portions of the riparian zone are still mostly natural with diverse and healthy riparian vegetation in various age and structural classes. But other areas have been seriously affected by changes in water flows, heavy livestock use, and agricultural activities. Some sections have cottonwood stands that will soon die out completely and not regenerate. The riparian zone along the part of the river that has been channelized continues to decline in function and vigor. The Ravalli Canyon area is a wildlife movement corridor for larger species, but the constricted nature of the reach and the presence of houses, a railroad, and the highway reduce its value as a wildlife habitat linkage corridor. Wildlife such as big game, birds, small mammals, and amphibians are all affected.

Reach 4

The impacts in Reach 4 are primarily from on-going agricultural practices and historic channel and floodplain alterations. The reach includes five private diversions, one FAID diversion, one pump site, and irrigation return flows from six diversions. Impacts from irrigation practices include fish entrapment in unscreened diversions, unstable diversion points, and water quality problems associated with the six return flows. None of the private divisions has control structures associated with them, and at times (depending on flow) they divert more water than necessary. This results in excess return flows and can cause water quality problems by increasing the temperature and fine sediment. These private diversions do not have permanent headgate structures and generally require some annual maintenance to divert water. The "Morin Ditch" is a classic example of a problematic diversion where the annual maintenance narrows the channel. The river responds by down-cutting and degrading the stream bed. As a result, the diversion point has to be moved upstream each year to capture water. This has gone on for years, and the current diversion point is now some 700 feet upstream from

the original site. None of the five private diversions has fish screens, and they are a constant drain on the fisheries resource.

Riparian areas along the mainstem of the Jocko River provide important habitat to white-tailed deer.

Impacts from livestock grazing — loss of riparian vegetation and bank trampling — are a problem in the Schall Flats area above and below South Valley Bridge and in the area just upstream of the Valley Creek confluence. Grazing makes the banks more susceptible to erosion. Bank erosion is common in these areas due to the lack of riparian vegetation and the effects of channelization and floodplain dikes. Bank erosion contributes fine sediments to the stream and reduces fish habitat complexity. Between South Valley and North Valley Bridges, nearly the entire river has been channelized or the floodplain has been restricted by a dike. Past channel modification work and modern grazing practices have created very unstable conditions. One can expect dramatic responses to even minor disturbances. For example, impacts from the flood of 1997 (a natural disturbance) were made worse than they would have been otherwise. Portions of the reach actively degraded while other areas aggraded. In addition, grazing impacts within the tributaries that enter the river in this reach (such as along Finley Creek and Jocko Spring Creek) have negative impacts on water quality. Water temperature increases due to grazing impacts are likely less pronounced but should not be ignored.

Reach 3

In this reach, the river enters a canyon between Valley Creek and the Highway 200 bridge. Here the impacts from the railroad dominate. The railroad was constructed in 1904, and its prism acts as a dike restricting the active channel to the west side of the valley. The stream channel was moved farther to the west when a private lumber mill started operations in the early 1900s. Other impacts include grazing of the riparian zone and a private fish hatchery that diverts water. There are also at least three private irrigation diversions within the reach. Generally, the stream channel is stable, aside from the gradual downstream migration of meander bends just downstream from the North Valley Bridge. The migration is probably due to the cutoff of a historic meander and subsequent diking of the floodplain for the railroad grade.

Reach 2

From highway 200 downstream to Spring Creek Canyon, the primary impacts are from channel and floodplain alterations. Historically, the Jocko River had access to the entire valley floor. The railroad cut off the river's access to nearly half of the valley in 1904. In 1954, the National Bison Range (NBR) channelized that portion of the river. Soon after, the reach began to degrade. Material was deposited downstream and caused the channel to braid and form new channels. The landowner at the time turned to U.S. Soil Conservation Service (SCS) to engineer a remedy that included a channel and dike that pinched the river against the southern slope of the Bison Range. By 1967 the NBR channelization had begun to affect upstream areas by causing the river to down-cut on the adjacent

property. This landowner, too, sought assistance from the SCS. The solution resulted in further channelization of the stream.

The end result is a 3.5-mile stretch of stream confined between an artificial dike and the toe of the slope on the south side of the Bison Range. While the channel is currently fairly stable, it is poor fish habitat and well under its historic potential. Little riparian vegetation has established itself, due in part to the microclimate between the dike and the toe of the slope. There is little or no canopy cover to provide shade, and the reach is oriented east-west along a dry, steep, south-facing slope. During the heat of the summer, water temperatures become elevated over the historic condition.

Yellow warblers utilize relatively undisturbed riparian habitats along the Jocko River.

Other impacts include an irrigation diversion operated and maintained by FAID and one uncontrolled and unregulated private water diversion. Due to the physical arrangement of this structure, it needs fairly substantial periodic maintenance. In addition, because of the diversion's placement, the north bank of the river is eroding.

Reach 1

The area between Spring Creek Canyon and the confluence with the Flathead River is relatively stable. Although the upper portion of this reach was channelized as part of the upstream activities, most of it remains unchannelized. However, the floodplain is constricted in five locations by transportation corridors (three railroad crossings and two road bridges). Two of these are problematic due to increases in water velocities during high flows. The portion of river from the Flathead River upstream to the first railroad crossing is in disequilibrium due in part to agriculture practices and the restriction of the floodplain by the railroad crossing. The result is that erosion of the left bank has accelerated, and there has been a loss of pools and riparian cover.

Irrigation impacts are minimal. However, the return flow from Jocko "J" Canal has recently been identified as problematic by the Flathead Reservation Fish and Water Technical Team (Evarts 2000), and the situation is being reviewed. Water quality problems associated with this return flow have not been assessed. Grazing is generally light, although there are problem areas.

Finley Creek

Headwater tributaries to Finley Creek that flow from the Rattlesnake Mountains to the southeast are formed in hillslope or glacially derived materials. Tributary channels are confined within canyon walls or elevated terrace surfaces and are cascade or step-pool channels. In step-pool segments, steps are formed of boulders or boulder clusters and, to a lesser extent, woody debris.

Tributaries that issue from the west are small streams that flow over hillslope-derived materials. The channels are confined by adjacent terrace surfaces. Most

stream segments are step-pool reaches, the steps formed of woody debris. Where logging, logging roads, or grazing have reduced the instream woody debris, there is a significant decrease in channel diversity (CSKT 1998).

The mainstem of Finley Creek downstream of the East Fork of Finley Creek is a laterally unconfined stream that flows over glacial outwash and fluvially reworked sediments. Historically, the stream had a fan-shaped pattern with multiple active channels that can still be traced by stringers of cottonwood trees. The historic channels may have included a diverse combination of complex step-pool and pool-riffle channel units with a large amount of inchannel, large, woody debris and interconnected floodplain habitat. Streamside activities and ongoing development pressures have resulted in a very simplified channel network with limited large woody debris and low inchannel habitat diversity.

Finley Creek is the most impacted sub-basin in the Jocko Watershed. Major impacts to wetlands and riparian areas are the U.S. Highway 93 transportation corridor, urban development, agricultural development, and forestry practices. The greatest impacts come from irrigation and grazing practices. An assessment of riparian and wetland health has not been completed.

Another significant impact in the Finley Creek drainage is residential development and the threat of urbanization. Residential development commonly results in channel and floodplain modification, removal of riparian vegetation, degradation of water quality, and conflicts with wildlife using riparian corridors. Development can also affect fish populations through increased angling pressure, as well as enhanced predation, competition, and disease transmission associated with introduced species that escape from private ponds.

The high level of human development in the Finley Creek area has had a number of impacts upon the wildlife habitat and the wildlife of the drainage. Housing developments, livestock use, and logging have created major changes in the habitat, but the construction of Highway 93, county and logging roads, corridors for powerlines, a railroad, and a petroleum pipeline have compounded those impacts. A very constricted zone within the upper portion of the Finley Creek drainage offers the last best opportunity for larger species of wildlife to cross the valley floor in the Evaro area, which makes the Finley Creek subwatershed important from a wildlife perspective. The corridor is usually referred to as the Evaro Wildlife Movement Corridor, and it is generally located on Tribal lands and adjacent undeveloped habitat on either side of Highway 93. The short segment of Highway 93 that still supports viable wildlife passage is located between Joe's Smoke Ring and Schley Homesites. Passage also occurs under the highway along the railroad right-of-way. Other species, such as small mammals, birds, and amphibians have also been adversely impacted by the human activities in this drainage.

Valley Creek

Headwater tributaries to Valley Creek flow over hillslope and glacially derived materials. Channels are fully confined within bedrock canyons and consist of alternating cascade and step-pool channel units. Large woody debris is a critical component of the inchannel habitat in most headwater stream segments (CSKT 1999; Makepeace 1998).

Below the confluence of Valley and Hewolf Creeks, the stream is laterally less confined, and the predominant floodplain materials are stream-reworked sediments. Prior to disturbance, this reach may have contained pool-riffle channel units with concentrations of woody debris and extensive beaver-dam complexes (CSKT 1999a). Currently, the channel contains a high percentage of uniform runs, limited floodplain habitat, and little inchannel woody debris (CSKT 1999).

Ruffed grouse thrive in riparian habitats along the lower reaches of the mainstem of the Jocko River.

The Valley Creek drainage encompasses approximately 41,000 acres. Three named tributaries exist within the basin: the North and East Forks of Valley Creek and Hewolf Creek. Agriculture and logging have negatively affected Valley Creek and its tributaries.

Riparian areas and wetlands have been degraded by improper livestock grazing, streamside timber harvesting, and riparian road construction. The East Fork is part of a Tribal grazing range unit. Approximately 23 percent of the stream has experienced bank trampling. The result is areas of bare ground and accelerated sediment delivery to the stream. Approximately 34 percent of the riparian zone has been disturbed; the understory has been converted to Kentucky blue grass, the overstory is sporadic or completely absent. The headwater wetland complex is heavily trampled, and large slash piles have been deposited in the wetland. In 1999, the headwater wetland and approximately three miles of an upper-stream reach were riparian fenced, and off-site stock watering facilities were developed. Table 3.4 shows the results of the Montana Riparian and Wetland Association inventory of riparian-area conditions within the sub-basin.

Table 3.4. Montana Riparian and Wetland Association riparian condition results for the Valley Creek Subwatershed

Location	Date	Riparian Condition
East Fork Valley Creek	1995	Not Functioning
North Fork Valley Creek	1993	Proper Functioning Condition

Source: Montana Riparian and Wetland Association 1993 - 1997

Conclusions

As the Tribes restore, replace, and acquire wetland and riparian habitat and bull trout habitat, they will focus on:

- Reaches that are biologically, geologically, or geomorphologically the most susceptible to impacts.

- Reaches that are the most valuable from a biological perspective, such as those with bull trout spawning and rearing habitat. These are typically areas associated with ground-water upwelling.

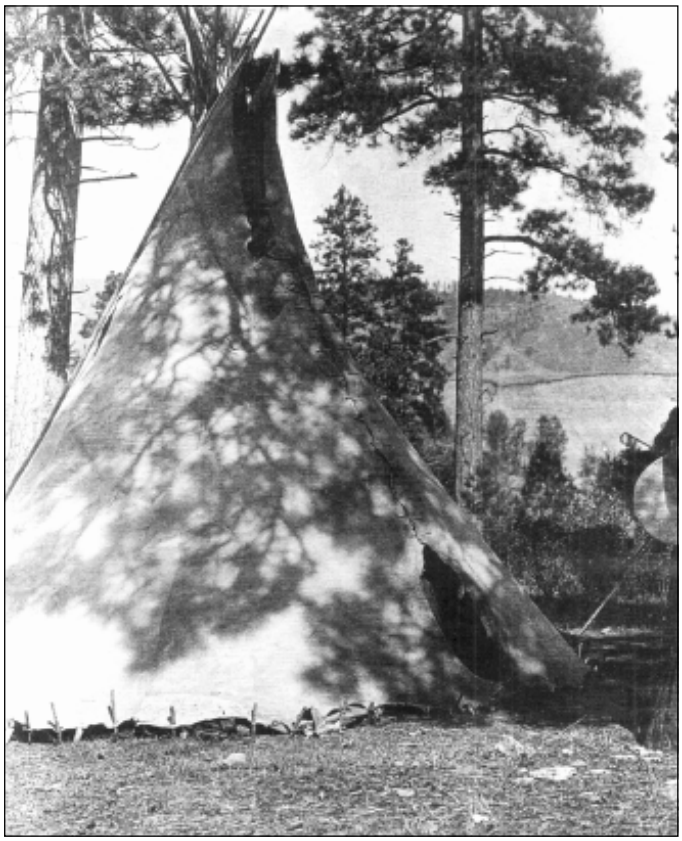
- Areas with the most restoration potential.

- Areas where land can be acquired in blocks that are large enough to have value for wildlife and to be efficiently managed.

Based on this initial assessment, the Tribes have decided to prioritize their activities within the Jocko River Watershed in the following way:

1. Protect key areas along mainstem Reaches 1, 2, and 4 and the lower part of Reach 5, first by purchasing lands from all willing sellers within these areas, and second by protecting the remaining lands with conservation easements.

2. Protect key tributaries, focusing initially on Valley Creek and its tributaries and then on Finley Creek. Again, the first step will be to purchase lands from willing sellers, the second will be to protect remaining lands with conservation easements.



A streamside camp in the early days of the Reservation.

Chapter 4

Action Plan

Introduction

The action plan that follows is broken into five periods: immediate actions will take place over the next year, short-term actions will take place between years 2 and 3, midterm actions between years 3 and 5, long-term actions between years 5 and 10, and extension years between years 10 and 20. Annual work plans prepared by an interdisciplinary team similar to that which prepared this plan will provide more specific project and scheduling information. Annual progress reports will document the work that occurred in the preceding year.

Year One: Immediate Actions

The first two steps in our watershed restoration planning process are planning and protection. Planning involves (1) filling data gaps in our knowledge of the watershed, (2) identifying the activities that degraded the watershed, and (3) developing a comprehensive, ecologically based restoration strategy. The planning actions proposed here will help to identify and prioritize areas with restoration potential and the measures necessary to restore those areas. Protection actions involve protecting the intact portions of the watershed through acquisition and other measures.

Planning Actions

- **Floodplain delineation**
  Because the floodplain and its associated ecological processes are so vital to the aquatic system, its delineation will be an immediate action. Hydraulic modeling should be part of this effort.

- **Watershed analysis**
  An important initial component of any restoration plan should be an evaluation of the ecological status of existing riparian and aquatic systems. Ideally, this assessment should be conducted at the watershed scale, while still being sufficiently detailed to depict specific reaches or channel units where particular restoration activities might ultimately occur. The

assessment provided in this document is merely descriptive, but suggests a starting point and demonstrates the need for a watershed analysis to better evaluate the ecological status of the aquatic system and links to human impacts. A watershed analysis is also needed to make a quantitative link between perceived problems and ecosystem function. This analysis should identify other landscape linkages and attempt to identify and rank limiting factors. With this information, a more comprehensive ecologically based strategy similar to that described in *Watershed Restoration: Principles and Practices* (Williams et al. 1997) can be developed.

- **Land ownership survey**
  The Tribes will need an inventory of all non-tribally owned lands within the Jocko River floodplain.

- **Baseline fisheries habitat data collection**
  While good information does exist, very little was collected specifically with bull trout and wetland/riparian restoration objectives in mind. Specific data on the current condition of bull trout habitat components are needed. Data collection will begin by using the indices and criteria-based standards developed in *The Relationship Between Land Management Activities and Habitat Requirement of Bull Trout* (MBTSG 1998). The data collected will complement the proposed watershed analysis and will be invaluable for future monitoring and evaluation efforts.

- **Baseline wildlife data collection**
  For wildlife, the work will entail habitat mapping and evaluation, wildlife baseline inventories, problem identification, cost estimation, planning, contracting, and initial protection activities.

- **Baseline vegetation database**
  A vegetation database will be developed that incorporates available biological and ecological information as well as traditional and cultural knowledge on plant species and communities in wetland and riparian areas within the watershed. The database will include information on: the Tribal and Federal Status and the Global Rank of the species or community; the status or condition of each population or site; the geographic range of the species or community; threats to the species and community; biological and ecological information; and management needs.

- **Assessing the feasibility of bull trout reintroduction**
  The cause and effect relationships of issues identified by the MBTSG will be assessed.

- **FEWA methodology**
  In consultation with the USFWS, we will assess the need to modify the Functional Effective Wetland Area (FEWA) methodology so it reflects regionally specific issues.

- **Document wetland and riparian area baseline conditions**
  Wetland and riparian area baseline conditions within priority restoration areas will be documented. Baseline conditions should include wetland and riparian acreage and functional assessment using FEWA, with appropriate modifications.

- **Fish screen assessment**
  Site identification and design work will begin.

- **Assess streamflows as they relate to fish habitat**
  The effects of altered streamflows on fish habitat will be measured.

- **Develop a monitoring strategy**
  An interdisciplinary group will be established to develop, and formalize a monitoring and evaluation strategy and produce an integrated monitoring plan.

Protection Actions

- **Develop acquisition criteria**
  The Tribes will need to develop screening criteria so acquisitions are consistent with restoration plan goals.

- **Begin acquisition of key properties and conservation easements**
  The most ecologically significant areas within the watershed are already known or can be identified quickly. Properties in these areas should be acquired or protected through binding agreements consistent with the goals of the restoration plan.

Years Two to Three: Short-term Actions

Assessment work will continue into years two and three, although the primary activities will be acquisition and passive restoration. Passive restoration involves the modification of the activities that are causing the degradation or that are preventing the ecosystem from recovering. Preliminary active restoration work may also begin.

Assessment Actions

- **Complete actions started in year one**

- **Initiate site-specific inventories**
  Site-specific wildlife and habitat inventories will be initiated based on the outcomes of the watershed-level inventory.

Protection Actions

- **Continue acquisition of key properties and conservation easements**
  Habitat protection activities will increase during this period.

Passive Restoration Actions

- **Begin passive restoration activities**
  Passive restoration activities will start in this period. These measures could include, but not be limited to: the development of site-specific management plans, fencing projects, special closures, off-site water developments, improving road management, more aggressive weed and exotic species management, improved forest practices, changing fishing regulations, improving streamflows, improving irrigation management, beaver management, improving management of urban runoff, improving public education, and developing a land stewardship program.

Active Restoration Actions

- **Planning and design of active restoration actions**
  Ongoing planning, design, and feasibility studies will occur.

Years Three to Five: Midterm Actions

Most of the major assessment work should be completed by year three. Some acquisition work will continue although the focus will shift to passive restoration activities. Active restoration work will begin in earnest.

Protection Actions

- **Continue acquisition of key properties and conservation easements**
  Habitat protection activities will be a lower priority during this period.

Passive Restoration Actions

- **Continue passive restoration activities**
  Passive restoration will become the primary focus during this period.

Active Restoration Actions

- **Begin active restoration activities**
  Active restoration activities will start in this period. These measures could include, but not be limited to: the removal and suppression of introduced fish species, the reintroduction of bull trout where extirpated, the installation of fish passage and protection (screens), fish habitat improvement projects, stream channel restoration, seeding of habitat, plantings, the development of wetland and riparian habitat, road improvement, and irrigation and agricultural water treatment. The Spring Creek Restoration Project will be completed.

Years Five to Ten: Long-term Actions

Most of the acquisition work should be completed by year five, although it is likely some key parcels and conservation easements will remain unsecured. Passive restoration work will continue, although the focus will begin to shift to active restoration activities. The monitoring and evaluation of specific restoration and enhancement measures will begin.

Protection Actions

- **Continue Acquisition of Key Properties and Conservation Easements**
  Habitat protection activities will continue to become a lower priority during this period.

Passive Restoration Actions

- **Continue passive restoration activities**
  Passive restoration will become a secondary focus during this period.

Active Restoration Actions

- **Continue active restoration activities**
  Active restoration activities become the primary focus.

- **Begin reintroduction of bull trout where extirpated**
  If proved feasible by earlier assessments, the reintroduction program will begin.

Monitoring and Evaluation Actions

- **Begin monitoring and evaluation of restoration and enhancement measures**
  This will be a major activity during the period. As a part of the Tribes' adaptive management strategy, corrective actions will be taken if monitoring and evaluation shows the need.

Years Ten to Twenty: Extension Years

With court approval, there will be an opportunity for a ten-year extension for wetland and riparian habitat restoration (but not bull trout habitat restoration). If this occurs, the actions outlined for the long-term (5-to-10-year) period will continue. Upon expending all of the funding and/or completing the restoration plan and with the concurrence of the USFWS, the Tribes will have met their restoration obligation to the court. At that point, the Tribes intend to steward the lands as part of the Tribes' homeland for the purpose of protecting treaty-reserved resources in perpetuity.

Protection Actions

- **Continue Acquisition of Key Properties and Conservation Easements**
  Habitat protection activities will continue to become a lower priority during this period.

Passive Restoration Actions

- **Continue passive restoration activities**
  Passive restoration will become a secondary focus during this period.

Active Restoration Actions

- **Continue active restoration activities**
  Active restoration activities will become the primary focus.

Monitoring and Evaluation Actions

- **Increase monitoring and evaluation of all restoration and enhancement measures**
  This will be a major activity during the period. As a part of the Tribes' adaptive management strategy, corrective actions will be taken if monitoring and evaluation show the need.

Clean water is central to the culture of the Tribes.

Chapter 5

Restoration and Enhancement Measures to be Used and Cost Estimates

The restoration measures the Tribes will use can be grouped into three broad categories: protection, passive restoration, and active restoration.

Introduction

The basic goal of watershed restoration is to reestablish the natural processes that existed before the watershed was disturbed. Because the Tribes believe a broad, comprehensive approach has a greater chance of succeeding, the goal includes reestablishing natural linkages between the terrestrial, riparian, and aquatic parts of the ecosystem. The focus, however, will be on the protection and restoration of riparian and wetland areas because they have the greatest influence over the health of the watershed. The goal includes keeping the Tribes' acquisitions of lands consolidated in order to maximize their habitat value and improve management efficiency.

Costs have been estimated whenever possible. The estimates are based on the best current information and on similar projects undertaken elsewhere on the Reservation. For some activities, costs cannot be estimated at this stage in the planning process. Costs for these activities and acquisitions will be included in annual work plans. In addition, the costs of some measures may be covered by other Tribal programs. The restoration measures the Tribes will use can be grouped into three broad categories: protection, passive restoration, and active restoration.

Protection Measures

Measures that fall under the protection heading involve identifying the best available remaining habitats and protecting them. The protection of intact ecosystems is typically less expensive and often has greater importance to the overall restoration effort than restoring degraded systems. Protecting intact wetland and riparian areas, for example, is important because: (1) intact areas are key sources of biological diversity; (2) intact wetland and riparian areas provide reference sites to guide restoration activities; (3) there is a risk of failure when attempting to restore degraded areas; and (4) protection of intact wetland and riparian areas can often be more cost effective than restoring degraded areas. When selecting one of the following protection measures, two primary considerations will be: (1) preservation and promotion of Tribal self-government and Tribal jurisdiction over Tribal natural resources; and (2) avoidance of the creation of any restrictions on the title of a parcel for acquisition that would be an impediment to placement of such title into trust status. Protection measures include:

- **Legislative Enactment of the Tribal Council**
  The Council may adopt an appropriate legislative enactment committing the Tribes to protecting restored wetlands, riparian areas, and other habitat in perpetuity.

- **Contracts**
  Land that includes specific riparian and/or wetland habitat similar to that injured might be acquired in fee from willing sellers. These lands would then be transferred to the federal government to be held for the benefit of the Tribes, and would be managed in perpetuity specifically for fish and wildlife production. Other incidental uses would have to be compatible with those purposes, as determined by supporting biological information.

  Recent transactions of properties similar to those that might be acquired in this process show that prices range widely. Costs will depend on market value.

- **Easements**
  An easement is an interest one person has in the land of another. The Tribes may choose to convey an easement for fish, wildlife, wetlands, and/or riparian conservation purposes to the federal government or a conservation organization on lands acquired and restored by the Tribes. Alternatively, the Tribes may choose to contract with an existing landowner who does not want to sell his parcel for the right to restore natural resources on that landowner's parcel and then concurrently acquire a perpetual easement from the landowner in the name of the federal government or a conservation organization for fish, wildlife, wetlands, and/or riparian conservation purposes.

  Costs of developing conservation easements include the cost of initial easement reports, title searches, recording fees, etc. Additional costs may be required for additional easement appraisals and to secure the chari-

table contribution involved with the easement. These costs will vary widely depending upon the circumstances.

- **Restrictive Covenants**
  A restrictive covenant is a provision in a deed limiting the use of the property and prohibiting certain uses. The Tribes may choose to convey a restrictive covenant to the federal government or a conservation organization preventing any uses of a Tribally acquired restoration site that are incompatible with use of the site as a restored wetland, riparian area, or other habitat in perpetuity.

Passive Restoration Measures

Passive Restoration involves modifying or halting activities that are causing degradation or that are preventing the ecosystem from recovering. Many riparian areas are capable of rapid recovery with a modification of land use. The two most common examples of successful passive ecological restoration are the re-watering of streams after years of withdrawal for agricultural or municipal purposes and the improved management of livestock grazing in riparian areas. Passive restoration measures could include any of the following (alone or in combination):

- **Site-specific Habitat Management Plans**
  Management plans for fish and wildlife resources or their habitat are developed to guide the management and use of lands acquired, placed under easement or agreement, or leased. These plans would outline how the lands will be managed to achieve the conservation purposes. They could include guidelines for human uses, the use of fire as a management tool, and specific passive and active restoration measures. Costs will vary depending on the site.

- **Riparian, Wetland, and Sensitive Area Fencing**
  Fencing of riparian, wetland, and sensitive habitats and key associated habitats could be undertaken to protect areas from overuse by livestock or other human activities. Current contracting costs for fencing projects are averaging approximately $1.50 per foot of fence or $7,824 per mile.

- **Special Closures**
  Closures, short-term or long-term, could be used to protect habitat values from human disturbance or human-caused degradation.

- **Off-site Water Development**
  Development of off-site water facilities for livestock could alleviate livestock degradation of habitat in sensitive areas. Development of stock watering structures can range from $1,500 to $2,500.

- **Transportation System Improvements and Road Management**
  Improving the transportation system and road management can significantly reduce sediment entering streams and improve wildlife habitat.

Road management will consider at least the following:

- *Road Best Management Practices (BMPs)*
- *Road spacing and density standards*
- *Season of use restrictions*
- *Transportation planning*

Culverts range in cost from $315 to $1,825. Road obliteration costs range from $500 to $5000 per mile. Other costs will vary and some may be covered by other Tribal programs.

- **Controlling the spread of nonnative wetland/riparian species**
  Public education and outreach activities could be directed at preventing the unintentional introduction of nonnative wetland, riparian, and aquatic species. Controlling the spread of nonnative species will also require continuing and expanding current control programs for purple loosestrife and developing control programs for yellow iris, bullfrogs, and other species. The Tribes' Wetlands Conservation Plan provides a detailed description of current nonnative species control programs (Price 2000a). Costs will vary depending on the species being controlled.

- **Improved Forest Practices**
  Best Management Practices (BMPs) and 100-foot Stream-side Management Zones (SMZs) could be used to protect sensitive riparian areas from logging impacts.

- **Changing Fishing Regulations**
  Fishing limits could be adjusted to favor the protection of native species.

- **Improving Streamflows**
  The hydrology of the Jocko River has been altered for irrigation purposes. Streamflows could be evaluated and adjusted to improve native-fish habitat conditions. Impacts on irrigators could be offset through improvements in irrigation efficiency. Improving streamflows through these and other measures will directly benefit bull trout. Costs will vary and may be covered by other Tribal programs.

- **Irrigation and Agricultural Water Management**
  Better management of on-farm and canal return-flow waters could improve water quality and fish and wildlife habitat, especially for bull trout. Passive measures to reduce sediment and nutrient export from agricultural operations (including pasture, crop, and confined feeding areas) could be implemented. Costs will vary.

- **Improved Beaver Management**
  Beaver play an important role in the creation and maintenance of wetland habitat. A management plan could be developed for ensuring sustainable populations of beaver to indirectly ensure the long-term self-perpetuation of wetland habitat.

- **Improved Management of Stormwater Runoff**
  Better management and treatment of stormwater runoff could be used to improve water quality and fish and wildlife habitat. Improving water quality will improve conditions for bull trout. Costs for these activities will vary and may be covered by other programs.

- **Improved Public Education on Land Stewardship**
  Educational media such as pamphlets and videos that focus on approaches to land stewardship could be prepared and disseminated.

- **Initiate a Land Stewardship Program or Watershed Council**
  A team composed of Tribal resource professionals and professionals from other organizations such as the USFWS and the Natural Resources Conservation Service could be organized to help landowners with the development of stewardship plans to achieve or maintain watershed and riparian conservation goals. Costs will vary.

Active Restoration Measures

In some situations, the injury to an ecosystem has been so great that simply modifying or stopping the injurious activity is not enough. Without some kind of active restoration the ecosystem will remain degraded indefinitely. Active restoration measures could include any of the following (alone or in combination):

- **Fish Passage and Protection (screens)**
  The Jocko "S" canal has been an effective fish barrier since the early 1900s. The "S" canal diversion is slated to receive a fish ladder in the fall of 2000. The Jocko "K" canal was a significant fish barrier until 1997 when a fish ladder was constructed. Bull trout passage at both of these structures should be evaluated. While the most significant irrigation diversions have been screened, many smaller private diversion still entrap fish. These situations should be evaluated and remedied if appropriate.

  Fish screens vary in cost depending on the design and diversion flow characteristics and run anywhere from $500 to $2000 per cfs diverted. Costs associated with evaluation of bull trout passage through ladders may be covered by other Tribal programs, but include personnel and telemetry equipment.

- **Fish Habitat Improvement Projects**
  In many cases, this measure could be carried out in conjunction with stream restoration work. For example, root wads both stabilize a new meander and provide cover for fish. Both of these are short-term measures; root wads will rot, but not before the riparian vegetation reestablishes and stabilizes the bank and provides natural cover. The costs of habitat improvement projects vary widely, depending on stream conditions.

- **Removal and Suppression of Introduced Fish Species**
  This could be done in a number of ways, including removal of spawners

at weir traps, electrofishing, and chemical toxicants. Public information and education are key to the success of any such program. Costs associated with this measure may be covered by other fisheries programs.

- **Reintroduction of Bull Trout where Extirpated**
  Following the guidelines laid out in *The Role of Stocking in Bull Trout Recovery* (MBTSG 1996a), there may be areas where the reintroduction of bull trout is appropriate. Costs associated with this measure may be covered by other fisheries programs.

- **Stream Channel Restoration**
  Restoration of stream channels could be undertaken to restore the integrity of both fish and wildlife habitat to a more natural state. Restoration projects can be undertaken when the following conditions exist:

  - *Where channelization, floodplain encroachment, or other floodplain restrictions eliminate or limit the interaction between the active channel and the floodplain environment. Channel restoration projects could restore the interaction between the active channel and the floodplain.*

  - *Where channelization, floodplain encroachment, or land management activities have led to channel incision and lowering of the seasonal water table in adjacent riparian areas. Channel and floodplain restoration projects could be used to raise the water table in the floodplain environment.*

  - *Where channelization, floodplain encroachment, or land management activities have led to significant increases in bedload-size sediment in a channel such that a disequilibrium between sediment transporting discharges and available sediment exists. Channel and floodplain restoration could be completed to ameliorate sediment inputs and restore the active channel to a stable hydraulic geometry.*

  - *Specifically, channel restoration tools could include:*

    - *Reconstruction of the channel pattern*
    - *Reconstruction of the channel cross section (this is often called the hydraulic geometry)*
    - *Reconstruction of the channel slope and reconstructing the correct channel slope for each channel feature, for example riffles and pools have different slopes;*
    - *Bank stabilization. Bank stabilization by itself is not really restoration, but when included with channel reconstruction may be considered a restoration tool. The goals for bank stabilization include: sediment control, construction of river edge aquatic habitat, and increasing the channel roughness which is a measure of the energy dissipation in a channel.*

  Channel restoration work can range from $50 to $100 per linear foot, depending on the project.

- **Wetland and Riparian Habitat Restoration and Enhancement**
  Seeding of native and other grasses and forbs and plantings of vascular plants, forbs, shrubs, and trees could be used to restore or enhance degraded riparian and wetland habitats. Costs can range from $500 to over $10,000 per acre.

- **Creation of Wetland and Riparian Habitat**
  Habitat creation could be used to replace impaired or destroyed habitat features in wetland and riparian zones. Costs can range from $500 to over $15,000 per acre.

- **Irrigation and Agricultural Water Treatment**
  Treatment of on-farm and canal return-flow waters could be used to improve water quality and fish and wildlife habitat. Costs will vary. Measures could include:

  - *Treatment wetlands*
  - *Detention ponds*
  - *Retention ponds*
  - *Pump-back systems*

Other Costs

Administrative and indirect costs, personnel costs, the costs of baseline studies and inventories, and costs associated with monitoring and evaluation and operations and maintenance activities will vary depending upon the project. These costs will be estimated on a year-to-year basis in annual work plans.

A teepee in the upper mainstem sub-basin.

Chapter 6

Provisions for Plan Amendment and Monitoring

Plan Amendment

All actions implemented as a part of this plan will be monitored and evaluated on an on-going basis. If the monitoring and evaluation data suggest a need to change significant portions of the plan or if substantially new issues surface that suggest changes are needed in the plan, then as part of the adaptive management process, a Tribal interdisciplinary team, in consultation with the USFWS, will convene to review the plan. The team may recommend further assessment measures or amendments to the plan. Summaries of this review and any analysis will be appended to this plan.

If the interdisciplinary team recommends amendments, the USFWS shall be given the opportunity to review interim drafts of the amendments and periodic opportunity to consult regarding their development. The amendments will then be submitted to the Regional Director of the USFWS for concurrence. If the Regional Director does not concur, he or she will send the Tribes a written statement of the reasons for the decision. Within 90 days of receipt of the written statement of reasons, the Tribes, in consultation with the USFWS, shall make revisions to the amendments that the Tribes deem appropriate considering the Regional Director's written statement. Upon concurrence with the amendments and after reasonable review and comment by the public, including the State of Montana and ARCO, the Tribes shall make the amendments to the plan and begin implementation.

U.S. Fish and Wildlife Service Monitoring of Plan Implementation

The USFWS will monitor the Tribe's implementation of the Plan through the following activities:

- **Quarterly Activity Reports**
  Quarterly activity reports and annual progress reports submitted to USFWS; the frequency of the quarterly activity reports may be changed with the mutual agreement of the Tribes and USFWS.

- **Annual Budget/Expenditure Reports**
  Annual budget/expenditure reports submitted to USFWS.

- **Planning Meetings**
  Planning meetings to discuss and develop annual work plans and individual restoration projects.

- **On-site Inspections**
  Joint on-site inspections of proposed project areas, preserved areas and restoration projects.

- **Completion Report**
  A completion report to be submitted to the USFWS upon expending all of the funding and/or completing the restoration plan.

Restoring wetland and riparian habitats and bull trout is vital to the cultures of the Tribes.

Notes

Chapter 2: Watershed Description

Socioeconomic Conditions and Outlook

1. Population numbers are 1992 estimates from the US Bureau of Census.

2. The designated uses for waters classified as A-1 and B-1 are essentially the same: Waters classified A-1 are to be suitable for drinking, culinary, and food processing purposes after conventional treatment for removal of naturally present impurities. Water quality is to be suitable for bathing, swimming and recreation; wildlife (bird, mammals, amphibians and reptiles); the growth and propagation of salmonid fishes and associated aquatic life; and agricultural and industrial water supply purposes. Waters classified B-1 are to be suitable for drinking and culinary and food processing purposes after conventional treatment; bathing, swimming and recreation; wildlife (birds, mammals, amphibians and reptiles); the growth and propagation of salmonid fishes and associated aquatic life; and agricultural and industrial water supply purposes.

Chapter 3: Watershed Assessment

Floodplain/Fluvial Geomorphology

3. The three attributes used to describe geomorphology and floodplains are described here:

Floodplain Materials
These are the earth materials through which the channel flows. The materials which form the floodplain environment around the channel prism influence the channel type and the character of the instream habitat. Three types of materials are typical to the Jocko River and tributaries.

- Headwater floodplain sediments: hillslope and glacially derived boulder clusters with pockets of stream-reworked cobble and finer material.

- Glacial outwash: The Jocko Watershed contains areas where there are accumulations of over 300 feet of glacial outwash (Makepeace 1989). Outwash is generally very poorly sorted, glacially-derived material deposited by stream networks in front of a glacial environment. The mainstem Jocko River flows through outwash materials from the confluence of the Middle and South Forks of the Jocko, downstream to the confluence with Finley Creek.

- Fluvial (stream) deposits: These are floodplain sediments which have been transported and deposited in the floodplain environment by the Jocko River or tributaries under its current hydrologic regime. The Jocko River, downstream of Finley Creek to the mouth, generally flows through fluvial deposits.

Channel Confinement
The degree of interaction between the active stream channel and the adjacent valley floor are measures of the confinement of the channel. In steep, headwater areas stream channels tend to be laterally confined and in wide, valley-floor areas channels tend to be laterally unconfined. This attribute significantly influences the ability of a channel to migrate laterally, and it essentially controls the width of the riparian and wetland zone adjacent to a channel.

Channel Units

Channel units are the individual components of a channel, which when integrated together, form the overall character of a channel reach. To illustrate, two end member types of channels are step-pool and pool-riffle channels. The channel units in a step-pool channel are (1) the steps - steeper, turbulent segments of the channel, and (2) the pools - tranquil, flat water parts of the channel. In a pool-riffle channel, two primary channel units are the pools and the steeper, cobble-bedded riffle sections. A description of channel units can provide considerable insight into the habitat potential and diversity of the aquatic environment. (Grant et al. 1990)

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Appendix A

Wildlife Species found within the Watersheds under Consideration for Restoration

FISH

*Northern Pike**
Largescale Sucker
Longnose Sucker
Northern Pike Minnow
Redside Shiner
Longnose Dace
Peamouth Chub
*Rainbow Trout**
Westslope Cutthroat Trout†
*Yellowstone Cutthroat Trout**
*Brown Trout **
*Brook Trout**
Bull Trout† (threatened)
Mountain Whitefish
Pygmy Whitefish
*Black Bullhead**
*Yellow Bullhead**
*Mosquitofish**
*Pumpkinseed**
*Largemouth Bass**
*Smallmouth Bass**
Slimy Sculpin
*Yellow Perch**

REPTILES & AMPHIBIANS

Long-toed Salamander
Coeur D'alene Salamander†
Tailed Frog†
Western or Boreal Toad†
Pacific Chorus Frog
*Bullfrog**
Leopard Frog
Spotted Frog
W. Painted Turtle
N. Alligator Lizard
Western Skink
Rubber Boa
Racer
Bull Snake
W. Terrestrial Garter Snake
Common Garter Snake
Western Rattlesnake

BIRDS

Common Loon†
Pied-billed Grebe
Horned Grebe
Red-necked Grebe
Eared Grebe
Western Grebe
White Pelican†
Double-crested Cormorant
American Bittern
Great Blue Heron
Black-crowned Night Heron†
White-faced Ibis†
Tundra Swan
Trumpeter Swan†
Greater White-fronted Goose
Snow Goose
Ross' Goose
Canada Goose
Wood Duck
Green-winged Teal
Mallard
Northern Pintail
Blue-winged Teal
Cinnamon Teal
Northern Shoveler
Gadwall
Eurasian Wigeon
American Wigeon
Canvasback
Redhead
Ring-necked Duck
Lesser Scaup
Harlequin Duck†
Common Goldeneye
Barrow's Goldeneye
Bufflehead
Hooded Merganser
Common Merganser
Red-breasted Merganser
Ruddy Duck
Turkey Vulture
Osprey
Bald Eagle†
Northern Harrier
Sharp-shinned Hawk
Cooper's Hawk
Northern Goshawk†
Swainson's Hawk
Red-tailed Hawk
Ferruginous Hawk†
Rough-legged Hawk
Golden Eagle
American Kestrel
Merlin
Peregrine Falcon†
Gyrfalcon
Prairie Falcon
*Gray Partridge**
Chukar
*Ring-necked Pheasant**
Spruce Grouse
Blue Grouse
White-tailed Ptarmigan
Ruffed Grouse
Col. Sharp-tailed Grouse†
Wild Turkey
Virginia Rail
Yellow Rail
Sora
American Coot
Sandhill Crane
Black-bellied Plover

** Introduced Species*
† Sensitive Species

American Golden Plover
Semipalmated Plover
Killdeer
Black-necked Stilt†
American Avocet
Greater Yellowlegs
Lesser Yellowlegs
Solitary Sandpiper
Willet
Spotted Sandpiper
Upland Sandpiper
Long-billed Curlew
Marbled Godwit
Ruddy Turnstone
Sanderling
Semipalmated Sandpiper
Western Sandpiper
Least Sandpiper
Baird's Sandpiper
Pectoral Sandpiper
Stilt Sandpiper
Buff-breasted Sandpiper
Short-billed Dowitcher
Long-billed Dowitcher
Common Snipe
Wilson's Phalarope
Red-necked Phalarope
Franklin's Gull†
Bonaparte's Gull
Ring-billed Gull
California Gull
Herring Gull
Thayer's Gull
Glaucous Gull
Glaucous-winged Gull
Black-legged Kittiwake
Sabine's Gull
Caspian Tern†
Common Tern†
Forster's Tern†
Black Tern†
*Rock Dove**
Band-tailed Pigeon
Mourning Dove
Black-billed Cuckoo
Yellow-billed Cuckoo†
Barn Owl
Flammulated Owl†
W. Screech-owl
Great Horned Owl
Snowy Owl
N. Hawk-owl
N. Pygmy-owl
Burrowing Owl†
Barred Owl
Great Gray Owl†
Long-eared Owl
Short-eared Owl
Boreal Owl†
Northern Saw-whet Owl
Common Nighthawk
Common Poorwill
Black Swift†
Vaux's Swift
White-throated Swift
Black-chinned Hummingbird
Calliope Hummingbird
Rufous Hummingbird
Belted Kingfisher
Lewis' Woodpecker
Red-headed Woodpecker
Red-naped Sapsucker
Williamson's Sapsucker
Downy Woodpecker
Hairy Woodpecker
Three-toed Woodpecker
Black-backed Woodpecker†
Northern Flicker
Pileated Woodpecker
Olive-sided Flycatcher
Western Wood-pewee
Willow Flycatcher
Least Flycatcher
Hammond's Flycatcher
Dusky Flycatcher
Cordilleran Flycatcher
Say's Phoebe
Western Kingbird
Eastern Kingbird
Horned Lark
Tree Swallow
Violet-green Swallow
Rough-winged Swallow
Bank Swallow
Cliff Swallow
Barn Swallow
Gray Jay
Steller's Jay
Clark's Nutcracker
Black-billed Magpie
Common Crow
Common Raven
Black-capped Chickadee
Mountain Chickadee
Boreal Chickadee
Chestnut-backed Chickadee
Red-breasted Nuthatch
White-breasted Nuthatch
Pygmy Nuthatch
Brown Creeper
Rock Wren
Canyon Wren
House Wren
Winter Wren
Marsh Wren
Dipper
Golden-crowned Kinglet
Ruby-crowned Kinglet
Western Bluebird
Mountain Bluebird
Townsend's Solitaire
Veery
Swainson's Thrush
Hermit Thrush
American Robin
Varied Thrush
Gray Catbird
Sage Thrasher
Brown Thrasher
Water Pipit
Sprague's Pipit
Bohemian Waxwing
Cedar Waxwing
Northern Shrike
Loggerhead Shrike†
*European Starling**
Cassin's Vireo
Warbling Vireo
Red-eyed Vireo
Tennessee Warbler
Orange-crowned Warbler
Nashville Warbler
Yellow Warbler
Audubon's Warbler
Townsend's Warbler
American Redstart
Northern Waterthrush
Macgillivray's Warbler
Common Yellowthroat
Wilson's Warbler
Yellow-breasted Chat
Western Tanager
Black-headed Grosbeak
Lazuli Bunting
Spotted Towhee
Tree Sparrow
Chipping Sparrow
Clay-colored Sparrow
Brewer's Sparrow
Vesper Sparrow
Lark Sparrow
Lark Bunting
Savannah Sparrow
Baird's Sparrow†
Le Conte's Sparrow†
Grasshopper Sparrow
Fox Sparrow
Song Sparrow
Lincoln's Sparrow
White-throated Sparrow
White-crowned Sparrow
Oregon Junco
Lapland Longspur
Snow Bunting
Bobolink
Red-winged Blackbird
Western Meadowlark
Yellow-headed Blackbird
Rusty Blackbird
Brewer's Blackbird
Common Grackle
Brown-headed Cowbird
Bullock's Oriole
Black Rosy Finch
Gray-crowned Rosy Finch
Cassin's Finch
House Finch
Red Crossbill
White-winged Crossbill
Common Redpoll
Hoary Redpoll
Pine Siskin
American Goldfinch
Evening Grosbeak
*House Sparrow**

MAMMALS

Masked Shrew
Vagrant Shrew
Water Shrew
Pygmy Shrew
Little Brown Myotis
Yuma Myotis
Long-eared Myotis
Long-legged Myotis
California Myotis
Silver-haired Bat
Big Brown Bat
Hoary Bat
Townsend's Big-eared Bat†
Pika
Mountain Cottontail
Snowshoe Hare
White-tailed Jackrabbit
Least Chipmunk
Yellow-pine Chipmunk
Red-tailed Chipmunk
Yellow-bellied Marmot
Hoary Marmot
Columbian Ground Squirrel
Golden-mantled Ground Squirrel
Red Squirrel
Northern Flying Squirrel
Northern Pocket Gopher
Beaver
Deer Mouse
Northern Grasshopper Mouse

Bushy-tailed Woodrat
Southern Red-backed Vole
Heather Vole
Meadow Vole
Montane Vole
Long-tailed Vole
Water Vole
Muskrat
Northern Bog Lemming[†]
Norway Rat
House Mouse
Western Jumping Mouse
Porcupine
Coyote
Gray Wolf[†] *(Endangered)*
Red Fox
Black Bear
Grizzly Bear[†] *(Threatened)*
Raccoon
Marten
Fisher
Short-tailed Weasel
Long-tailed Weasel
Mink
Wolverine
Badger
Striped Skunk
River Otter
Mountain Lion
Lynx[†] *(Threatened)*
Bobcat
Elk
Mule Deer
White-tailed Deer
Moose
Woodland Caribou[†] *(Extirpated)*
Pronghorn
Bison
Mountain Goat
Bighorn Sheep

Appendix B

Wetland/Riparian Plant Species found within Watersheds under Consideration

Scientific Name	Common Name	CSKT	USFWS	USFS	MNHP	WIS
Acorus americanus	Sweet flag	SOC				OBL
Alectoria fremontii	Tree moss	SOC				NI
Allium columbianum	Columbia onion				G3/S1	NI
Allium spp.	Wild onions					FAC/OBL
Amelanchior alnifolia	Sarvis berry	SOC				FACU
Apocynum cannabinum	Dogbane	SOC				FAC+
Arctostaphylos patula	Green-leaf manzanita				G4/S1	NI
Aster frondosus	Leafy aster				G4/S1	FACW+
Atriplex truncata	Wedge-leaved saltbush				G5/SH	FACU+
Betula papyrifera	Paper birch	SOC				FACU
Boisduvalia densiflora	Dense spike-primrose				G5/SH	FACW-
Botrychium lineare	Linearleaf moonwort				G1/S1	NI
Botrychium montanum	Mountain moonwort			Sensitive	G3/S2	NI
Camassia quamash	Blue Camas	SOC				FACW
Carex tincta	Slender sedge				G4G5/SU	FAC
Centunculus minimus	Chaffweed				G5/S1	FACW
Claytonia lanceolata	Spring beauty	SOC				FAC-
Collomia tinctoria	Yellow-staining collomia				G5/S1	NI
Crataegus spp.	Hawthorn	SOC				FAC
Cyperus acuminatus	Short-pointed flatsedge				G5/S1	OBL
Cypripedium fasciculatum	Clustered lady's-slipper			Sensitive	G4/S2	FACU
Cypripedium parviflorum	Small yellow lady's-slipper			Sensitive	G5/S3	FACW-
Dichanthelium oligosanthes var scribnerianum	Scribner's panic grass				G5T5/S1	FACU
Elatine americana	American water-wort				G4/SU	OBL
Elatine californica	California water-wort				G5/SU	OBL
Eleocharis rostellata	Beaked spikerush			Sensitive	G5/S2	OBL
Epipactis gigantea	Giant helleborine			Sensitive	G4/S2	OBL
Erigeron eatonii ssp eatonii	Eaton's daisy				G5T5/S1	NI
Heteranthera dubia	Water star-grass			Sensitive	G5/S1	OBL
Hierochloe odorata	Sweetgrass	SOC				FACW
Howellia aquatillis	Water howellia		LT		G2/S2	OBL
Lagophylla ramosissima	Slender hareleaf				G5/S1	NI
Ledum glandulosum	Labrador tea	SOC				FACW+
Lewisia rediviva	Bitterroot	SOC				NI

Scientific Name	Common Name	CSKT	USFWS	USFS	MNHP	WIS
Ligusticum spp.	Lovage	SOC				FAC/FACW
Lilaea scilloides	Flowering quillwort				G4/S1	OBL
Lomatium spp.	Biscuit Root	SOC				NI
Najas guadalupensis	Guadalupe water-nymph				G5/S1	OBL
Nicotiana attenuata	Wild tobacco	SOC				FACU
Ophioglossum pusillum	Adder's tongue			Sensitive	G5/S2	FACW
Opuntia spp.	Prickly pear cactus	SOC				NI
Osmorhiza occidentalis	Sweet cicely	SOC				NI
Oxytropis campestris var columbiana	Columbia crazyweed			Sensitive	G5T3/S1	NI
Pinus albicaulis	Whitebark pine	SOC				NI
Pinus flexilis	Limber pine	SOC				NI
Polystichum kruckebergii	Kruckberg's sword-fern				G4/S1	NI
Prunus spp.	Wild Plum					FAC-/FACU
Psilocarphus brevissimus	Dwarf woolly-heads			Sensitive	G5/S1	FACW+
Rotala ramosior	Toothcup				G5/S1	OBL
Sagittaria cuneata	Wapato	SOC				OBL
Salix spp.	Willow	SOC				FAC/OBL
Sidalcea oregana	Oregon checker-mallow				G5/S1	FACW-
Silene spaldingii	Spalding's campion		Proposed		G2/S1	NI
Sporobolus neglectus	Small dropseed				G5/SU	UPL
Taxus brevifolia	Yew	SOC				FACU-
Thuja plicata	Western Red Cedar	SOC				FAC
Vaccineum spp.	Huckleberry	SOC				UPL/OBL
Wolffia columbiana	Columbia water-meal				G5/S2	OBL
Xerophyllum tenax	Beargrass	SOC				NI

CSKT (Confederated Salish and Kootenai Tribes): SOC = Tribal plants of special concern.
USFWS (U. S. Fish and Wildlife Service), Endangered Species Act classification: LT=threatened
USFS (U. S. Forest Service): The status of species of Forest Service plants as defined by the U.S. Forest Service manual (2670.22).
MNHP (Montana Natural Heritage Program): G-Range Wide, S=Montana, 1=Critically imperiled, 2=Imperiled, 3=Very rare and local or vulnerable to extinction, 4=apparently secure, though rate in some parts of range, 5=Demonstrably secure, though possibly rare in some parts of range, B=breeding status for a migratory species, E=an exotic established in the state, SX=believed to extinct, historical records only.
WIS=Wetland Indicator Status (USFWS, National List of Plant Species that Occur in Wetlands Region 9 - Northwest). OBL=obligate wetland (occurs with an estimated 90% probability in wetlands); FACW=facultative wetland (estimated 67 to 99% probability of occurrence in wetlands); FAC=faculative (equally likely to occur in wetlands and nonwetlands, 1 to 33% in wetlands); FACU=faculative upland (67 to 99% probability in nonwetlands, 1 to 33% in wetlands); UPL=obligate upland (>99% nonwetlands in this region, may occur in wetlands in other regions—species that do not occur in wetlands in any region are not included on list); NI=no indicator (insufficient information available to determine an indicator status).

Appendix C

Public Comment Summary

No comments were submitted during the thirty-day public comment period for Part 2 or during a public meeting held on July 11, 2000 at the Mission Valley Power Building, Pablo, Montana. Comments were recieved on Part 1, and those are included in Appendix C of Part 1 along with the ID Team's responses to the comments and a list of the individuals or agencies commenting. Complete copies of all written comments received on Part 1 are available for viewing from the Natural Resources Department at the CSKT Tribal Complex, Pablo, Montana.

Glossary

A-1 Water Quality Standard • Waters classified A-1 are suitable for drinking, culinary, and food processing purposes after conventional treatment for removal of naturally present impurities. Water quality must be suitable for bathing, swimming, and recreation; growth and propagation of salmonid fishes and associated aquatic life, waterfowl, and furbearers; as well as agricultural and industrial water supply.

Active Restoration • In some situations, the injury to an ecosystem has been so great that simply modifying or stopping the injurious activity is not enough and active steps must be taken to restore the site. Examples of active restoration include the reintroduction of native vegetation, the placement of woody debris, or the reconstruction of altered channels and landforms.

Adaptive Management • Planning and implementing management activities to the best of our abilities while at the same time remaining open to new information and monitoring the results of our actions to see if we are actually meeting our goals. If our original approach proves inadequate, adaptive management requires changing the strategy in order to increase the chances of reaching the goals.

ARCO • Atlantic Richfield Company

Assessment • Determining a watershed's environmental history, identifying the human actions that led to the degraded conditions, and locating the areas within the watershed with restoration potential.

B-1 Water Quality Standard • Waters classified B-1 are suitable for drinking, culinary, and food processing purposes after conventional treatment for removal of naturally present impurities. Water quality must be suitable for bathing, swimming, and recreation; growth and propagation of salmonid fishes and associated aquatic life, waterfowl, and furbearers; as well as agricultural and industrial water supply.

CERCLA • The Comprehensive Environmental Response, Compensation, and Liability Act also known as the federal Superfund Law.

Climax Species • Species characteristic of the final community in forest succession. Climax communities, which vary depending on the site, can reproduce themselves indefinitely under prevailing conditions in the absence of disturbance.

Consent Decree • The Consent Decree lodged in the District of Montana in Civil action number CV-83-317-HLN-PGH on June 19, 1998.

CSKT • Confederated Salish and Kootenai Tribes

Deepwater Habitats • Permanently flooded areas deeper than 6.6 feet at low water. Deepwater habitat is a non-wetland habitat.

Easement • An interest one person has in the land of another. For example, the Tribes may choose to convey an easement for fish, wildlife, wetlands, and/or riparian conservation purposes to the federal government or a conservation organization on lands acquired and restored by the Tribes.

FAID • Flathead Agency Irrigation Division

FERC • Federal Energy Regulatory Commission

FEWA • Functional Effective Wetland Area. An EPA-approved and USFWS-accepted methodology for determining wetland functional value and effective wetland areas in Upper Clark Fork River Superfund sites.

USFWS • U.S. Fish and Wildlife Service

Lacustrine Wetlands • Lacustrine wetlands include wetlands and deepwater habitats contained in permanently flooded lakes, reservoirs, and deep ponds.

MBTSG • Montana Bull Trout Scientific Group

MRWA • Montana Riparian and Wetland Association

Natural Resource Damages • Damages or other relief for injury to, destruction of, or loss of natural resources, including the cost of assessing such injury, destruction, or loss resulting from a release of hazardous or deleterious substances and including interest and litigation costs.

NWI • National Wetlands Inventory

NRCS • Natural Resources Conservation Service

Palustrine Wetlands • Palustrine wetlands include vegetated wetlands traditionally called marsh, wet meadow, bog, fen, and potholes.

Passive Restoration • Restoration by modifying the human activities responsible for causing the degradation or that are preventing the ecosystem from recovering.

Restoration • Actions taken to modify an ecosystem to achieve desired, healthy, and functioning conditions and processes. The term generally refers to the process of restoring ecosystem function and thereby enabling the system to resume its resiliency to disturbances.

Restrictive Covenant • A provision in a deed limiting the use of the property and prohibiting certain uses. The Tribes may choose to convey a restrictive covenant to the federal government or a conservation organization preventing any uses of a Tribally-acquired restoration site that are incompatible with use of the site as a restored wetlands, riparian area, or other habitat in perpetuity.

Riparian Area • The green zone bordering lakes, reservoirs, estuaries, potholes, springs and seeps, peatlands, wet meadows, vernal pools, and ephemeral, intermittent, or perennial streams.

Riverine Wetlands • Riverine wetlands include all wetlands and deepwater habitats contained within a river or stream channel.

Seral Species • Species viewed as a transitional in forest succession.

UCFRB • Upper Clark Fork River Basin, which is defined as the main stem of the Clark Fork River and all areas which naturally drain into the Clark Fork River or its tributaries above the Milltown Dam, except for the Blackfoot River and its tributaries.

Upper Clark Fork River Basin • The main stem of the Clark Fork River and all areas which naturally drain into the Clark Fork River or its tributaries above the Milltown Dam, except for the Blackfoot River and its tributaries.

Wetland • Areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions, including those areas inundated up to 6.6 feet.