

**FINAL JOINT ENVIRONMENTAL ASSESSMENT
AND RESTORATION PLAN FOR THE
JOHN DAY RIVER ACID SPILL**

TRUSTEES

U.S. Department of the Interior
Fish and Wildlife Service

State of Oregon
Oregon Department of Fish and Wildlife

and

Confederated Tribes of the Umatilla Indian Reservation

August 1994

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LEGAL AUTHORITY: Comprehensive Environmental Response, Compensation, and Liability Act
of 1980 (as amended)

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Natural Resource Damage Assessments, 43 Code of Federal Regulations,
Part 11

LOCATION: Grant County and Umatilla County, Oregon

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ABSTRACT: On February 8, 1990, a Thatcher Trucking Company tanker truck spilled an estimated 3,500 gallons of hydrochloric acid into the North Fork of the John Day River in north-central Oregon. The spill drastically changed the pH of the river water resulting in extensive mortality and injury to fish resources. An estimated 98,000 to 145,000 fish were destroyed, including 4,000 anadromous fish, 300 bull trout, and 9,500 Pacific lamprey. Additionally, 50 percent of the chinook salmon alevins were estimated to have been killed. Aquatic mammals, waterfowl, and endangered species which utilize the John Day River Basin may also have been directly or indirectly impacted by the spill. Claims for natural resource damages were settled by consent decree under Section 107 of the Comprehensive Environmental Response, Compensation, and Liability Act, as amended. The consent decree established a \$275,000 Trust Fund for use only on restoration, replacement, or acquisition of equivalent resources injured by the spill. This document outlines the extent of injuries to natural resources as a result of the acid spill and identifies strategies, alternatives, and projects for restoration of injured resources in the John Day River Basin.

EXECUTIVE SUMMARY

On February 8, 1990, a tanker truck owned and operated by Thatcher Trucking Company of Salt Lake City, Utah, skidded off Highway 395 and rolled down an embankment into the North Fork of the John Day River in north-central Oregon. An estimated 3,500 gallons, or 33,500 pounds, of hydrochloric acid was discharged into the river and flowed downstream at an approximate rate of one mile per hour.

The spill drastically changed the pH of the river water resulting in extensive mortality and injury to fish resources. An estimated 98,000 to 145,000 fish were destroyed, including 4,000 anadromous fish, 300 bull trout, and 9,500 Pacific lamprey. Additionally, 50 percent of the chinook salmon alevins in the area impacted by the spill were estimated to have been killed. Aquatic mammals, waterfowl, and endangered species which utilize the John Day River Basin may also have been directly or indirectly impacted by the spill.

In 1992, the United States of America, the State of Oregon, and the Confederated Tribes of the Umatilla Indian Reservation settled claims for natural resource damages associated with the 1990 John Day River acid spill. The claims were settled by consent decree under Section 107 of the Comprehensive Environmental Response, Compensation, and Liability Act, as amended. The consent decree established a \$275,000 Trust Fund for use only on restoration, replacement, or acquisition of equivalent resources injured by the spill.

A Restoration Committee was established to review and select restoration activities to be funded with monies available in the Trust Fund. This document outlines the extent of injuries to natural resources as a result of the acid spill and identifies strategies, alternatives, and projects for restoration of injured resources in the John Day River Basin. The strategies and their corresponding alternatives are as follows:

- 1) **Permanent Protection:** This strategy consists of land acquisition or management actions which provide protection in perpetuity to lands containing important fish habitats or having significant influence on aquatic ecosystems. Alternatives considered under this strategy include land acquisition and perpetual easements, leases, or covenants. These alternatives would result in an increase in fish abundance through restoration and protection of the aquatic community.
- 2) **Temporary Protection:** Temporary Protection measures include management actions which will provide protection to important fish habitats or terrestrial habitats having direct influence on the aquatic ecosystem. Measures considered are those which are either unavailable or unwarranted for more permanent protection. Temporary Protection alternatives include easements, leases, or management rights which can enhance riparian plant communities, improve recovery rates, and provide physical protection from livestock grazing through the construction of riparian enclosure fencing. These actions should aid in the restoration of fish resources injured in the spill.
- 3) **Habitat Enhancement:** Habitat Enhancements include management actions that improve productivity and speed recovery of existing habitats through the addition of key structural or biological elements. Alternatives considered under this strategy include riparian habitat restoration, instream habitat improvement measures, and watershed improvement measures. These actions would restore the natural riparian community structure and flood plain function, reduce inputs of sediments from the flood plain, provide organic debris sources and instream cover for fish, provide substrates for macroinvertebrate production, and moderate fluctuations in water temperatures. Such actions will improve spawning and rearing habitat for anadromous and resident fish.

- 4) **Combined Protection and Enhancement:** Under this strategy, a variety of permanent protection, temporary protection, and habitat enhancement alternatives and projects would be utilized on lands containing important fish and wildlife habitats or having significant influence on aquatic ecosystems. Permanent Protection provides perpetual control and management authority over these lands whereas Temporary Protection provides temporary or interim control and management authority. Temporary Protection may allow for resource protection where a more permanent alternative is unavailable or undesirable. Habitat Enhancement alternatives include management actions which would improve productivity and speed recovery of existing habitats through the addition of key structural or biological elements. Implementation of this strategy would restore the natural riparian community structure and flood plain function, reduce inputs of sediments from the flood plain, provide organic debris sources, and moderate fluctuations in water temperatures. These actions will improve spawning and rearing habitat for anadromous and resident fish.
- 5) **No Action - Unmitigated Action Alternative:** Under this alternative, no actions would be taken to restore resources injured in the acid spill. No benefits would be realized from the mitigation settlement with the Thatcher Trucking Company and the obligations of the Consent Decree would not be fulfilled. Benefits would only arise if the injured aquatic resources are able to recover to pre-spill population levels without restoration actions. Although some natural recovery is expected, the high loss of fish resources associated with the spill and the degraded fish rearing and spawning habitat in the John Day River Basin make unmitigated recovery a long and uncertain process. Additionally, candidate species for listing as threatened or endangered under the Endangered Species Act of 1973 may not be able to recover to previous levels without the implementation of restoration projects.

In order to maximize recovery of injured resources, the Trustees selected the Combined Protection and Enhancement Strategy as the preferred strategy and alternatives. This strategy, which allows the Trustees maximum flexibility in restoration projects in order to take full advantage of the opportunities to protect and enhance the impacted aquatic ecosystem, is also the environmentally preferred strategy and alternatives. In selecting the Combined Protection and Enhancement Strategy, the Trustees emphasis on the selection of restoration projects was on Permanent Protection followed by Temporary Protection and then Habitat Enhancement projects.

For each strategy and associated alternatives, the Trustees developed a list of projects and allocated potential trust fund monies. These projects would be implemented on the North Fork, Middle Fork, and other tributaries of the John Day River. Projects were selected based on their potential to restore resources injured in the spill. The Trustees selected restoration projects which would have the greatest potential to restore these resources to their pre-spill population levels and would also benefit other aquatic resources. The selected projects will result in improved spawning and rearing habitat for both resident and anadromous fish which should increase the production of these species in the John Day River Basin. The time frame needed for these species to recover to their pre-spill levels is unknown but is suspected to be several generations. Additionally, with improved habitat conditions, resident and anadromous fish populations are expected to exceed pre-spill population levels. Funds available for restoration projects are limited to \$275,000. Protection projects were allocated approximately 85 percent of the restoration funds and habitat enhancement projects were allocated approximately 15 percent of the restoration funds. The Trustees are also actively seeking matching funds for restoration projects in order to enhance current projects or implement additional projects.

This document was provided to the public for a 30 day review and comment period. Two comments were received from the public, both of which supported the Trustees' selection of the Combined Protection and Enhancement Strategy. Following the public review period, the Trustees determined that there was a Finding of No Significant Impact associated with the selected strategy.

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CHAPTER 1. PURPOSE OF AND NEED FOR THE PROPOSED ACTION

A. OVERVIEW OF THE JOHN DAY RIVER BASIN

1. Location and General Environment

The John Day River Basin has been described in detail in a basin plan developed for the Northwest Power Planning Council (NPPC; Oregon Department of Fish and Wildlife et al. 1990). The John Day River drains nearly 8,100 square miles in east-central Oregon, the longest free-flowing river with wild anadromous salmon and steelhead in the Columbia River Basin (Figure 1). The basin covers 11 counties and is bounded by the Columbia River to the north, the Blue Mountains to the east, the Aldrich Mountains and Strawberry Range to the south, and the Ochoco Mountains to the west.

The mainstem John Day River flows 284 miles from its source at an elevation near 9,000 feet in the Strawberry Mountains to its mouth at RM 218 on the Columbia River. The lower John Day River from Service Creek (RM 157) downstream to Tumwater Falls (RM 10) is included in the Federal and Oregon Scenic Waterways Systems. Major tributaries in the John Day Basin include the North Fork, Middle Fork, and the South Fork. The North Fork, which enters the mainstem John Day River at Kimberly (RM 185) and extends upstream 117 miles to its headwaters in the Blue Mountains at elevations near 8,000 feet, is the largest tributary in the John Day Basin. Fifty-four miles of the North Fork, from Camas Creek upstream, were added to the Federal and State Wild and Scenic Rivers. The Middle Fork John Day River originates immediately south of the North Fork and flows roughly parallel to it for 75 miles to its confluence with the North Fork at RM 32, about 31 miles above Kimberly. In 1988, the Middle Fork was added to Oregon's Scenic Waterway system. The South Fork John Day River, tributary to the mainstem near Dayville (RM 212), extends 60 miles to its headwaters in the area south of the Aldrich Mountains. Other major mainstem tributaries include Rock Creek (RM 22) and Canyon Creek (RM 248).

The climate of the John Day Basin is semi-arid characterized by low winter and high summer temperatures, low average annual precipitation, and dry summers. Most precipitation occurs between late fall and spring. Summertime temperatures reflect hot days and cool nights. Precipitation is low over the whole plateau with much of the moisture falling on the Coast Range and Cascade Mountains before reaching the lower John Day Basin.

Land cover in the John Day Basin is predominantly forest and rangelands, with a small amount of cropland. Grass, shrub, and juniper communities predominate in the valleys, but give way to ponderosa pine, lodgepole pine, Douglas fir, and white fir communities at higher elevations. Much of the agricultural land in the basin is found on the plateaus of Gilliam and Sherman counties. Irrigation is used to a greater extent in the upper subbasin to grow alfalfa, meadow hay, and fruit crops.

Recreation and tourism also are important to the basin's economy. The John Day Fossil Beds National Monument, the Strawberry Mountains, Black Canyon, and North Fork John Day Wilderness areas, scenic waterways, and abundant Federal and State lands open to public hunting, fishing, camping, and sightseeing attract thousands of visitors to the basin each year. An estimated 100,000 angler days were spent fishing for steelhead, trout, smallmouth bass, and other species in 1987 (Oregon Department of Fish and Wildlife et al. 1990). Canoeists, drift-boaters, and rafters are floating the waterway in increasing numbers. Tourism, especially hunting, fishing, hiking, sightseeing, and boating, is increasing throughout the John Day Basin, and its economic importance complements the agricultural, forest product, and service sectors of the John Day Basin economy.

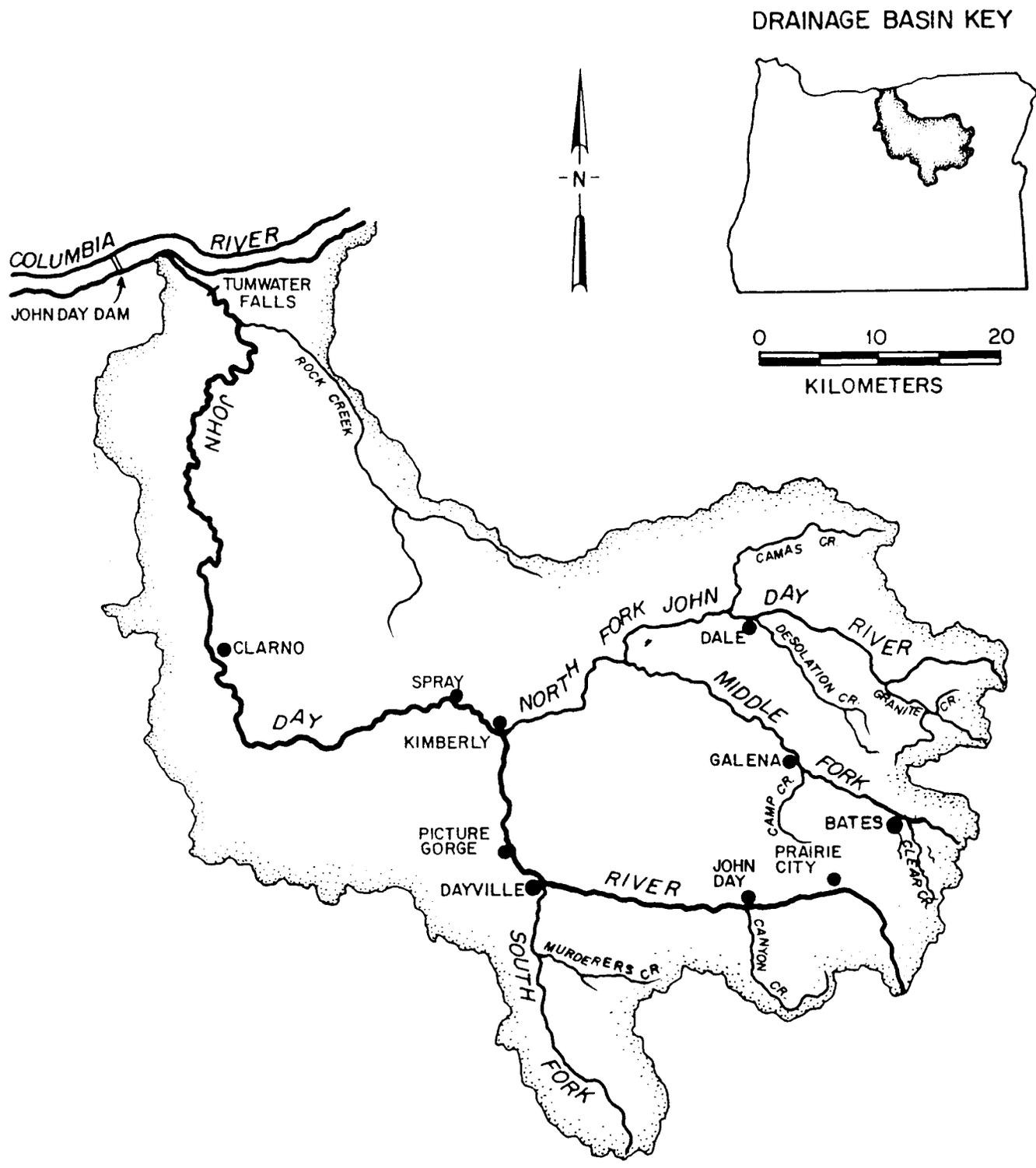


Figure 1. Map of the John Day River Basin. The acid spill occurred at River Mile 56.8 immediately below the confluence of Camas Creek and the North Fork John Day River. (Source: Lindsay et al. 1986)

2. Habitat Problems and Needs

The salmon and steelhead plan developed for the NPPC identified habitat problems and corrective measures that are not only appropriate for anadromous fish but will benefit resident fish as well (Oregon Department of Fish and Wildlife et al. 1990). The salmon and steelhead plan is useful for these planning efforts because it was developed by State and Tribal fisheries managers in the John Day Basin and also received multi-agency and public review. The following section is based on information from that report.

Historical descriptions of the John Day Subbasin indicate that the John Day River was once a relatively stable river with good summer streamflows, water quality, and heavy riparian cover. Watershed conditions in the John Day River Subbasin changed significantly in the mid to late 1800's. Several factors contributed to these changes. Placer mining left many streams channelized with little or no shade, high silt loads, and diverted flows. Dredging overturned the stream channels in the larger streams, changing stream courses, silting gravel, and destroying stream cover. Inactive mine sites and their settling ponds in the upper North Fork continue to release turbid flows, some known to contain toxic concentrations of trace elements. Early forest practices included removing timber from, and building roads on, steep slopes, along streambanks, across watersheds, and in other sensitive areas (Oregon Water Resources Department 1986). Farmers and ranchers settled the lower basin during the 1860s and 1870s. Under grazing pressure, the rangelands converted from grass-forb-browse ecosystems to weed-forb ecosystems. As grass rangelands declined in the basin, and wildfire suppression increased, the invasion of juniper and sage increased. More recently, livestock overgrazing, water appropriations for irrigation, landowner clearing, road building, timber harvest, and channelization have further degraded fish habitat by reducing or eliminating riparian vegetation, eroding streambanks, altering channel morphology, and increasing stream sediment transport (Clary and Webster 1990 *in* U.S. Environmental Protection Agency 1993, Oregon Department of Fish and Wildlife 1990).

Riparian habitat degradation is the most serious habitat problem in the John Day River Basin with approximately 660 degraded stream miles identified. Degraded fish habitat in the John Day River Basin is a result of low summer flows, high summer and low winter water temperatures, high spring flows, depressed beaver populations, accelerated streambank erosion, excessive stream sedimentation, and reduced instream cover. The basin's ability to naturally repair itself from riparian habitat degradation and other impacts is slow in the John Day's semiarid environment, and some areas are adversely affected by activities which ceased long ago. In other cases, poor management practices continue and problems are escalating. As soil erosion increases, flooding occurs and streambanks erode away, degrading habitat quality. In many tributary streams, excessive water volumes are deepening channels, thus lowering water tables in the immediate proximity (Oregon Water Resources Department 1986). Such loss of habitat quantity and quality and instream diversity has caused the greatest negative impacts to fish resources in the basin. Since streamflow is a part of habitat quantity and quality, managers believe improved irrigation systems along with restoration of the uplands and riparian systems would provide the greatest long-term natural benefits for fish and improve late season streamflow as well.

B. BACKGROUND

1. Incident

On February 8, 1990, a tanker truck owned and operated by Thatcher Trucking Company of Salt Lake City, Utah, skidded off Highway 395 and rolled down an embankment into the North Fork of the John Day River in north-central Oregon. The accident occurred near the town of Dale, just south of the Camas Creek Bridge and immediately below the mouth of Camas Creek at River Mile (RM) 56.8. The contents of the tanker,

approximately 5,000 gallons of 35.2 percent hydrochloric acid, began leaking through a ruptured disc in the pressure valve. An estimated 3,500 gallons, or 33,500 pounds, of the acid discharged into the river and flowed downstream at an approximate rate of one mile per hour, causing substantial change in the acidity of the river.

Natural resource trustees with the authority for managing and protecting natural resources in the impacted area include the Department of the Interior (DOI), represented by the U.S. Fish and Wildlife Service and the Bureau of Indian Affairs, the State of Oregon, represented by the Oregon Department of Fish and Wildlife (ODFW), and the Confederated Tribes of the Umatilla Indian Reservation (CTUIR). Assessment of natural resource injuries and development of a restoration plan was coordinated between the Trustees and the Confederated Tribes of the Warm Springs Reservation of Oregon (CTWS).

Numerous natural resources under the Trusteeship of Federal and State agencies and Indian Tribes were injured as a result of the hydrochloric acid discharge into the John Day River. The Trustees settled claims for natural resource damages by Consent Decree (United States of America v. Thatcher Company) under Section 107 of the Comprehensive Environmental Response, Compensation, and Liability Act, as amended. The Consent Decree established a \$275,000 trust fund for use only on restoration, replacement, or acquisition of equivalent resources injured by the spill. This restoration plan documents the extent of injuries to natural resources as a result of the acid spill and identifies strategies and alternatives for restoration of injured resources in the John Day River Basin.

2. Fish and Wildlife Resources and Natural Resource Injury

Historically, the John Day River was one of the most significant anadromous fish producing rivers in the Columbia River Basin. The basin continues to support one of the largest remaining runs of wild spring chinook salmon (*Oncorhynchus tshawytscha*) and summer steelhead trout (*Oncorhynchus mykiss*) with populations estimated to range from 3,000 to 4,000 spring chinook salmon and 25,000 to 30,000 summer steelhead. The basin also supports a population of Pacific lamprey (*Lampetra tridentata*) and other indigenous species. The management policy for the John Day Basin is designed to maintain native, wild stocks of salmon and steelhead, and to preserve the genetic diversity of the native salmon and steelhead stocks for maximum habitat use and fish production (Oregon Department of Fish and Wildlife et al. 1990).

The basin also supports a variety of resident fish species, such as rainbow trout (*Oncorhynchus mykiss*), brook trout (*Salvelinus fontinalis*), bull trout (*Salvelinus confluentus*), cutthroat trout (*Salmo clarki*), mountain whitefish (*Prosopium williamsoni*), channel catfish (*Ictalurus punctatus*), and smallmouth bass (*Micropterus dolomieu*). Bull trout are of particular concern since they are a Federal candidate species petitioned for listing as threatened or endangered under the Endangered Species Act of 1973. Other resident species common to the area include chiselmouth (*Acrocheilus alutaceus*), suckers (*Catostomus* spp.), redbelt shiner (*Richardsonius balteatus*), longnose dace (*Rhinichthys cataractae*), sculpins (*Cottus* spp.), and northern squawfish (*Ptychocheilus oregonensis*).

The Thatcher Trucking Company acid spill resulted in acute impacts to natural resources within a minimum 12 mile stretch of the North Fork John Day River. The introduction of hydrochloric acid changed the pH of the river from a normal background level of 8.0 to 2.4 (Oregon Department of Environmental Quality 1990). The sensitivity of fish to acidic water varies, but pH levels below 6.0 can be detrimental to many species (Haines and Baker 1986, Gloss and Schofield 1989, Wiener and Eilers 1989). Hydrological modeling applications showed that the river probably would not have possessed the capacity to fully dilute and neutralize the acid and recover to a pH of 6.5 even at RM 15.3 which is 41.5 miles downstream of the spill site. The

true extent of damage to the river and other resources was probably greater than the 12 mile stretch below the incident site. Thus, natural resources under the Trusteeship of the DOI, the State of Oregon, the CTUIR, and the CTWS were adversely affected by the acid spill.

The spill drastically changed the pH of the river water resulting in extensive mortality and injury to fish resources. Exposure to the acid was manifested in fish by burned, blistered, or discolored skin, singed fins, bleeding gills, loss of scales, cloudy eyes, internal bleeding, and severe behavioral distress. The ODFW (1990) and Dougan (1990) estimated 98,000 to 145,000 fish were destroyed, including 4,000 anadromous fish, 300 bull trout, and 9,500 Pacific lamprey. The loss of 300 bull trout in the river is especially critical because the spill may have destroyed a large portion of the adult bull trout population in this area (H. Li, pers. comm., 1990). Although bull trout primarily occur in the upper tributaries of the John Day Basin, they seasonally utilize the North Fork of the John Day River in the winter. The spill occurred at a time when a large portion of the adult bull trout population was probably in the North Fork of the river.

In addition to adult fish, an estimated loss of 50 percent of the chinook salmon alevins in gravel areas impacted by the spill was reported (Oregon Department of Fish and Wildlife 1990, Dougan 1990). This estimate was based on a quantitative aquatic invertebrate analysis which showed a 50 percent loss of invertebrates in the first mile below the spill site. Aquatic invertebrates provide an essential food resource for many species of resident and anadromous fish as well as other species. A reduction in aquatic invertebrate abundance had a short-term impact on food availability. Long-term loss of natural production of salmonid species and complete annihilation of at least one age class of locally spawning salmon and steelhead occurred due to the spill. Additionally, although direct mortality of fish was not documented in surveys beyond 12 miles downstream from the spill site, chronic effects most likely occurred in these areas.

Aquatic mammals, waterfowl, and endangered species which utilize the John Day River Basin may also have been directly or indirectly impacted by the spill. Loss of fish from the North Fork John Day River could affect wintering bald eagles (*Haliaeetus leucocephalus*; a threatened species), mink (*Mustela vison*), and river otter (*Lutra canadensis*) known to forage in the river. Peregrine falcons (*Falco peregrinus*; an endangered species) nest in the basin and numerous waterfowl species use the river, including Canada geese (*Branta canadensis*), common (*Mergus merganser*) and hooded mergansers (*Lophodytes cucullatus*), mallards (*Anas platyrhynchos*), gadwalls (*Anas strepera*), American widgeon (*Anas americana*), wood ducks (*Aix sponsa*), and green-winged teal (*Anas crecca*). All of these species may have been indirectly impacted by the spill due to destruction of their food base, foraging areas, shelter, breeding and rearing areas, and other factors essential for long-term survival.

In addition to fish and wildlife resources, the river supports significant tourism for resource observation, hiking, camping, subsistence fishing and trapping, and commercial and sport fisheries. The recreational importance of the area is evident by the large numbers of people which fish in the John Day River Basin annually. The impacted area also has important cultural and archaeological values to the local Indian Tribes. Tribal subsistence fishing in tributaries in the John Day Basin and mainstem Columbia River provides a culturally important food source for the Tribes. Pacific lamprey, salmon, and other indigenous species such as whitefish, suckers, and chiselmouth, have been essential food fish for the Tribes of the John Day Basin for centuries. The capacity of the river system to compensate for these consumptive and non-consumptive activities may be reduced for many years as a result of the spill.

C. PURPOSE OF AND NEED FOR THE PROPOSED ACTION

The underlying purpose of the proposed restoration plan is to restore, replace, or acquire the equivalent of any natural resources injured or destroyed by the John Day Acid Spill, pursuant to applicable State and Federal laws and regulations. The underlying need for the proposed action is to ensure the recovery of resources injured as a result of the spill. Recovery of injured resources will be through habitat restoration actions which are consistent with management plans for the affected area.

D. DESCRIPTION OF PROPOSED ACTION

Funds for the restoration of injured resources were recovered under Section 107 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, and by the State of Oregon, ORS 465.255, 465.200(17), 496.705, and 468B.060. Recovered funds were placed in a Trust Fund account in the Registry of the United States District Court, District of Oregon and the funds are administered by the Court. Prior to the expenditure of Trust Fund monies, a restoration plan must be prepared. Guidance applicable to the restoration, replacement, or acquisition of equivalent resources is contained in 43 Code of Federal Regulations, Section 11.93, Interior Natural Resource Damage Assessment Regulations. Additionally, in developing the restoration plan, the U.S. Fish and Wildlife Service (Service) gives priority to alternatives which result in restoration of in-kind natural resources at the same location and vicinity, as required by the Service's Mitigation Policy (Federal Register Vol. 46. No. 15, January 1981). The John Day River Acid Spill Restoration Plan was developed in accordance with these regulations.

A John Day Restoration Committee (Committee), consisting of representatives from each of the Trustees, was established to develop a restoration plan and select restoration activities to be funded with monies available in the Trust Fund. In developing the restoration plan, the Committee followed the guidance in the Consent Decree for the settlement of natural resource damages which states that "the \$275,000 paid for natural resource damages shall be used by the Trustees only to restore, replace, or acquire the equivalent of any natural resources injured or destroyed by the John Day Acid Spill, pursuant to applicable State and Federal laws and regulations." A Memorandum of Agreement between the Trustees notes that meeting this requirement will entail the development of habitat restoration and enhancement projects for anadromous and resident fish in the North Fork John Day River and tributaries to mitigate for the fish losses resulting from the spill. Emphasis will be placed on riparian systems and habitat recovery through land acquisition, easement purchases, riparian fencing, and in-kind exchanges for riparian lands. Selected projects shall be consistent with the Salmon and Steelhead Production Plan for the John Day Subbasin (Oregon Department of Fish and Wildlife et al. 1990). The Trustees can seek matching funds to increase leveraging opportunities for the Trust Fund. Committee decisions on the restoration plan shall be through consensus.

The John Day River Basin is managed to maintain wild salmon populations, with no enhancement through the release of hatchery stock. A management plan has been developed by the ODFW and Tribes to oversee this objective (Oregon Department of Fish and Wildlife et al. 1990). Because of this management policy, no short-term remedial actions, such as restocking with hatchery reared fish, can be used to restore resources lost during the acid spill. Recovery of damages from the spill should be in the form of habitat restoration actions in the John Day River Basin which are consistent with management plans for the area. Appropriate restoration actions will improve conditions in the river to promote fish and wildlife production lost due to the acid spill.

Restriction of restoration activities to the North Fork of the John Day River would be insufficient to replace the resources injured in the spill. Broader efforts in nearby tributaries are essential to promote recovery of

injured fish resources. In addition to the mainstem North Fork, restoration efforts should be directed to the tributaries of the North Fork, such as the Middle Fork John Day River, Camas Creek, and Desolation Creek.

Providing improved habitat for fish within the John Day River Basin will aid in replenishing the injured resources. Appropriate restoration projects in the North Fork of the John Day River and associated tributaries will increase the survivability of fish not killed during the acid spill and will aid in replenishing the natural population by increasing productivity levels. Restoration projects will provide more and better habitat for juvenile fish rearing and food resources, increase egg to smolt survival, increase smolt carrying capacity, and increase pre-spawner survival. Recovery of lost resources will not happen quickly; completion of restoration actions and full recovery of the fish populations could take 10 or more years.

CHAPTER 2. DESCRIPTION OF RESTORATION STRATEGIES, ALTERNATIVES, AND ENVIRONMENTAL CONSEQUENCES

In order to restore resources lost as a result of the spill, the Trustees examined a variety of restoration activities. Five restoration strategies were developed: permanent protection, temporary protection, habitat enhancement, and combined protection and enhancement. A variety of alternatives were developed for each strategy. These strategies, with their corresponding alternatives and restoration projects, are described below. An additional alternative which is also discussed below is that of no action which results in an unmitigated recovery of injured resources.

A. STRATEGY A. PERMANENT PROTECTION

Permanent Protection consists of land acquisition or management actions which provide protection in perpetuity to lands containing important fish habitats or having significant influence on aquatic ecosystems.

1. Permanent Protection Alternatives

a. Land Acquisition

Description

Acquisition of fee title interest in lands containing important fish and wildlife habitats or having significant influence on aquatic ecosystems.

Benefits

Provides perpetual control and management authority over lands containing important fish habitats or influencing aquatic ecosystems in a cost effective manner.

Specific Projects

Project Title: Middle Fork John Day River Land Acquisition

Purpose(s): In an effort to protect northwest wild fish, advocates have launched a campaign to protect the Middle Fork of the John Day River, a key tributary of the Columbia Basin. Acquisition, restoration, and enhancement of these lands are expected to increase populations of the imperilled spring chinook salmon and summer steelhead and provide improved habitat for a diversity of wildlife. The project goal is to restore the riverine system at the Middle Fork John Day River.

Proposed Activity(ies): Acquire private lands from willing landowners along the Middle Fork John Day River to restore the riverine system. Restoration will be achieved through two key strategies: (1) removal of unnatural constraints on the function of the ecosystem so that natural recovery may occur, and (2) restoring the natural processes of the ecosystem such as fire and flooding.

Location(s): The upper 21 miles of the Middle Fork John Day River.

Environmental Consequences: The proposed activities will restore the condition and functioning elements of the cold water aquatic and riverine ecosystem to its natural condition. These actions are expected to increase populations of spring chinook salmon and summer steelhead and provide improved habitat for a variety of wildlife. With increased fish abundance, additional chinook salmon and steelhead could be harvested in the tribal, commercial, and sport fisheries. A negative impact would be the loss of cattle foraging areas along the river bank since cattle would be excluded from this area.

Schedule: A comprehensive riparian inventory from the headwaters of the Middle Fork to the main stem of the North Fork John Day River was completed by the Oregon Natural Heritage Program. Using this information, acquisition efforts were targeted on the upper 21 miles of the river. Four and one half river miles were acquired in 1990. Other purchases are currently being negotiated. Trust Fund monies would be used to leverage acquisitions and to obtain matching funds.

Estimated Budget: Potential Trust Fund Monies = \$100,000
Total Project = \$300,000

Cost Share Agencies: The Nature Conservancy

b. Perpetual Easements, Leases, or Covenants

Description

Acquisition of management control on lands containing important fish habitats or having significant influence on aquatic ecosystems through perpetual easements or lease agreements with land owners or through acquisition and resale of lands with the addition of protective land use covenants to the title of ownership.

Benefits

Provides perpetual control and management authority over lands containing important fish and wildlife habitats or influencing aquatic ecosystems in a cost effective manner.

Specific Projects

Project Title: Upper Middle Fork John Day River Permanent Easement

Purpose(s): Restore the natural riparian community structure and floodplain function to enhance aquatic habitat.

Proposed Activity(ies): Protect three and one half miles of stream through a permanent easement and riparian fencing on the property. This project may be conducted in association with the Middle Fork land acquisition project.

Location(s): Upper Middle Fork John Day River.

Environmental Consequences: A permanent easement on the property would result in perpetual control and management authority over the land. Riparian fencing would enhance riparian habitat and

result in a resurgence of native streamside vegetation, increased shade on the river, moderation of water temperature fluctuations, improved bank stability and reduction in sediment inputs, higher water table, improved water quality, and increased summer flows. These changes will improve spawning and rearing habitat for anadromous and resident fish resulting in increased production.

Schedule: This project will be conducted in association with the Middle Fork John Day River Land Acquisition and the Upper Middle Fork John Day River Instream Habitat Enhancement projects. Project implementation could potentially begin in 1995 following finalization of a negotiated agreement with the landowner.

Estimated Budget: Potential Trust Fund Monies = \$30,000
Total Project = \$30,000

Cost Share Agencies: The Nature Conservancy

c. Acquisition of Water Rights

Description

Secure rights to water resources in the John Day Basin for in-stream flow or other uses beneficial to fish and other aquatic species. Emphasis will be on water rights with early appropriation dates to ensure maximum benefits during drought years.

Benefits

Provides perpetual control of a critical habitat element for direct and indirect benefits to fish resources and aquatic ecosystems.

Specific Projects

No feasible projects have been identified for this alternative and any proposed projects would require review of applicable water laws.

B. STRATEGY B. TEMPORARY PROTECTION

Temporary Protective measures include management actions which will provide protection to important fish habitats or terrestrial habitats having direct influence on the aquatic ecosystems that are either unavailable or unwarranted for more permanent protection.

1. Temporary Protection Alternatives

a. Easements, Leases, or Management Rights

Description

Temporary or interim acquisition of management control on lands containing important fish habitats or having significant influence on aquatic ecosystems through easements or lease agreements with landowners. Temporary protection can enhance riparian plant communities, improve recovery rates, and provide physical

Proposed Activity(ies): Protect 11 miles of stream through riparian fencing and exclude streambank grazing for 15 years.

Location(s): Desolation Creek immediately below U.S. Forest Service habitat improvements.

Environmental Consequences: Streambank protection through riparian fencing will result in a resurgence of native streamside vegetation, increased shade on the creek, moderation of water temperature fluctuations, improved bank stability and reduction in sediment inputs, higher water table, improved water quality, and increased summer flows. These changes will improve spawning and rearing habitat for anadromous and resident fish resulting in increased production.

Schedule: A schedule for this project will be developed pending the success of the North Fork John Day River Riparian Habitat Protection project. Project is dependent upon landowner-corporation approval.

Estimated Budget: Potential Trust Fund Monies = -----
Total Project = \$176,000

Cost Share Agencies: Potential cost share agencies include the Bonneville Power Administration and the Oregon Department of Fish and Wildlife - Restoration and Enhancement Program.

Project Title: North Fork John Day River Riparian Habitat Protection

Purpose(s): Improve spawning and rearing habitat for wild chinook salmon, steelhead trout, and other fish by restoring the natural riparian community structure and flood plain function of the creek.

Proposed Activity(ies): Protect 12 to 15 miles of stream through riparian fencing and exclude streambank grazing for 15 years.

Location(s): North Fork John Day River below the mouth of Camas Creek.

Environmental Consequences: Streambank protection through riparian fencing will result in a resurgence of native streamside vegetation, increased shade on the creek, moderation of water temperature fluctuations, improved bank stability and reduction in sediment inputs, higher water table, improved water quality, and increased summer flows. These changes will improve spawning and rearing habitat for anadromous and resident fish resulting in increased production.

Schedule: This project is supported by the ODFW's Northeast Region. The project proposal has been forwarded to the landowner-corporation, through their forester, for corporate approval. Depending upon approval date, the project could potentially be implemented in 1994. Implementation could take up to five years to complete 12 to 15 miles of riparian protection.

Estimated Budget: Potential Trust Fund Monies = \$50,000
Total Project = \$130,000

Cost Share Agencies: Potential cost share agencies include the Bonneville Power Administration and the Oregon Department of Fish and Wildlife - Restoration and Enhancement Program.

Project Title: Oxbow Ranch Riparian Habitat Protection

Purpose(s): Improve spawning and rearing habitat for wild chinook salmon, steelhead trout, and other fish by restoring the natural riparian community structure and flood plain function of the creek.

Proposed Activity(ies): Protect two miles of stream through temporary exclusion of streambank grazing and riparian fencing.

Location(s): Oxbow Ranch - Middle Fork John Day River

Environmental Consequences: Streambank protection through riparian fencing will result in a resurgence of native streamside vegetation, increased shade on the creek, moderation of water temperature fluctuations, improved bank stability and reduction in sediment inputs, higher water table, improved water quality, and increased summer flows. These changes will improve spawning and rearing habitat for anadromous and resident fish resulting in increased production.

Schedule: This project was implemented in 1993 and will continue in 1994. Project contact person is Jeff Neal, ODFW, John Day.

Estimated Budget: Potential Trust Fund Monies = \$14,000
Total Project = \$14,000

Cost Share Agencies: Bonneville Power Administration, Oregon Department of Fish and Wildlife - Restoration and Enhancement Program, and the Grant County Soil and Water Conservation District.

C. STRATEGY C. HABITAT ENHANCEMENT

Habitat enhancements include management actions that improve productivity and speed recovery of existing habitats through addition of key structural or biological elements.

1. Habitat Enhancement Alternatives***a. Riparian Habitat Restoration*****Description**

Enhance riparian plant communities through the addition and increase of native plant species that have been lost or suppressed due to past management activities. Improve native habitat recovery rates through plantings in areas where physical protection from livestock grazing through construction of riparian enclosure fencing has occurred.

Benefits

Restores natural riparian community structure and flood plain function, reduces inputs of sediments from the flood plain, provides organic debris sources, and moderates fluctuations in water temperatures which will improve spawning and rearing habitat for anadromous and resident fish.

Specific Projects

Project Title: Camas Creek Riparian Habitat Restoration

Purpose(s): Improve spawning and rearing habitat for wild chinook salmon and steelhead trout by restoring the natural riparian community structure and flood plain function of the creek.

Proposed Activity(ies): In coordination with streambank grazing exclusions and riparian fencing, enhance three miles of streamside habitat through plantings of native riparian vegetation. The project would be implemented through a cooperative lease between the Oregon Department of Fish and Wildlife and the landowner.

Location(s): Headwaters of Camas Creek near the town of Lehman Springs.

Environmental Consequences: Riparian plantings will result in a resurgence of native streamside vegetation, increased shade on the creek, moderation of water temperature fluctuations, improved bank stability and reduction in sediment inputs, higher water table, improved water quality, and increased summer flows. These changes will improve spawning and rearing habitat for anadromous and resident fish resulting in increased production.

Schedule: This project is ready to implement in 1994 and will be coordinated with the Camas Creek Riparian Habitat Protection project.

Estimated Budget: Potential Trust Fund Monies = \$2,500
Total Project = \$2,500

Cost Share Agencies: Bonneville Power Administration, Oregon Department of Fish and Wildlife - Restoration and Enhancement Program

Project Title: North Fork John Day River Riparian Habitat Restoration

Purpose(s): Restore riparian vegetation degraded by mining and logging operations in order to improve spawning and rearing habitat for resident and anadromous fish. Riparian plantings will restore the natural riparian community structure and flood plain function of the river.

Proposed Activity(ies): Restore riparian habitat and moderate water temperatures in the Upper North Fork John Day River drainage through plantings of native riparian conifers, hardwoods, willows, and brush. Total mileage for restoration is approximately six to eight miles.

Location(s): U.S. Forest Service, Wallowa-Whitman National Forest, Baker and Unity Ranger districts, Upper North Fork John Day River drainage. Identified streams for riparian restoration include: Granite Creek, Bull Run Creek, Boulder Creek, Beaver Creek, Clear Creek, Crane Creek, Onion Creek, and the North Fork John Day River from Crawfish Creek to the North Fork Campground.

Environmental Consequences: Riparian plantings will result in a resurgence of native streamside vegetation, increased shade on the creek, moderation of water temperature fluctuations, improved bank stability and reduction in sediment inputs, higher water table, improved water quality, and

increased summer flows. These changes will improve spawning and rearing habitat for anadromous and resident fish resulting in increased production.

Schedule: A native vegetation seed collection and growing program was established in the spring of 1993. Following approval of the Restoration Plan, the Trustees would meet with the Forest Service to prioritize riparian restoration of streams in the upper North Fork John day drainage. Restoration projects would be implemented in summer 1994.

Estimated Budget: Potential Trust Fund Monies = \$5,000
Total Project = \$84,800

Cost Share Agencies: U.S. Forest Service, Wallowa-Whitman National Forest, Baker and Unity Ranger Districts.

b. Instream Habitat Improvement Measures

Description

Modification of existing habitat or the creation of new habitat to imitate natural stream channel structure and stability.

Benefits

Restore natural stream channel structure and stability, increase retention of natural organic inputs, provide instream cover for fish, and provide substrates for macroinvertebrate production.

Specific Projects

Project Title: Upper Middle Fork John Day River Instream Habitat Enhancement

Purpose(s): Enhance habitat diversity in the most frequently used chinook salmon spawning reach on the Middle Fork John Day River in order to increase production.

Proposed Activity(ies): Place large woody debris and off-channel rearing structures in the Middle Fork John Day River.

Location(s): Upper Middle Fork John Day River.

Environmental Consequences: Enhanced habitat diversity and instream cover for spawning chinook salmon and other fish, increased retention of natural organic inputs, and enhanced substrates for macroinvertebrate production.

Schedule: This project would be implemented in coordination with the Upper Middle Fork John Day River Permanent Easement project upon finalization of a negotiated agreement. This project could potentially be initiated in 1995.

Estimated Budget: Potential Trust Fund Monies = \$-----
Total Project = \$22,000

Cost Share Agencies: The Nature Conservancy

Project Title: Oxbow Ranch Instream Habitat Enhancement

Purpose(s): Increase habitat diversity and instream cover for anadromous and resident fish, correct fish passage and instream cover deficiencies in a corridor fenced section of the river. This project will also correct old streambank stabilization structures present in a small portion of the project area.

Proposed Activity(ies): Place large woody debris, boulders, stream deflectors, culverts, and miscellaneous riprap within a seven and one half mile stretch of stream.

Location(s): Mainstem Middle Fork John Day River and chinook salmon rearing tributaries. Project will be located in areas presently under a 15 year lease for grazing exclusion.

Environmental Consequences: The proposed activities will enhance habitat diversity and instream cover for spawning chinook salmon and other fish species, increase retention of natural organic inputs, and enhance substrates for macroinvertebrate production resulting in increased production of macroinvertebrates and fish.

Schedule: This project was implemented in 1993 and will continue in 1994. The project will be coordinated with the Oxbow Ranch Riparian Habitat Protection project.

Estimated Budget: Potential Trust Fund Monies = \$2,500
Total Project = \$36,915

Cost Share Agencies: Potential cost share agencies include the Bonneville Power Administration and the Oregon Department of Fish and Wildlife - Restoration and Enhancement Program.

c. Watershed Improvement Measures

Description

Projects undertaken on a large scale which have the potential to affect the ecological processes of rivers and streams on a watershed level.

Benefits

Restores the natural community structure, flood plain function, water flow, and channel dynamics of rivers and streams within a watershed.

Specific Projects

Project Title: Mine reclamation, road obliteration, and erosion control in the North Fork John Day River Subbasin.

Purpose(s): Reverse impacts of mine and road development to restore fish habitat. Restore floodplain function, natural flow and channel dynamics, and riparian vegetation by removal and redistribution of dredge tailings from mines and obliteration of roads. These actions would increase fish habitat

complexity and reestablish a full array of riverine and riparian ecological processes in affected reaches.

Proposed Activity(ies): Mining projects would involve: removal and redistribution of mine tailings to restore the stream channel and bank contour, removal of fish passage barriers from the stream channel, coverage of waste tailing with top soil, seeding of disturbed areas and replanting of trees and shrubs, filling of excavated areas and contouring of disturbed areas to decrease erosion into streams, and placement of woody debris in eroded upland channels to dissipate overland water flow into streams. Road projects would involve: closing the road to vehicular use, subsoiling or ripping of roads to eliminate compaction and facilitate revegetation, waterbarring to reduce surface erosion, and seeding and planting to enhance revegetation.

Location(s): U.S. Forest Service, Umatilla National Forest, North Fork John Day River Subbasin. Mining projects include East Ten Cent Creek and Camp Creek. Road obliteration projects would occur in the Texas Bar, Oriental, Camas, and Desolation Creek watersheds.

Environmental Consequences: The proposed activities would restore the natural stream channelization and floodplain function disrupted by placement of dredge tailings, increase habitat diversity, increase fish spawning and rearing habitat, and eliminate sedimentation associated with roads.

Schedule: Implementation is proposed for 1994.

Estimated Budget: Potential Trust Fund Monies = \$5,000
Total Project = \$90,600

Cost Share Agencies: U.S. Forest Service, Umatilla National Forest, North Fork Ranger District.

Project Title: Middle Fork John Day River Watershed Restoration

Purpose(s): Restore critical habitat within the Middle Fork of the John Day River watershed by closing or obliterating 111 miles of road. Native surfaced roads can affect streams directly by accelerating erosion and sediment loadings, by altering channel morphology, and by changing the runoff characteristics of watersheds. These processes interact to cause secondary changes in channel morphology. All of these changes negatively impact fish habitats. By closing and obliterating roads, providing adequate drainage and revegetation, the abundance and quality of spawning gravel can increase. This in turn will result in increased incubation rates and subsequent recruitment of juvenile salmonids into the populations. Culverts pose the most common migration barriers associated with road networks. Culvert removal, as a part of road obliteration, can eliminate potential migration and movement barriers to salmonids seeking food, shelter, better water quality, and spawning areas. These actions would positively affect anadromous and resident fish which utilize the Middle Fork John Day River and ten streams within the project area.

Proposed Activity(ies): Reduce road densities in the Malheur National Forest by obliterating, revegetating, or permanently closing unnecessary roads or any roads which cause significant resource damage. Within the project area, approximately 16 miles of road will be obliterated and 95 miles will be closed. Surface erosion associated with roads will be reduced. Road work will consist of installation of approximately 10 wood pole barricades, 25 log-earth berms, 30 camouflaging entrances

with native materials (root-wads, logging slash, boulders, juniper slash, tree planting), ripping and culvert removal on 10 miles, and grass seeding of 55 miles. Interpretive signs and maps will be installed along main forest roads explaining the need and benefit of closing roads. All closed and obliterated roads will receive follow-up evaluation and monitoring to determine their effectiveness, and learn their impacts upon the local public, the Forest Service, hunters, and campers.

Location(s): U.S. Forest Service, Malheur National Forest, Long Creek Ranger District. This area encompasses the entire north side of the Middle Fork John Day River and it is composed of 11 subwatersheds in their entirety.

Environmental Consequences: There are 53.5 miles of anadromous streams that will be positively affected by this restoration plan. In addition, approximately 9.5 miles of bull trout stream will be positively affected. Initial observations show that approximately 20 miles of road having direct impacts to these salmonids will either be closed or obliterated. The project will occur in a major deer and elk migration route area and reduced open road densities will increase habitat effectiveness for elk and mule deer populations. The closure of 111 miles of road means that fewer native surfaced roads will be driven during the 'muddy' season. Therefore, waterbars will remain intact and water will be channeled off the road keeping sediment loading in the streams to a minimum. Recreational opportunities will be maintained by maintaining access to established dispersed campsites.

Schedule: The project will be completed in two years, with 60% of the area (five subwatersheds) being done the first year. National Environmental Policy Act (NEPA) requirements have been completed for four of the five subwatersheds. NEPA requirements for the fifth watershed are currently underway. Project implementation will begin in winter or spring 1994 depending on weather conditions. NEPA requirements will be fulfilled for the seven remaining watersheds during the summer of 1994. Project implementation will begin in these subwatersheds in 1995.

Estimated Budget: Potential Trust Fund Monies = \$4,000
Total Project = \$53,100

Cost Share Agencies: U.S. Forest Service, Malheur National Forest, Long Creek Ranger District.

D. STRATEGY D. COMBINED PROTECTION AND ENHANCEMENT

Description

A variety of permanent protection, temporary protection, and habitat enhancement alternatives and projects would be utilized on lands containing important fish and wildlife habitats or having significant influence on aquatic ecosystems.

Benefits

Permanent Protection provides perpetual control and management authority over lands containing important fish habitats or influencing aquatic ecosystems in a cost effective manner. Temporary Protection provides temporary or interim control and management authority over lands containing important fish habitats or influencing aquatic ecosystems in a cost effective manner. Temporary Protection may allow for resource protection where a more permanent alternative is unavailable or undesirable. Easements associated with riparian fencing would restore the natural riparian community structure and flood plain function, reduce inputs

of sediments from the flood plain, provide organic debris sources, and moderate fluctuations in water temperatures. Habitat Enhancement restores the natural riparian community structure and flood plain function, reduces inputs of sediments from the flood plain, provides organic debris sources, and moderates fluctuations in water temperatures which will improve spawning and rearing habitat for anadromous and resident fish.

Specific Projects and Environmental Consequences

Refer to alternatives and projects listed under Strategy A. Permanent Protection, Strategy B. Temporary Protection, and Strategy C. Habitat Enhancement.

E. NO ACTION - UNMITIGATED ACTION ALTERNATIVE

Description

No actions would be taken to restore resources injured in the February 8, 1990, acid spill. Injuries to fish and other aquatic resources impacted by the spill would be unmitigated.

Benefits

Benefits would only arise if the injured aquatic resources are able to recover to pre-spill population levels without restoration actions. No benefits would be realized from the mitigation settlement with the Thatcher Trucking Company and the obligations of the Consent Decree would not be met.

Specific Projects

No projects would be conducted under this strategy.

Environmental Consequences: Although some natural recovery is expected, the high loss of fish resources associated with the spill and the degraded fish rearing and spawning habitat in the John Day River Basin make unmitigated recovery a long and uncertain process. Candidate species for listing as threatened or endangered under the Endangered Species Act of 1973 may not be able to recover to previous levels without the implementation of restoration projects.

F. PROPOSED RESTORATION ACTIVITIES

1. Selected Strategies and Alternatives

In order to maximize recovery of injured resources, the Trustees selected Strategy D. Combined Protection and Enhancement. This strategy allows the Trustees maximum flexibility in restoration projects in order to take full advantage of the opportunities to protect and enhance the impacted aquatic ecosystem. In selecting the Combined Protection and Enhancement Strategy, the Trustees emphasis on the selection of restoration projects was on Permanent Protection followed by Temporary Protection and then Habitat Enhancement projects.

For each strategy, the Trustees developed a list of projects and allocated potential trust fund monies (Tables 1 and 2). Projects were selected based on their potential to restore resources injured in the spill. Funds available for restoration projects are limited to \$275,000. Protection projects (Table 1) will be allocated

approximately 85 percent (\$233,750) of the restoration funds and habitat enhancement projects (Table 2) will be allocated approximately 15 percent (\$41,250) of the restoration funds. Potential trust fund monies have not been allocated to the Desolation Creek protection project and the Upper Middle Fork enhancement project. Because these two projects are dependent upon the implementation of other projects, the Trustees deferred funding allocation until the feasibility of these projects was determined.

Based on the projects identified in Tables 1 and 2 above, \$15,000 in Trust fund monies are currently available for funding either the Desolation Creek and Upper Middle Fork projects, increasing funding of the other identified projects, or funding additional restoration projects. The Trustees are also actively seeking matching funds for restoration projects in order to enhance current projects or implement additional projects.

2. Thresholds

The acid spill resulted in an estimated loss of 98,000 to 145,000 adult fish including 4,000 anadromous fish, 300 bull trout, and 9,500 Pacific lamprey. Additionally, 50 percent of the chinook salmon alevins in areas impacted by the spill were estimated to have been destroyed. The Trustees selected restoration projects which would have the greatest potential to restore these resources to their pre-spill population levels and would also benefit other aquatic resources. The selected projects will result in improved spawning and rearing habitat for both resident and anadromous fish which should increase the production of these species in the John Day River Basin. The time frame needed for these species to recover to their pre-spill levels is unknown but is suspected to be several generations. Additionally, with improved habitat conditions, resident and anadromous fish populations are expected to exceed pre-spill population levels.

This restoration plan will be subject to an annual review by the Trustees. Reviews will include a determination of the efficacy, and suggestions for improvement, of the implemented projects as well as proposals for new projects. The annual review process may result in the redistribution of funds given the feasibility of specific projects. Proposed revisions to the plan will be reviewed by the Trustees. Major revisions will also be subject to public review. Revisions to the plan will be guided by documented evidence and best professional judgement.

3. Schedule and Budget

The schedule and budget for implementation of restoration projects will be completed when the restoration plan is finalized following public review. At that time the final restoration projects will be selected and it will be possible to detail schedules and budgets.

Table 1. John Day River Acid Spill Protection Projects.

Project Title	Total Project Costs	Potential Trust Fund Monies
Middle Fork John Day River Land Acquisition	\$300,000	\$100,000
Upper Middle Fork John Day River Permanent Easement	\$30,000	\$30,000
Camas Creek Riparian Habitat Protection	\$97,060	\$47,000
Oxbow Ranch Riparian Habitat Protection	\$14,000	\$14,000
Desolation Creek Riparian Habitat Protection	\$176,000	-----
North Fork John Day River Riparian Habitat Protection	\$130,000	\$50,000
TOTAL FUNDS:	\$747,060	\$241,000

Table 2. John Day River Acid Spill Enhancement Projects.

Project Title	Total Project Costs	Potential Trust Fund Monies
Camas Creek Riparian Habitat Restoration	\$2,500	\$2,500
Oxbow Ranch Instream Habitat Enhancement	\$36,915	\$2,500
Upper Middle Fork John Day River Instream Habitat Enhancement	\$22,000	-----
North Fork John Day River Riparian Habitat Restoration	\$84,800	\$5,000
Mine reclamation, road obliteration, and erosion control in the North Fork John Day River Subbasin	\$90,600	\$5,000
Middle Fork John Day River Watershed Restoration	\$53,100	\$4,000
TOTAL FUNDS:	\$289,915	\$19,000

CHAPTER 3. AFFECTED ENVIRONMENT

The Memorandum of Agreement between the DOI, the State of Oregon, and the CTUIR only allows Trust Fund expenditures on restoration, replacement, or acquisition of equivalent resources injured in the John Day River Acid Spill. Meeting this requirement entails the development of habitat restoration and enhancement projects for anadromous and resident fish in the North Fork John Day River and tributaries to mitigate for the fish losses resulting from the spill. In order to restore fish resources injured by the spill, the Trustees considered restoration projects in the following areas: Lower North Fork Subbasin, Upper North Fork Subbasin, Middle Fork Subbasin, Camas Creek, and Desolation Creek. The following sections provide an overview of the affected environment in each of the proposed areas which would benefit from restoration actions.

A. NORTH FORK SUBBASIN

The North Fork Subbasin has been extensively described in a basin planning report developed by the Oregon Water Resources Department (1992): The North Fork Subbasin is one of four subbasins in the Upper John Day River Basin system and it is a major producer of wild spring chinook salmon (70 percent of the total) and wild summer steelhead (43 percent of the total) in the John Day River Basin. The subbasin provides the greatest natural water source in the John Day River Basin, contributing over 60 percent of the average annual discharge of the Basin and draining approximately 1800 square miles. Major tributaries in the subbasin include Granite, Desolation, Camas, Potamus, Big Wall, Fox, and Cottonwood Creeks (Figure 2). The average annual discharge of the North Fork at Monument is 904,000 acre-feet.

The North Fork Subbasin is primarily located in Grant, Umatilla, and Morrow counties, although Wheeler and Union counties also contain a portion of the subbasin. The subbasin is a sparsely populated area with three incorporated cities: Granite, Monument, and Ukiah. It is also comprised of ceded lands of the CTUIR and the CTWS. These Tribes have reserved treaty rights to use this land and its resources. This area is used by the Tribes for ceremonial purposes and for hunting, fishing, grazing, and gathering plants.

Forests comprise nearly 77 percent of the subbasin, and range and pasture account for another 20 percent. About 36 square miles are in crops, half of which is irrigated. Most of the forest lands are within the Umatilla and Wallowa-Whitman National Forests. Malheur National Forest, the Prineville District of the Bureau of Land Management, and the State of Oregon also own land in the subbasin. Private ownership accounts for about 40 percent of the subbasin (Oregon Water Resources Department 1986).

B. LOWER NORTH FORK JOHN DAY RIVER (DIRECT IMPACT AREA FROM THE MOUTH OF CAMAS CREEK TO THE MOUTH OF THE MIDDLE FORK).

The Lower North Fork John Day River reach from the mouth of Camas Creek to the mouth of the Middle Fork was the area most heavily impacted by the acid spill. A severe loss of riparian vegetation has also occurred in this reach due to heavy grazing pressure and timber harvest. Surface shading, which is contributed more by topography than by riparian vegetation, is poor to fair in this area. Woody debris is minimal due to a lack of large organic debris and high spring flows. This river reach is generally characterized by a poor depth to width ratio, a poor pool to riffle ratio, low gradient, and fair to poor bank stability. Major fish production constraints in this reach include low flows, high stream temperatures, inter-specific competition, lack of riparian vegetation, streambank degradation, and a lack of habitat complexity. The NPPC's planning process characterized habitat quality in this reach as "fair".

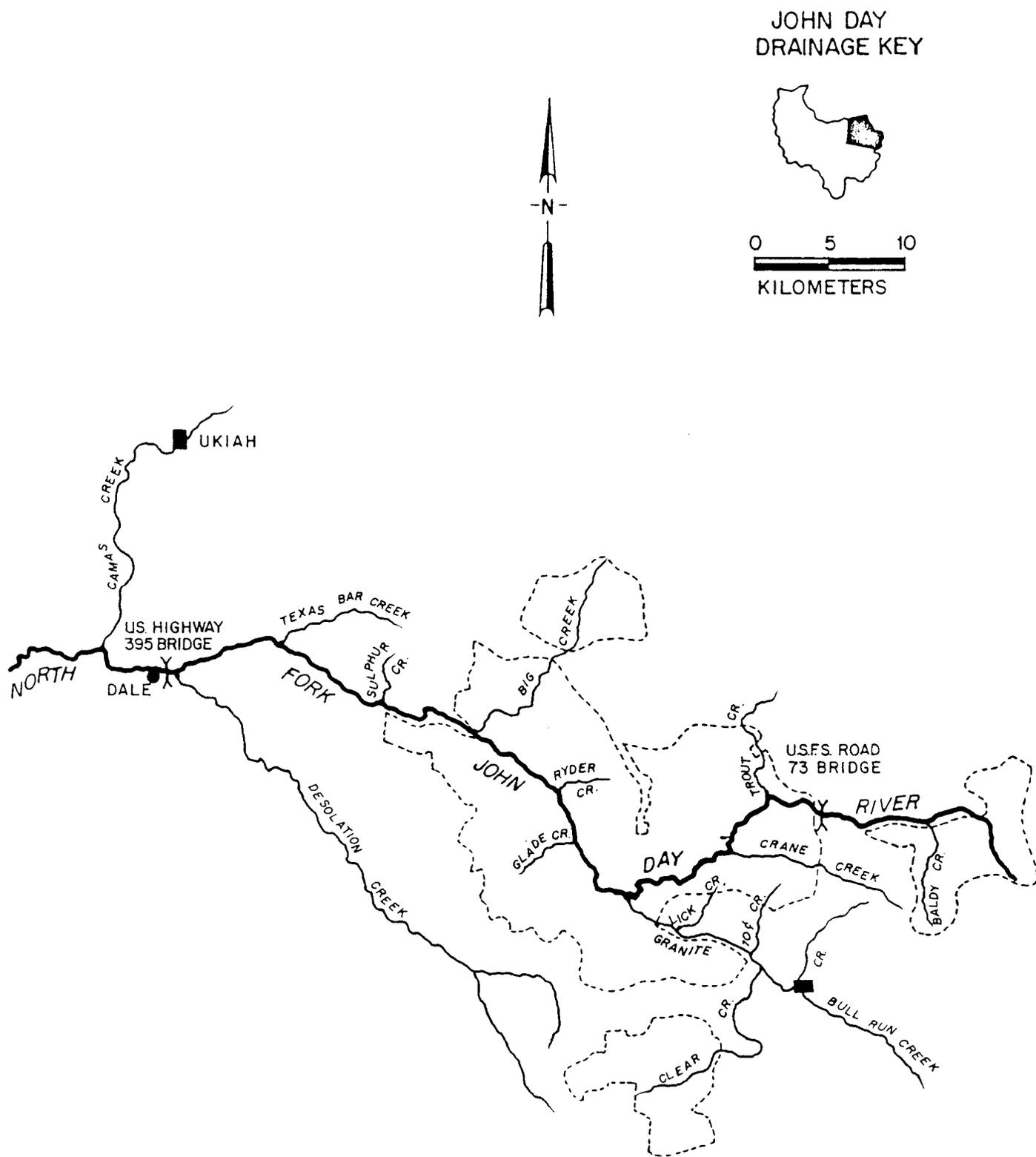


Figure 2. Map of the North Fork John Day River Subbasin. (Source: Lindsay et al. 1986)

Spring chinook salmon, steelhead, and redband trout rear in this reach, although most of this spawning and rearing occurs upriver, above the mouth of Desolation Creek. Large numbers of smolts from upriver move through this area in the spring on their seaward migration. Juvenile chinook salmon were found rearing in the lower reaches of Ditch, Mallory, Potamus, Stony, and Camas Creeks, and 15 tributaries of the Middle Fork John Day River (Lindsay et al. 1986). Migratory (fluvial) bull trout, a Federal candidate species, inhabit this area in the winter and early spring.

C. UPPER NORTH FORK JOHN DAY RIVER (UPSTREAM OF CAMAS CREEK).

The Upper North Fork John Day River suffers from a variety of habitat problems. This stretch of river has previously been described by the U.S. Forest Service (1993). The following description was extracted from the U.S. Forest Service's report: Riparian habitat in this area is in fair condition. Surface shading is poor to fair with an average of 26.86 percent shade. Poor surface shading is exacerbated by the decline in timber stands associated with infestations of fir trees by spruce budworm, Douglas fir bark beetle, tussock moth, and mountain pine beetle. Many of the infested trees are located within a special fish management area, which is currently deficient in large wood and shading. Mass wasting of the upper banks and cutting of the lower banks is also a recurring problem in this area. Woody debris is essentially absent from the channel area. Pool rating is poor to fair due to the depth and the lack of cover. No migration barriers were observed. Chinook salmon smolts and adult chinook salmon have been observed throughout this area and chinook salmon have been observed making redds.

A Hankin and Reeves Stream Inventory was conducted in 1991 on the entire Wild & Scenic portion (54 miles) of the North Fork John Day River by the Wallowa-Whitman National Forest. Results from the inventory indicate good riparian condition, inadequate stream shade, and poor percentage of pools available as fish habitat. Monitoring of stream temperature from 1982 to 1987 showed temperatures exceeded ideal habitat conditions for steelhead, spring chinook salmon and bull trout for short periods of time (U.S. Forest Service 1993). Temperatures above 68° F are of concern since they exceed State of Oregon Water Quality Standards and favor non-game fish.

The Oregon Statewide Assessment of Nonpoint Sources of Water Pollution (Oregon Department of Environmental Quality 1988) indicates that the North Fork John Day River has a pollution problem. Degradation of this area due to disturbances such as surface erosion, turbidity, changes in flow pattern and timing, elimination of thermal cover, traffic, and a decline in the alluvial water table has affected both fish resources and aesthetics. These disturbances were likely caused by alterations from water withdrawal, channelization, and wetland drainage.

The riparian habitat area for the North Fork John Day River has been historically used for mining, cattle grazing, road building, recreation and timber harvest. Historical mining has left eroding stockpiles of dredge tailings, eroded streambanks, and a reduction of riparian shrubs. Cattle grazing has been eliminated from the drainage, but degraded riparian hardwood stands are still evident. Roads are a significant source of sediment delivered to streams and road densities in most areas outside the John Day Wilderness are higher than established guidelines.

D. MIDDLE FORK JOHN DAY RIVER SUBBASIN

The Middle Fork John Day River, as described by an Oregon Water Resources Department (1991) planning report, flows for about 75 miles from its headwaters to its confluence with the North Fork. The Middle Fork is the major stream in the Middle Fork Subbasin draining 806 square miles. Major tributaries include

Squaw, Clear, Bridge, Vinegar, Granite Boulders, Big Boulder, Camp, Elk, Big and Long Creeks. Average annual discharge of the Middle Fork at Ritter is about 185,000 acre-feet. With its high water flows, this subbasin produces about 24 percent of the spring chinook salmon and 30 percent of the steelhead trout of the entire John Day Basin.

The Middle Fork Subbasin is located entirely within Grant County and is sparsely populated (Figure 3). Nearly two-thirds of the subbasin is comprised of forest land and most of the remaining lands are range and pasture. Croplands account for approximately 17 square miles, or two percent, of the subbasin. About three-fourths of the subbasin is in Federal ownership, however, much of the chinook salmon spawning habitat and potential rearing habitat is on mainstem Middle Fork private lands. Most of the Federal land is managed by the Malheur National Forest. Thirty square miles are managed by the Umatilla National Forest. The Wallowa-Whitman National Forest is the permittee for one and one half square miles of grazing allotments on Malheur National Forest. Scattered tracts of land are managed by the Bureau of Land Management (Oregon Water Resources Department 1986).

Logging is the major economic activity in the subbasin. Cattle ranching is also a primary activity in the subbasin. Most forest lands and much of the private land is grazed. There is also some mining activity, primarily for gold and silver, in the subbasin.

E. CAMAS CREEK

Camas Creek is a third order stream which flows into the North Fork John Day River near the town of Dale, Oregon. The creek flows across property managed by the State of Oregon, the U.S. Forest Service (Umatilla and Wallowa-Whitman National Forests) and several privately owned ranches. The Camas Creek area has previously been described in a habitat stream survey report by the Umatilla National Forest (U.S. Forest Service 1988):

The hydrology of Camas Creek varies by season. The stream channel is confined in a narrow (<100 feet wide) floodplain for much of its length. However, there are sections of Camas Creek where the floodplain is greater than 1000 feet wide. The substrate is comprised primarily of cobble followed by gravel and pea gravel although large and small boulders are abundant in the lower 10 miles of the stream. Silt is also abundant in some areas. This stream consists mainly of riffles and glides with very few pools.

Heavy grazing, highway channelization, and timber harvest have had the greatest impacts on the watershed. These activities have altered the hydrology and reduced bank stability and pool abundance in Camas Creek. The effects of these activities have substantially reduced Camas Creek fish production. Bank stability varies from poor to good. Streambank stability is generally good on State and Federal lands. However, there are areas on private lands where the channel is nearly as wide as the floodplain and others where mass wasting of the streambanks is evident and six foot high cutbanks have been observed.

Although historically Camas Creek was a significant production area for spring chinook salmon, habitat conditions have been degraded resulting in reduced adult returns and smolt production. Summer steelhead production occurs in Camas Creek, also at reduced levels. Redband rainbow trout are also produced in the Camas Creek system.

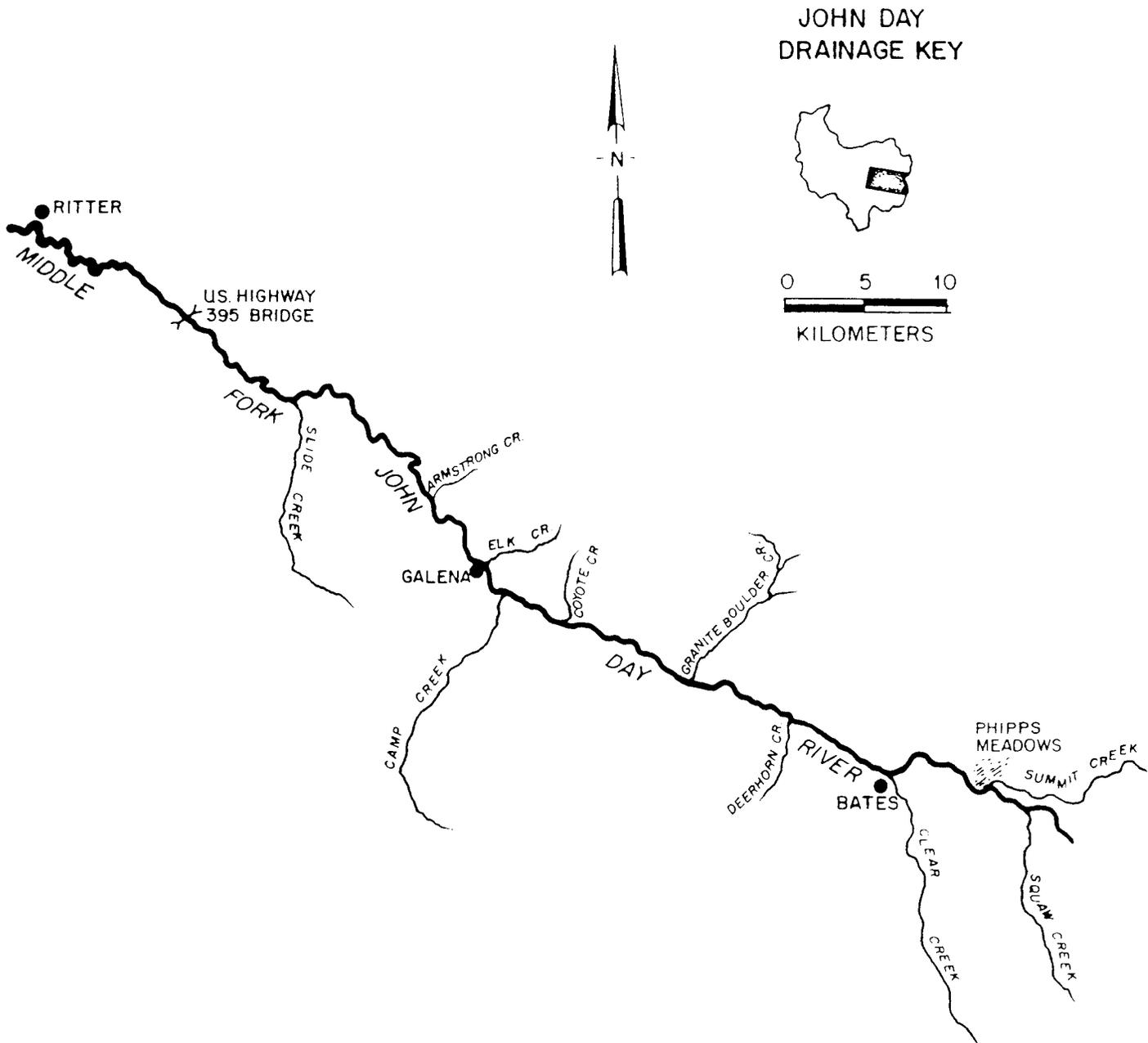


Figure 3. Map of the Middle Fork John Day River Subbasin. (Source: Lindsay et al. 1986)

F. DESOLATION CREEK

Desolation Creek has previously been described in a stream habitat report by the Umatilla National Forest (U.S. Forest Service 1982): The creek is a fourth order stream which flows into the North Fork John Day River over land managed by the Umatilla National Forest as well as over private land. Numerous streams flow into Desolation Creek but none of them have been surveyed. With a few exceptions, large and small rubble are the most abundant substrate components, followed by small boulders and coarse gravel. No single component appears dominant. Woody debris is present in light to moderate amounts in most reaches. Mass wasting of the upper banks and significant lower bank cutting is occurring in a few reaches and braiding is present throughout the stream. The lower reaches of Desolation Creek have been heavily impacted by livestock grazing and timber harvest. The pool to riffle ratio is generally poor and seven reaches contain no pools at all. The pool to riffle ratio has been improved somewhat in the middle reaches of Desolation Creek by the placement of weir pools and large woody debris. There are potential barriers to migration scattered throughout the upper reaches of the creek.

The Desolation Creek system produces spring chinook salmon, summer steelhead, redband rainbow trout, westslope cutthroat trout, and bull trout. An ODFW Fish Restoration and Enhancement Aquatic Inventory Project surveyed Desolation and South Fork Desolation creeks in the summer of 1990. This project found bull trout distributed in 1.75 miles in Desolation Creek and in 6.0 miles of the South Fork Desolation Creek. Cutthroat trout were found in 5.75 miles of the South Fork only. Adult spring chinook salmon enter Desolation Creek primarily in high water years, and typically only in small numbers. Summer steelhead and rainbow trout juveniles are the most abundant fish in the creek, with spawning and rearing occurring from the mouth to above Desolation Meadows.

CHAPTER 4. ENVIRONMENTAL CONSEQUENCES

Project specific environmental consequences for each of the alternatives and associated projects are provided in Chapter 3. Since the projects are primarily designed to restore degraded habits and improve fish rearing and spawning habitats, the cumulative environmental consequences will primarily be beneficial. These cumulative impacts include long-term restoration of the condition and functioning elements of the cold water aquatic and riverine ecosystem to its natural conditions, enhanced riparian habitat, increased shade, moderated water temperature fluctuations, improved bank stability and reduced sediment inputs, higher water tables, improved water quality, and increased summer flows. These impacts will result in improved spawning and rearing habitat for anadromous and resident fish resulting in increased production within the North Fork, Middle Fork, and other tributaries of the John Day River. A potential negative impact of these projects would be the loss of cattle foraging areas along the river bank since cattle would be excluded from these areas. However, cattle exclusion would only occur on lands on which there is a willing landowner.

Environmental consequences would not be limited to the project location. Indirect beneficial impacts would also occur for some distance downstream of the selected projects. These impacts include decreased siltation, improved water quality, moderation in water temperature fluctuations, a higher water table, and increased summer flows. Cumulative impacts at the project locations, as well as in the surrounding riverine area, are expected to increase populations of spring chinook salmon and summer steelhead and provide improved habitat for a variety of fish and wildlife.

Although a variety of fish occur within the John Day River and its tributaries, their production and survival is affected by a number of activities which occur in the basin. These activities include agriculture, timber production and harvest, cattle grazing, mining, water withdrawal, channelization, wetland drainage, road construction, and recreation among others. Many of these activities have impacted the John Day River and its tributaries resulting in poor surface shading, lack of woody debris in channel areas, lack of cover, poor depth to width ratio, a poor pool to riffle ratio, low gradient, and fair to poor bank stability. Major fish production constraints in the basin are the result of low water flows, high stream temperatures, inter-specific competition, lack of riparian vegetation, altered hydrology, streambank degradation, and a lack of habitat complexity. The North Fork of the John Day River has also been documented to have a pollution problem. Implementation of the proposed restoration strategies should improve these conditions in localized areas.

If this plan is significantly revised following public review, an Environmental Assessment or Environmental Impact Statement will be prepared for any new alternatives and projects.

CHAPTER 5. PUBLIC INVOLVEMENT

This document was provided to the public for a 30 day review and comment period. The following is a list of agencies, organizations, and persons to whom copies of the draft document were sent for review. Two comments were received on the draft document from the public. Both of these comments supported the Trustees' selected strategy of Combined Protection and Enhancement. Copies of the comment letters are provided in Appendix A.

Interested members of the public may obtain copies of the final document by writing or calling the U.S. Fish and Wildlife Service, Portland Field Office, 2600 S.E. 98th Avenue, Portland, Oregon, 97266 (503) 231-6179. Copies of the final document are also available for review at the U.S. Fish and Wildlife Service's Portland Field Office, the Oregon Department of Fish and Wildlife's John Day District Office (305 North Canyon Boulevard, John Day, Oregon) and the Grant County Library (507 South Canyon Boulevard, John Day, Oregon).

A. AGENCIES

A.1. State of Oregon

- a. Department of Fish and Wildlife
- b. Department of Fish and Wildlife - Restoration and Enhancement Board
- c. Oregon Water Resources Department
- d. Oregon State University

A.2. Federal Agencies

- a. National Marine Fisheries Service
- b. U.S. Forest Service
 - 1) Malheur National Forest
 - 2) Umatilla National Forest
 - 3) Wallowa-Whitman National Forest
- c. Bureau of Land Management
- d. Bureau of Indian Affairs
- e. Soil Conservation Service
- f. Bonneville Power Administration
- g. U.S. Fish and Wildlife Service
- h. Department of the Interior

A.3. Counties

- 1. Grant County Planner
- 2. Grant County Soil and Water Conservation District
- 3. Umatilla County Planning Committee

A.4. Cities

B. ORGANIZATIONS

1. The Nature Conservancy
2. Columbia River Inter-Tribal Fisheries Commission
3. Columbia Basin Fish and Wildlife Authority
4. Pacific Rivers Council
5. Oregon Trout
6. Trout Unlimited
7. WaterWatch
8. Louisiana-Pacific Corporation
9. Pendleton Ranches, Inc.
10. Bring Back the Natives
11. Northwest Steelheaders
12. Oregon Rivers Council
13. Rocky Mountain Elk Foundation
14. Thatcher Trucking Company

C. TRIBES

1. Confederated Tribes of the Umatilla Indian Reservation
2. Confederated Tribes of the Warm Springs Reservation

D. INTERESTED PERSONS

1. John Forrest
2. Rotchford Barker

E. NEWS MEDIA

1. Blue Mountain Eagle
2. The Central Oregonian
3. The East Oregonian
4. The Dalles Chronicle
5. The Oregonian
6. Sherman County Journal
7. The Times Journal

F. LIBRARIES (copies of the document may be reviewed at the libraries listed)

1. Grant County Library

G. CONGRESSIONAL DELEGATION

1. Robert Packwood
2. Mark Hatfield
3. Bob Smith
4. Elizabeth Furse
5. Ron Wyden

H. STATE LEGISLATORS

1. Wes Cooley
2. Gordon Smith
3. Ray Baum
4. Michael Payne

CHAPTER 6. REFERENCES

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B. PERSONAL COMMUNICATIONS

Hiram Li, U.S. Fish and Wildlife Service, Oregon Cooperative Fisheries Research Unit, Oregon State University, Corvallis, Oregon

CHAPTER 7. LIST OF PREPARERS

This document was drafted by Colleen Henson, an Environmental Contaminant Specialist for two years with the U.S. Fish and Wildlife Service's Portland Field Office in coordination with the Restoration Committee. Restoration Committee Members developed the alternatives and participated in the subsequent preparation of the environmental document. Document reviews and ideas for restoration alternatives were also provided by interested persons. Cost-share contacts were invited to submit cost-share proposals to the Restoration Committee for consideration in developing alternatives and projects.

A. RESTORATION COMMITTEE MEMBERS

Errol Claire	Oregon Department of Fish and Wildlife, Northeast Region, John Day, Oregon
Doug Olson	U.S. Fish and Wildlife Service, Lower Columbia River Fishery Resource Office, Vancouver, Washington
Carl Scheeler	Confederated Tribes of the Umatilla Indian Reservation, Pendleton, Oregon

B. INTERESTED PERSONS

Ron Eggers	Bureau of Indian Affairs, Branch of Fisheries, Portland, Oregon
Mark Fritsch	Confederated Tribes of the Warm Springs Reservation, Warm Springs, Oregon
Mike Gray	Oregon Department of Fish and Wildlife, Northeast Region, John Day, Oregon
Roger Helm	U.S. Fish and Wildlife Service, Region 1 Regional Office, Portland, Oregon
David Nolte	Bring Back the Natives, Redmond, Oregon
Charles Polityka	U.S. Department of the Interior, Regional Environmental Office, Portland, Oregon
Greg Robart	Oregon Department of Fish and Wildlife, Habitat Conservation Division, Portland, Oregon
Carol Schuler	U.S. Fish and Wildlife Service, Ecological Services, Portland Field Office, Portland, Oregon
Barry Stein	U.S. Department of the Interior, Regional Solicitor's Office, Portland, Oregon
Steve Wille	U.S. Fish and Wildlife Service, Ecological Services, Portland Field Office, Portland, Oregon

C. COST-SHARE CONTACTS

Bill Bakke	Oregon Trout
Carolyn Bohan	Bonneville Power Administration
Ken Delano	Grant County Soil and Water Conservation District
Ralph Denny	Rocky Mountain Elk Foundation
Bob Doppelt	Oregon Rivers Council
Rich Gritz	U.S. Forest Service, Malheur National Forest
Wayne Hams	Northwest Steelheaders
Phil Howell	North Fork John Day Ranger District
Mike McCord	Oregon Water Resources Department
Kathy McDonald	The Nature Conservancy
Rhoda Portis	Soil Conservation Service
John Sanchez	U.S. Forest Service, Umatilla National Forest
Greg Wilmore	Baker Ranger District
David Young	Bureau of Land Management, Prineville District, Prineville, Oregon

CHAPTER 8. APPENDIX

During the 30 day public review and comment period of the Joint Draft Environmental Assessment and Draft Restoration Plan, two comment letters were received. Copies of these letters are provided in this appendix. Both comments were supportive of the Trustees' selected restoration strategy of Combined Protection and Enhancement.

A. COPIES OF REVIEW COMMENTS



Oregon Field Office
1205 N.W. 25th Avenue
Portland, Oregon 97210-2497
503 228-9561

July 1, 1994

Colleen Henson
U.S. Fish & Wildlife Service
2600 SE 98th Avenue, Suite 100
Portland, Oregon 97266

Dear Colleen,

The Nature Conservancy would like to take this opportunity to comment on the Draft Restoration Plan for the John Day River Acid Spill. As you are aware, the Conservancy is a private, non-profit conservation organization dedicated to the preservation of biotic diversity. We have been involved with the mitigation planning for the acid spill in the North Fork John Day River since the effort began and are pleased to see the completion of the Draft Restoration Plan.

The proposed action which combines permanent protection with habitat enhancement is an excellent strategy for addressing the pressing needs of fish and riparian habitat protection in the upper John Day River basin. Benefits to such an approach reach far beyond the direct needs of anadromous and resident fisheries as riparian areas provide habitat to numerous wildlife species in the region and have significant effects on downstream watershed values as well.

The Conservancy is supportive of the proposed action and stands ready to assist the Fish & Wildlife Service in implementing both permanent protection and habitat enhancement aspects of the plan. Our organization has put considerable resources into the Middle Fork of the John Day River and views it as having the greatest potential for restoration in regards to benefits to the threatened anadromous fisheries. We welcome the opportunity to work with the Service on projects on the Middle Fork as well as the North Fork.

Sincerely,


Dick Vander Schaaf
Public Lands Coordinator



United States Department of the Interior

BUREAU OF INDIAN AFFAIRS

PORTLAND AREA OFFICE
911 N.E. 11th AVENUE
PORTLAND, OREGON 97232

MEMORANDUM

TO: U.S. Fish & Wildlife Services

FROM: Portland Area Director

SUBJECT: Joint Draft Environmental Assessment and Draft Restoration Plan

We have received your June 6, 1994, letter requesting comments on the Joint Draft Environmental Assessment (EA), and Draft Restoration Plan for the John Day River Acid Spill. We have reviewed the EA and agree that the preferred alternative of combined protection and enhancement would be the best approach for restoring and improving the area affected by the spill.

If you have any questions, please contact June Boynton or Valerie Elliott at (503) 231-2326, Branch of Fisheries and Environment.