UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
PROGRAM PLANNING AND INTEGRATION
Silver Spring, Maryland 20910

MAR 19 2012

To All Interested Government Agencies and Public Groups:

Under the National Environmental Policy Act, an environmental review has been performed on the following action.

TITLE: Restoration Plan and Environmental Assessment for the March 4, 1999 American Transport, Inc. Gasoline Spill into Beaver Butte Creek

LOCATION: Warm Springs Reservation of Oregon, USA

SUMMARY: The National Oceanic and Atmospheric Administration (NOAA) is the lead federal agency for National Environmental Policy Act (NEPA) compliance for the Beaver Creek Restoration Plan/Environmental Assessment (RP/EA), Warm Springs Reservation of Oregon, Oregon. This project is sponsored by the Beaver Creek Natural Resource Trustees and designed to help restore natural resources injured by the discharge of gasoline into Beaver Butte Creek.

This RP/EA was prepared by federal and Tribal natural resource Trustees responsible for restoring natural resources and services injured in connection with the March 4, 1999, American Energy, Inc. (formerly named American Transport, Inc.) gasoline spill into Beaver Butte Creek. This document provides details regarding the injuries and their quantification, restoration planning, and the proposed restoration projects to restore the injuries. Consistent with the Oil Pollution Act of 1990, 33 U.S.C. §§ 2701, et seq. (OPA) and the National Environmental Policy Act, 42 U.S.C. Section 4321, et seq. (NEPA), the purpose of restoration planning is to identify and evaluate restoration alternatives and to provide the public with an opportunity for review and comment on the proposed restoration alternatives.

The Beaver Creek Trustees determined that the preferred alternative (a suite of habitat restoration actions developed to specifically address factors limiting anadromous fish production in the Beaver Creek watershed) is most likely to restore, rehabilitate, replace or acquire natural resources and their services equivalent to those injured or lost as a result of incidents involving the discharge or the significant threat of a discharge of oil. As such, the preferred alternative best addresses the Trustees' goal of making the environment and the public whole for injuries to natural resources under the Oil Pollution Act (OPA).

RESPONSIBLE OFFICIAL: Brian T. Pawlak
Acting Director, Office of Habitat Conservation
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
1315 East-West Highway
Silver Spring, MD 20910

The environmental review process led us to conclude that this action will not have a significant effect on the human environment. Therefore, an environmental impact statement will not be prepared. A copy of the finding of no significant impact including the supporting environmental assessment is enclosed for your information.

Although NOAA is not soliciting comments on this completed EA/FONSI, we will consider any comments submitted that would assist us in preparing future NEPA documents. Please submit any written comments to the responsible official named above.

Sincerely,

Patricia A. Montanio
NOAA NEPA Coordinator

RESTORATION PLAN
and
ENVIRONMENTAL ASSESSMENT

for the
MARCH 4, 1999
AMERICAN TRANSPORT, INC. GASOLINE SPILL
into
BEAVER BUTTE CREEK
WARM SPRINGS RESERVATION, OREGON

***Prepared by*:**
National Oceanic and Atmospheric Administration
Confederated Tribes of the Warm Springs Reservation of Oregon
U.S. Fish and Wildlife Service, U.S. Department of the Interior

FINAL: APRIL 3, 2009

FACT SHEET

FINAL RESTORATION PLAN and
ENVIRONMENTAL ASSESSMENT
for the
American Transport, Inc. Gasoline Spill into Beaver Butte Creek
Warm Springs Reservation of Oregon

COOPERATING AGENCIES:	National Oceanic and Atmospheric Administration Confederated Tribes of the Warm Springs Reservation of Oregon U.S. Fish and Wildlife Service, U.S. Department of the Interior
ABSTRACT:	This Final Restoration Plan and Environmental Assessment (RP/EA) has been prepared by the federal and Tribal Natural Resource Trustees to address restoration of natural resources and resource services injured in the March 4, 1999 tanker truck and trailer accident, which discharged gasoline into Beaver Creek, Oregon.
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COPIES:	Copies of the Final RP/EA are available by contacting the person listed above or available for download at http://www.darrp.noaa.gov/pacific/beavercreek/index.html.
DATE OF RELEASE:	April 3, 2009

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1.0 Introduction and Purpose

This Restoration Plan and Environmental Assessment (RP/EA) was prepared by federal and Tribal Natural Resource Trustees responsible for restoring natural resources and services injured in connection with the March 4, 1999 American Energy, Inc. (formerly named American Transport, Inc.) gasoline spill into Beaver Butte Creek. This document provides details regarding the injuries and their quantification, restoration planning, and the proposed restoration projects to restore the injuries. Consistent with the Oil Pollution Act of 1990, 33 U.S.C. §§ 2701, et seq. (OPA) and the National Environmental Policy Act, 42 U.S.C. Section 4321, et seq. (NEPA), the purpose of restoration planning is to identify and evaluate restoration alternatives and to provide the public with an opportunity for review and comment on the proposed restoration alternatives. Restoration planning provides the link between injury and restoration. The purpose of restoration as stated in this RP/EA is to make the environment and the public whole for injuries resulting from the spill by implementing restoration actions that return injured natural resources and services to baseline conditions and compensate for interim losses.

1.1 Overview of the Incident

At approximately 12:30 AM on March 4, 1999, the driver of an American Transport, Inc. (ATI) tank truck and trailer, loaded with approximately 10,300 gallons of unleaded gasoline, lost control while descending a grade on Oregon State Route 26. The truck jack-knifed and the truck and trailer became separated. The truck tank dislodged from the truck chassis and came to rest immediately adjacent to Beaver Butte Creek just above the confluence with Beaver Creek, a tributary to the Warm Springs River. This land is part of the Confederated Tribes of Warm Springs Reservation of Oregon (CTWSRO) reservation. The trailer came to rest approximately 100 feet further south of the truck location, also on Tribal property. The tanks on both the tanker truck and trailer ruptured and approximately 5,388 gallons of unleaded gasoline were discharged. A majority of the gasoline flowed overland and was released directly into Beaver Butte Creek.

Emergency response crews from the CTWSRO; a fire department HAZMAT team from Redmond, Oregon; Oregon Department of Environmental Quality (ODEQ); Oregon Department of Fish and Wildlife (ODFW); Oregon Department of Transportation (ODOT); U.S. Environmental Protection Agency (EPA); U.S. Department of Interior, Bureau of Indian Affairs (BIA); and Olympus Environmental Services (Olympus), ATI's emergency response contractor; responded to the accident site. Concurrently, ATI's insurance company (AIG insurance) hired SECOR International (SECOR) to respond to the spill. Initial response actions by Olympus and SECOR included truck and trailer stabilization, product offloading and removal, excavation of trenches between the spill sites and Beaver Butte Creek to slow down the overland flow of gasoline to the creek, and removal of contaminated soil. SECOR began full-time operation of a groundwater remediation system on March 25, 1999, through a network of water extraction points. SECOR reported that it shut down the remediation system on April 25, 2001, although benzene was still being measured above detection limits in the groundwater. A groundwater sampling plan was initiated to monitor groundwater recovery. Concentrations of BTEX compounds (benzene, toluene, ethylbenzene, and total xylenes) in Beaver Creek were below detection limits within 1 month following the spill.

1.2 Natural Resource Trustees and Authorities

The natural resources impacted by the Beaver Butte Creek spill are under the trusteeship of the CTWSRO, the United States Department of Commerce acting through the National Oceanic and Atmospheric Administration (NOAA), and the United States Department of the Interior acting in this case through the United States Fish and Wildlife Service (collectively the "Trustees").

Each of these entities acts as a Trustee pursuant to OPA and the OPA Natural Resource Damage Assessment (NRDA) regulations (15 CFR Part 990). As a designated Trustee, each entity is authorized to act on behalf of the public under state and/or federal laws to assess and recover natural resource damages and to implement actions to restore, rehabilitate, replace, or acquire the equivalent of the affected natural resources injured by the gasoline spill. For purposes of coordination and compliance with OPA and NEPA, the Trustees have designated NOAA as the federal lead administrative trustee.

1.3 Overview of OPA Requirements

NRDA is described under Section 1006(c) of OPA (33 U.S.C. § 2706(c)). Under the OPA NRDA regulations at 15 C.F.R. Part 990, the NRDA process consists of three phases: 1) Preassessment; 2) Restoration Planning; and 3) Restoration Implementation.

During the Preassessment Phase, the Trustees determine whether they have jurisdiction to pursue a NRDA for the incident. In order for the Trustees to proceed with a NRDA, the following conditions must be met under 15 C.F.R. § 990.41:

1. an incident must have occurred as defined at 15 C.F.R. § 990.33;
2. the incident must not be permitted under a permit issued under federal, state, or local law;
3. the incident must not involve a public vessel; and
4. the incident must not be from an onshore facility subject to the Trans-Alaska Pipeline Authority Act (43 U.S.C. § 1651, et seq.).

The Trustees determined that an incident occurred and that all of the above conditions were met for the Beaver Butte Creek oil spill. In addition, based on early available information collected during the Preassessment Phase, Trustees must make a preliminary determination whether natural resources or services have been injured and/or are threatened by ongoing injury. Injury is defined as "an observable or measurable adverse change in a natural resource or impairment of a natural resource service" (15 C.F.R. § 990.33). Through coordination with response agencies (e.g., the USCG), Trustees next determine whether response actions will eliminate injury or the threat of ongoing injury. If injuries are expected to continue, and feasible restoration alternatives exist to address such injuries, Trustees may proceed with the Restoration Planning Phase. Restoration planning also may be necessary if injuries are not expected to continue but are suspected to have resulted in interim losses of natural resources and services from the date of the incident until the date of recovery.

The purpose of the Restoration Planning Phase is to evaluate potential injuries to natural resources and services, and use that information to determine the need for, and scale of, restoration actions. Natural resources are defined as "land, fish, wildlife, biota, air, ground water, drinking water supplies, and other such resources belonging to, managed by, held in trust by, appertaining to, or otherwise controlled by the United States, any state or local government or Indian tribe" (15 C.F.R. § 990.30). This phase provides the link between injury and restoration and has two basic components: injury assessment and restoration selection.

The goal of injury assessment is to determine the nature and extent of injuries to natural resources and services, thus providing a factual basis for evaluating the need for, type of, and scale of restoration actions. As the injury assessment is being completed, the Trustees develop a plan for restoring the injured natural resources and services. The Trustees must identify a reasonable range of restoration alternatives, evaluate and select the preferred alternative(s), develop a Draft Restoration Plan presenting the alternative(s) to the public, solicit public comment on the Plan, and consider these comments when developing a Final Restoration Plan.

Under the regulations, the Final Restoration Plan is presented to the RPs at the start of the Restoration Implementation Phase, to implement or to fund the Trustees' costs of implementing the plan, thus providing the opportunity for settlement of damage claims without litigation. Should the RPs decline to settle a claim, OPA authorizes Trustees to bring a civil action against the RPs for damages, or to seek disbursement from the USCG's Oil Spill Liability Trust Fund equal to the value of the damages. Components of damages include the cost of implementing the selected restoration action or actions, including monitoring and necessary corrective actions, and the cost of the damage assessment itself (33 U.S.C. §§ 2701(5) and 2702(b)). For this incident, however, the Trustees worked independently throughout the Restoration Planning Phase in identifying potential restoration actions. The RPs agreed to provide funding for the estimated cost of the selected restoration actions identified in this Final Damage Assessment and Restoration Plan/Environmental Assessment (DARP/EA).

1.4 Summary of Natural Resource Injuries

The spill killed thousands of fish in a four mile reach below the site, including wild juvenile Chinook salmon and steelhead. Wild steelhead in the Warm Springs River system are included in the Middle Columbia Evolutionarily Significant Unit (ESU), listed as a threatened species under the Endangered Species Act on March 25, 1999 (64 FR 14517). The area affected by the spill is an important spawning and rearing area for anadromous fishes in Beaver Creek. Approximately 5,000 dead fish (juvenile Chinook salmon, steelhead, rainbow trout, sculpins, dace, etc.) were collected in the days following the spill. The spill resulted in direct impacts (mortality) to wild Chinook salmon redds (gravel nests) and wild Chinook salmon and steelhead yearlings in Beaver Creek. Juvenile Chinook salmon and steelhead were impacted indirectly (reduced growth and survival) due to reduced quality of rearing habitat associated with the loss of aquatic macroinvertebrates from the spill, and due to loss of production from future generations of fish. Because the gasoline plume was flowing downstream, the Warm Springs National Fish Hatchery, located 25 miles downstream, released all yearling Chinook salmon in order to avoid the possibility of a massive mortality from contamination of the hatchery. This release, approximately six weeks prior to the scheduled release date, resulted in lower than expected survival of the hatchery-reared fish. Chinook salmon fry (early-stage juveniles) were transported to a nearby hatchery and suffered mortalities due to transportation stress. Wild Chinook salmon yearlings in the lower Warm Springs and Deschutes rivers were also impacted indirectly because of the release of the hatchery fish. A variety of other natural resources and resource services were potentially injured as a result of the spill (e.g. surface water, benthic macroinvertebrates, resident fishes and amphibians, riparian vegetation, cultural resources, loss of recreational fishing opportunity for adult salmon, ceremonial and subsistence loss due to reduced adult returns to the river and hatchery, etc.)

1.5 Summary of Proposed Restoration Projects

This Restoration Plan identifies the restoration actions proposed to address natural resource injuries and losses of service in the Beaver Creek Watershed. Information on the Warm Springs River system, which includes Beaver Creek, suggests that anadromous fish production in this system is limited by spawning and rearing habitat quantity and quality. As such, the proposed restoration actions focus on improving spawning and rearing habitat conditions in the Beaver Creek Watershed.

Natural production of anadromous fish in Beaver Creek is limited by high water temperatures and high levels of fine sediment in spawning and rearing habitat. Restoration actions such as livestock exclusion fencing, establishing and improving riparian vegetation, protecting and improving streambanks, increasing stream canopy cover, reducing sediment-producing sources such as roads and unstable banks, and other actions that will promote natural recovery of the ecosystem are being proposed with this Restoration Plan. Projects included as selected alternatives in the Restoration Plan include:

- Lower Beaver Creek Riparian Habitat Enhancement Project
- Beaver Creek (Robinson Park) Floodplain/ Riparian Habitat Restoration
- Beaver Creek (Robinson Park) Floodplain/ Channel Development and Large Wood Placement
- Quartz Creek Riparian Habitat Restoration and Sediment Reduction Project
- Coyote Creek Riparian Habitat Restoration and Sediment Reduction Project
- Watershed Project Maintenance Program

1.6 Coordination with the Public

Public review of this RP/EA was undertaken pursuant to NEPA and OPA. On August 14, 2008, the draft RP/EA was made available for public review and comment for a period of 30 days. No public comments were received.

2.0 Environment Affected by the Spill

The following section describes the Beaver Creek drainage area, including tributaries considered for restoration projects.

2.1 Physical and Biological Environment

Beaver Creek is the second largest tributary to the Warm Springs River and is a 5th order stream.[1] Beaver Creek originates in the northwestern part of the reservation and flows in a southeasterly direction for about 25 miles, joining the Warm Springs River at River Mile 19.0. Beaver Creek has a drainage area of 115 square miles. Its principal water sources are snowmelt and springs. Wilson Creek (entering at RM 20.4), Beaver Butte Creek (RM 19.2), Indian Creek (RM 16.8), Butte Creek (RM 12.8), Coyote Creek (RM 7.6), and Quartz Creek (RM 7.4) are the principal tributaries to Beaver Creek. Several springs located between RM 8.0 and RM 10.0 contribute approximately 23 cfs to the flow of Beaver Creek. A map of the Beaver Creek system showing reach breaks is included as Figure 1.

Beaver Creek currently supports populations of spring Chinook salmon (*Oncorhynchus tshawytscha*), summer steelhead (*O. mykiss*), rainbow trout (*O. mykiss*), Pacific lamprey (*Lampetra tridentata*), sculpin (*Cottus spp*.), longnose dace (*Rhinichthys cataractae*), speckled dace (*R. osculs*), redside shiner (*Richardsonius balteatus*), freshwater mussel (*Margritiferia falcata*), and crayfish (*Pacifastacus leniusculus*).

Reach 1 – Reach 3: R.M. 0.0 Confluence with Warm Springs River to RM 5.0

From its confluence with the Warm Springs River, Beaver Creek flows for five miles through a broad canyon composed of a large complex of ancient landslides that have had direct and indirect effects on the valley bottom and channel that persist today. Many of these landslides have rafted large volumes of debris to the bottom of the canyon and significantly narrowed the valley bottom and channel, creating landslide dams along the channel. It appears that the channel was completely blocked by these landslide dams, resulting in temporary impoundment of Beaver Creek above these landslide dams. Alluvial surface deposits upstream of these landslide dams are composed of sandy, cobbly gravel deposited up to 15 feet above the present low-flow water surface apparently as the result of aggradation of the channel behind these landslide dams. In addition to these types of deposits, the two lower landslide dams have deposits of fine silt and sand behind them that are up to seven feet above the present water surface. Currently, the channel is migrating and eroding into this material, depositing point bars on the inside of the bends. The point bar surfaces, less than two feet above the summer low flow level, are hydrologically connected to the present channel; having a shallow water table, they are inundated frequently, and are vegetated with young willow and other riparian plants. Livestock grazing, however, is preventing this vegetation from reaching its full potential.

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[1] A method of numbering streams as part of a drainage basin network. The smallest unbranched mapped tributary is called first order; the stream receiving the tributary is called second order, and so on.

Presently, Beaver Creek has partially breached these landslide dams and as a result the channel has downcut into these deposits. Extensive livestock grazing and past farming practices in this reach of Beaver Creek have undoubtedly exacerbated the results of this natural process. The partial breaching of these landslide dams has created stepped longitudinal stream channel profiles with gradients exceeding 3%. Stream reaches located immediately upvalley of these partially breached landslide dams are characterized by low gradients (average gradient 0.6%) with substrates predominantly composed of gravel and cobble.

Air temperatures in this area (Reach 1 – Reach 3) of Beaver Creek fluctuate from below freezing during the winter to above 100°F in summer. The semiarid climate has a mean annual precipitation of less than 12 inches. The riparian area supports wild rose (*Rosa woodsii*), willow (*Salix spp*.), red-osier dogwood (*Cornus stolonifera*), alder (*Alnus spp*.), and scattered stands of ponderosa pine (*Pinus ponderosa)*. The uplands are dominated by bunch grass, scattered juniper (*Juniperus occidentalis)* and deciduous brush, with north facing slopes and deep draws supporting scattered stands of ponderosa pine and Douglas fir (*Pseudotsuga menziesii*).

This area of Beaver Creek has been excessively grazed by livestock, which has resulted in the conversion of native bunch grasses to non-native annuals. The riparian area has also been heavily grazed which has resulted in substantial damage to riparian habitat and fish habitat as well. The negative impacts to fish habitat as a result of grazing have included loss of undercut bank, a reduction of vegetative overhead cover, and increased inputs of fine sediment to Chinook salmon and summer steelhead spawning and rearing habitat due to increased streambank erosion.

Sediment sampling (bulk core) in this reach of Beaver Creek has shown that fine sediment content of Chinook salmon and summer steelhead spawning habitat is high, with particle size less than 1.0 mm averaging 14% (range 7 – 24%). McHenry et al. (1994) found fine sediments (less than 0.85 mm) were nearly 100% lethal to steelhead eggs when concentration exceeded 13% within the redd.

Incubating eggs of salmonids require spawning gravel that is relatively free of fine sediment (Bjornn and Reiser 1991). Documented studies of increased fine sediment in streams have repeatedly shown reduced salmonid survival, production and/or carrying capacity, with salmonid populations typically being negatively correlated with the amount of fine sediment in stream substrate (Shepard et al. 1984; Hicks et al. 1991; Bjornn and Reiser 1991; Scully and Petrosky 1991; Rich et al. 1992; Weaver and Fraley 1993; Rich and Petrosky 1994; Meyer et al. 2005). A negative correlation of salmonid survival and production to fine sediment has been mainly attributed to reduced survival-to-emergence of salmonid fry from the redd (Scrivener and Brownlee 1989), primarily due to reduced dissolved oxygen concentrations to the incubating eggs (Maret et al. 1993) or entombment of the emerging alevins (newly hatched fish with yolk sac attached) within the redd.

Summer water temperatures in this reach of Beaver Creek are high with the 7-day mean mean-maximum water temperature exceeding 68°F (Table 1). According to the Matrix of Indicators provided by NOAA Fisheries, temperatures above 57°F for summer steelhead rearing would place this indicator at risk.

Table 1. Beaver Creek (RM 0.0 – 5.0) 7-day mean-maximum water temperature for 2001-2005.

Year	**2001**	**2002**	**2003**	**2004**	**2005**
Temperature (°F)	70.0	71.0	74.5	72.3	73.4

Reach 4 – Reach 5: RM 5.0 to RM 12.9

Reaches 4 – 5 of Beaver Creek flow through a narrow basalt canyon for 7.9 miles with channel gradients averaging 0.7%. The canyon itself is largely undeveloped and almost completely roadless. Above the canyon there are large flats that are in some places covered with ancient alluvial gravel terraces. The riparian area in this reach is narrow and supports red-osier dogwood, willow, alder, and wild rose. The steep flanks of the canyon are covered with ponderosa pine, Douglas fir, and western larch (*Larix occidentalis*).

Spawning habitat quality in this reach of Beaver Creek has been substantially impaired due to high sediment levels. Bulk core sampling in this reach of Beaver Creek below the confluence of Quartz and Coyote creeks has shown that fines less than 1.0 mm in spawning gravel are very high, averaging 20% (range 18 – 24%). Bulk core sampling immediately above the confluences of Quartz Creek and Coyote Creek showed that fines less than 1.0 mm averaged 8.3% (range 5.5 – 9.4%). Bulk core sampling immediately above the confluences of Quartz Creek and Coyote Creek showed that fines less than 1.0 mm averaged 8.3% (range 5.5 – 9.4%). High road density and riparian grazing in the Coyote Creek and Quartz Creek watersheds are two primary sources of sediment in this reach of Beaver Creek. Livestock grazing of the Beaver Creek riparian area is another source of sediment in this reach.

Reach 6 – Reach 11: RM 12.9 to RM 25

Much of the upper 13 miles of Beaver Creek flows through an ancient lakebed composed of deep lacustrine and alluvial deposits. This has resulted in the formation of “C” stream types[2] (Rosgen, 1996) throughout most of the upper half of Beaver Creek. These areas are especially sensitive to increases in erosion (and sediment yields), as fine alluvial soil particles are easily moved. In these stream types, streambank vegetation, sinuosity, and floodplain connectivity are important factors in maintaining channel stability. These channel types are most sensitive to increases in water and sediment yields.

[2] "C" stream types are located in narrow to wide valleys, constructed from alluvial deposition. "C" type channels have a well developed floodplain (slightly entrenched), are relatively sinuous with a channel slope of 2% or less, and a bedform morphology indicative of a riffle/pool configuration.

In valley bottoms where "C" stream types are present, there are usually wide riparian areas. Riparian areas not only provide diverse vegetation and habitat, they also act as a sponge, absorbing water during runoff and periods of high precipitation, then releasing water during periods of low flow. This makes them highly sensitive to soil compaction. Wide valley bottoms with associated riparian areas are present in the upper reaches of Beaver Creek. There is considerable beaver (*Castor canadensis*) activity in these reaches of Beaver Creek. Beaver dams contribute to groundwater recharge, helping to moderate summer stream temperatures. Beaver dams also reduce velocity and dissipate energy during high flows, as water flows over the riparian vegetation as the floodwater makes its way back to the main channel (Dunaway et al. 1994).

Approximately 1.5 miles of Beaver Creek have been channelized near the Dahl pine area (near RM 13) to facilitate the construction of Highway 26 through the Beaver Creek valley bottom and floodplain. This channelization has greatly reduced habitat complexity in these segments of Beaver Creek by decreasing pool habitat, channel sinuosity, altering bank-full width-to-depth ratios, and reducing floodplain connectivity. In addition, Oregon Department of Transportation (ODOT) frequently removes large wood from these channelized segments of Beaver Creek. The removal of large wood coupled with a straightened channel has increased channel slope and stream power, thus increasing bed shear stress and bed load transport capacity, both of which promote coarsening of channel substrate and armoring of the stream bed (Buffington and Montgomery 1999). Pool development is also lost as a result of wood removal.

The proximity of Highway 26 to Beaver Creek also results in the input of large volumes of sediment to Beaver Creek as a result of cinder application during winter months. Sediment input due to cinder application has resulted in the degradation of spring Chinook salmon and summer steelhead spawning habitat in Beaver Creek (Mid-Columbia River summer steelhead are listed as threatened under the Endangered Species Act). The location of Highway 26 along Beaver Creek also puts this stream and its aquatic resources at great risk of chemical contamination, as evidenced by the March 1999 gasoline tanker truck accident that spilled 5,300 gallons of gasoline into Beaver Creek. In 1998, Oregon Department of Fish and Wildlife (ODFW) was contracted to conduct a physical aquatic habitat survey on Beaver Creek. The data for large wood and pool habitat presented in Tables 2 and 3 was primarily derived from this stream survey.

Table 2. Density of large wood in Beaver Creek by reach separated by ODFW (1998).

Reach	**Total pieces >12 inches diameter and >35 feet long per mile of stream**	**Total pieces >4 inches diameter and >35 feet long per mile of stream**
One	0.0	0.6
Two	0.0	0.1
Three	0.0	0.6
Four	0.0	1.0
Five	0.0	2.9

Six	0.0	1.6
Seven	0.1	10.6
Eight	0.0	3.2
Nine	0.0	15.0
Ten	0.2	18.3
Eleven	0.0	4.0

This data was collected shortly after a major large wood transport and redistribution event from the 1996 flood. Peak discharge on Beaver Creek was measured at 5,760 cubic feet/second. The large wood data are not representative of current conditions.

Table 3. Pool frequency and quality, Beaver Creek by reach separated by ODFW (1998).

Reach	Average bankfull channel width (ft)	Average residual pool depth (ft)	Number of pools per mile
One	42	1.25	9.3
Two	43	1.15	7.8
Three	37	1.3	7.9
Four	45	1.35	4.7
Five	47.6	0.89	3.9
Six	25	1.7	15.3
Seven	40	1.15	17.8
Eight	31.5	1.18	8.1
Nine	32	0.98	18.4
Ten	30	0.89	20.7
Eleven	19.3	0.69	15.2

Coyote Creek

Coyote Creek is a 4th order tributary to Beaver Creek flowing 13 miles before entering Beaver Creek at River Mile 7.6. Coyote Creek drains approximately 44 square miles and provides significant flow during the winter, spring and early summer months with much of its flow going subsurface by mid-summer. During late winter and early spring the lower 0.25 miles of Coyote Creek provides rearing habitat for juvenile spring Chinook salmon. The upper reaches of Coyote Creek support resident populations of speckled dace (*R. osculus*). The majority of Coyote Creek is incised and is a significant source of sediment to Beaver Creek.

Erosion of fine-grained soils in the Coyote Creek subwatershed has resulted in incised channels with the main axial channel incised as much as 10 feet, that continue to erode headward up the stream channel. Where the valley narrows at ancient landslide sites, this channel incision has been interrupted by bedrock and large boulders, which serve as hydraulic controls. This incision has been widely attributed to overgrazing of domestic livestock, past farming practices, and poor road placement. Clearly, destruction of vegetative cover in the meadow has significantly reduced the erosional resistance of the valley fill material.

The valley grade control feature that appears to be responsible for the formation of the Coyote Creek meadow system is a series of landslide dams that were likely formed during the tectonic uplift of the Mutton Mountains and subsequent landslides. This apparently resulted in deposition of fine-grained soils eroded from surrounding hill slopes.

Once these types of systems have been incised, recovery to the pre-disturbance state is unrealistic, and restoration activities should be based on the current site potential once a new stable state has been established. Once completely incised, these systems may reestablish a new equilibrium of profile, pattern, and dimension. New channels and floodplains can develop on the floor of the trench and these systems have the potential to evolve into "E" channel types[3] (Rosgen 1996).

There have been numerous efforts in the past to stop or slow down the incision of these stream channels. These efforts have primarily been in channel activities such as the placement of gabions and construction of earthen dams. A large number of gabions and log drop structures have been placed in the incised channels of the basin over the past 30 years. They were placed at headcut knick points with the intention of arresting the upstream migration of the knick point and to cause aggradation and subsequent filling of the channel above them. Many of these gabions and wood drop structures are now failing as the stream, during high flows, has eroded around and/or under these structures as the channel tries to establish a new near-equilibrium longitudinal profile. This has resulted in the over-widening of the channel at the structure and immediately downstream of the structure. In addition to gabions and drop structures, three earthen dams were constructed in the late 1970s across the meadows to try to stop the incision. These were intended to function in much the same way as the gabions, to try to fill in the channels with sediment behind them and stop the incision of the channel at headcut knick points. The spill design on these earthen dams consists of culverts that allow for excess water captured above the dams to spill. This only occurs during very high flow events and the culverts are inadequately designed and are undersized. The result has been severe erosion downstream of these structures. Also, two of these dams have been partially breached during more recent high flow events, most notably the 1996 flood event.

Livestock grazing in the Coyote Creek subwatershed has significantly damaged riparian areas. The heavy livestock use of this area, and grazing impacts on any riparian vegetation that manages to establish in the new incised channel, prevents the stabilization of this channel. Livestock grazing, coupled with the erosive power of floodwater spilling from above the earthen dams, through culverts, is maintaining these channels in a perpetual state of disequilibrium.

[3] "E" stream type represents the developmental "end-point" of channel stability and fluvial process efficiency for certain alluvial streams undergoing a natural dynamic sequence of system evolution. "E" stream types are slightly entrenched, exhibit very low channel width/depth ratios, and display very high channel sinuosities which result in the highest meander width ratio values of all the other stream types.

Timber harvest and associated road construction has been extensive in the Coyote Creek subwatershed. Road density in the Coyote Creek subwatershed is high, with a calculated road density of approximately 4.6 miles per square mile. The roads in the Coyote Creek subwatershed are a major watershed issue. They deliver large volumes of sediment directly into Coyote Creek and also increase the drainage network of Coyote Creek, resulting in increased peak stream flows and subsequent channel erosion during storm and snow melt events.

Quartz Creek

Quartz Creek is a 4th order tributary to Beaver Creek flowing 11 miles before entering Beaver Creek at River Mile 7.4. Quartz Creek drains an area of approximately 30 square miles and provides significant flow during the winter, spring and early summer months with flows becoming subsurface by mid-summer. During late winter and early spring the lower 300-400 feet of Quartz Creek is utilized as rearing habitat by juvenile spring Chinook salmon. The majority of Quartz Creek is incised and contributes significant volumes of sediment to Beaver Creek that degrades downstream spawning and rearing habitat for spring Chinook and summer steelhead.

As in Coyote Creek, extensive in-channel work was done in the past in an effort to restore the channel and to arrest channel incision at knick points where channel entrenchment was progressing upstream. While earthen dams were not constructed as on Coyote Creek, several gabions were installed in the channel. Presently, at least one of these gabions is failing. During high flow events, water is eroding around this structure and is causing the channel to become wider at this point and immediately downstream of the structure. This structure does appear to have resulted in some degree of aggradation above it and there is some riparian vegetation that has become established in the channel.

As in Coyote Creek, livestock grazing in the Quartz Creek subwatershed has and presently still does result in significant damage to riparian areas. In some segments of Quartz Creek a fairly healthy riparian plant community has managed to establish itself. These segments are located primarily within a small riparian exclusion fence and demonstrate the recovery potential for riparian habitat in Quartz Creek with proper management. However, in much of Quartz Creek, livestock grazing of riparian vegetation prevents stabilization of these channels.

While not as extensive as in the Coyote Creek subwatershed, timber harvest and associated road construction has occurred in the Quartz Creek subwatershed. Road density in the Quartz Creek subwatershed is approximately 3.1 miles per square mile. While not as great an issue as in Coyote Creek, surface roads in the Quartz Creek subwatershed are a watershed and fisheries issue, as they have the potential to deliver sediment and direct surface flows to Quartz Creek, resulting in increased peak stream flows and subsequent channel erosion during storm and snow melt events.

2.2 Threatened and Endangered Species

Species listed as threatened or endangered under the Endangered Species Act that are potentially present in the action area or potentially affected by the proposed restoration actions include:

Northern spotted owl *Strix occidentalis caurina*
Canada lynx *Lynx Canadensis*
Bald eagle *Haliaeetus leucocephalus*
Bull trout *Salvalinus confluentus*
Middle Columbia River steelhead *Oncorhynchus mykiss*

2.3 Archaeological and Cultural Resources

A 640,000-acre reservation in north central Oregon is home to a confederation of three tribes: the Warm Springs, Wasco, and Paiute tribes. The reservation is occupied by nearly 4,000 Tribal members, most of whom live in or near the town of Warm Springs. The Tribe is made up of the Upper Deschutes (Tygh), Lower Deschutes (Wyam), Tenino, and John Day (Dock-spus) bands. The Wasco Tribe is made up of The Dalles (Ki-gal-twal-la) and Dog River bands. Several Paiute bands from southeastern Oregon were removed to the Warm Springs Reservation in 1869. In 1855 the Warm Springs and Wasco tribes treatied with the United States in the Treaty with the Middle Oregon Tribes of Oregon. In the treaty, 10 million acres of aboriginal lands were ceded to the United States. The Cascade Mountains flank the reservation on the west, and the Deschutes River forms its eastern border.

The Tribal economy is based primarily on natural resources, including hydropower, forest products, and ranching. Tourism and recreation also make important contributions. The CTWSRO co-manages the Columbia, Deschutes, Fifteenmile Creek, John Day, and Hood River watersheds. The U.S. Fish and Wildlife Service operates a Chinook salmon hatchery on the reservation. Tribal headquarters are in Warm Springs, Oregon. Tribal members still fish with dip nets and set nets from wooden scaffolding at the falls near Sherars Bridge on the Deschutes River.

Prior to settling on the Reservation, natural food resources were so plentiful that agriculture was unnecessary for the three tribes of the Warm Springs Reservation. Salmon from the nearby Columbia River was a staple. Since gathering and preparing food was a substantial part of daily life for the three tribes, their methods became as much a part of the tribal culture as the foods themselves. Many of these foods and the methods of obtaining them are still an important part of life on the Warm Springs Reservation. Roots are dug from early spring through late summer. Fruits, especially huckleberries, are harvested summer and fall. Hunting and fishing occur year round. These foods are highly prized, and are a significant part of the many special festivals and rituals as well as part of the regular Indian diet.

Annually, the CTWSRO observe three religious feasts of thanksgiving based on important native foods:

- The Root Feast in the spring recognizes the first appearance of many important roots.

- The First Catch, or Salmon Feast, in the spring recognizes the migration of salmon.
- The Huckleberry Feast in early fall recognizes the ripening of the first berries.

The riparian corridor and floodplain in the Beaver Creek drainage is an important area for gathering of culturally important edible and medicinal plant materials.

About 500 of the Tribal members who live on the Warm Springs Reservation are livestock owners. There are approximately 2000 mother cows and approximately 3500 horses across the 640,000 acres of the reservation-proper, with the majority of these animals being concentrated on the non-forested lands of the Warm Springs Reservation. Cattle are turned out onto the rangelands in early March and are weaned by October. The reservation is divided topographically into six separate grazing districts, with each district determining its own pasture rotations, roundups, and stewardship. District meetings are held on an annual basis to discuss fencing, salting stations, and most importantly, water.

The Warm Springs Reservation is about two-thirds forested, making forestry and forest products an important environmental and socioeconomic aspect of community life. The forests of the Reservation exist under a generally productive but stressed environment. The CTWSRO have developed an integrated resource management plan and the Bureau of Indian Affairs has developed a Forest Management Implementation Plan. These plans have stated goals and objectives that articulate both the overall Tribal management guidelines and the specific guidelines within each management zone and management group. The lands within these units are further divided into reserved and unreserved lands. Unreserved lands are divided into three management zones: timber, wildlife, and riparian. Each zone is managed for specific plant species, seral stages, and structure.

Annual allowable cut (AAC) is based on a 10-year planning horizon with a 5-year mid-term re-evaluation. The current management planning period is 2002-2011. The AAC is calculated on 13 forest planning units, which correlate to the Warm Springs Reservation watersheds. The commercial timber zone is managed to produce a sustainable supply of high quality wood products while maintaining economic efficiency and improving the ecological health of the entire watershed. Sensitive, threatened, and endangered plants and animals are protected, as is habitat for deer, elk, and non-game wildlife. Cultural resources, water, and aquatic habitat are protected. Production of forage for domestic livestock is emphasized in this zone.

In the wildlife zone, vegetation is managed, through timber harvests and under-burning, to provide two to three layers of tree canopy, with crown closure of 70% over 20% of the area, and a high tree density to provide thermal and hiding cover for deer and elk.

In the riparian zone, management is strictly regulated to protect water quality, aquatic habitat, water dependent resources, and riparian ecosystems. Streams are classified into three categories (Class I – III) depending upon the presence of fish and other aquatic life, use for domestic purposes, flow characteristics into downstream waters, and other factors. No timber harvest or manipulation of vegetation is allowed in the inner buffer zone, which varies from a minimum 30 to 100 feet, depending on the class of the stream, with Class I being the widest.

The reserved lands are designated conditional use, recreational use, and cultural use. Conditional use lands are maintained in a primitive state to protect and enhance cultural values and unique features and uses and to allow natural processes and systems to function. Wildfires are suppressed in these areas but all other management activities require an action plan or project assessment and approval by the Tribal Council. Cultural areas may contain archaeological, traditional use, religious, or food resources. These areas are protected. Recreation areas are sites specifically designated for recreational use such as camping, hunting, hiking, etc.

3.0 Injury Determination and Quantification

3.1 Overview of Data Collection and Studies

In early meetings between the Trustees and representatives of the Responsible Party, the Trustees agreed to work to minimize the costs of assessing natural resource damages by relying upon available information developed in connection with the spill response process and scientific literature, rather than conducting independent injury assessment and valuation studies. The Trustees considered longer-term assessment studies to evaluate the injuries resulting from the incident and the need for restoration. The Trustees recognized the value of additional information in planning and scaling restoration actions but were uncertain whether the additional information gained from those studies would justify the additional costs, or that the results would substantially change the type and scale of the potential restoration actions. While available information provided an adequate basis for estimating injuries and developing restoration plans for anadromous fishery resources (salmon and steelhead), it did not cover the full range of natural resources and natural resource services injured or lost as a result of the gasoline spill. When faced with uncertainties in the assessment, the Trustees attempted to take an interpretation of the information that benefited the resource, and selected more extensive restoration projects. As a result, the Trustees are confident that the restoration projects proposed in this RP/EA, if approved and implemented, will compensate for the losses to the resource.

3.2 Injury Quantification and Damage Assessment

The gasoline spill resulted in a number of injuries to and losses of natural resources and natural resource services. The most immediate injuries were to the Chinook salmon, steelhead and other fish in Beaver Creek as well as aquatic and stream-side vegetation and other habitat components. The spill also impacted cultural, ceremonial, subsistence and recreational uses of natural resources. For purposes of this claim, the Trustees have agreed to focus on impacts to and restoration of Chinook salmon and steelhead.

3.2.1 Hatchery Spring Chinook Salmon Juveniles

The Trustees calculated losses to two year classes (brood years 1997 and 1998) of spring Chinook salmon from the Warm Springs National Fish Hatchery, located on the Warm Springs

River, approximately 25 miles downstream of the spill. The hatchery is operated for the benefit of a tribal fishery and manages its operation to minimize impacts on Warm Springs River wild Chinook salmon. To avoid drawing gasoline into the hatchery, which would likely result in the loss of the fish in the hatchery and require decontamination of the hatchery, hatchery managers closed the hatchery's water intakes on the day following the spill. At the time of the spill the hatchery had on hand an estimated 811,570 Chinook fingerlings of the 1997 brood year and 825,000 Chinook sub-yearlings of the 1998 brood year. To salvage as many of the fish as possible, hatchery managers released the 1997 brood year fingerlings to the river. The 1998 brood year sub-yearlings were transported to a State hatchery. Due to the stress of handling, approximately 40,000 of the 1998 brood year sub-yearlings died during transportation.

Hatchery releases are normally timed when the fish are at an optimum size and age to maximize their chances of survival in the wild. The release timing also corresponds to the time period when the mainstem Columbia hydropower dams are operated to maximize fish survival. The ability of a juvenile salmon to acquire prey and to avoid predators is highly dependent upon fish size, and undersized fish are subject to higher mortality rates. Hatchery managers were forced to release the 1997 brood yearlings 5-6 weeks earlier than normal. Based on size and release investigations at the hatchery (Cates 1992, Olson 1997) and policy guidelines in Integrated Hatchery Operations Team (IHOT) (1995) and National Marine Fisheries Service (NMFS) (1999), the Trustees estimate that a substantial increase in mortality to the fingerlings occurred as a result of the early release due to the spill.

While it is impossible to count directly the number of fish that were lost as a result of the early release, available data on returns of the released fish to the hatchery compared with returns of the same year class to other similar hatcheries provide a fairly accurate means of estimating the losses. Two other lower Columbia area federal fish hatcheries, Carson and Little White Salmon, also conduct Columbia River spring Chinook programs. Fish released from those hatcheries are subject to comparable river migration and ocean residence conditions as those from the Warm Springs hatchery, but were not affected by the Beaver Creek spill. Due to excellent rearing, out-migrant passage and ocean conditions, spring Chinook juveniles released in the normal course of operations in 1999 had outstanding survival and adult return rates. Returns in 2001of the 1997 brood (Columbia River spring Chinook typically return in their 4th year) at Carson and Little White Salmon were 20% greater than the returns in 2000 to those hatcheries. However the returns of the 1997 brood to the Warm Springs Hatchery in 2001 (4,362 fish) were less than 50% of the returns to that hatchery in 2000 (9,209 fish). Because all three hatcheries are part of the federal hatchery system and employ comparable husbandry techniques, and because all were subject to comparable river migration and ocean residence conditions, the evidence strongly suggests that the reduction in returns in 2001 for the Warm Springs Hatchery's 1997 brood was due to losses resulting from the early release in response to the gasoline spill. Using the same 20% increase over the 2000 returns as experienced at the Carson and Little White Salmon hatcheries, the Warm Springs hatchery would have been expected to have 11,051 fish return in 2001 (9,209 x 1.2 = 11,051). When the number of 1997 brood returning in 2002 (170 fish) are added to those returning in 2001, the evidence indicates that the total 4,532 fish returning to the Warm Springs Hatchery from the 1997 brood represent a loss of 6,519 adult spring Chinook (11,051 - 4,532 = 6,519).

The number of juvenile fish lost as a result of the premature release of the 1997 brood can be inferred from the reduction in returns of adult fish. The loss of 6,519 returning adult Chinook represents a 56.3% loss of the expected return. A corresponding 56.3% reduction in the prematurely released 1997 brood would correspond to a loss of 456,914 juveniles from the 1997 brood as a consequence of the spill (811,570 x 56.3% = 456,914).

While 40,000 of the 1998 brood subyearlings died in transit to the State hatchery, the Trustees recognize that not all of those that died would have been expected in the normal course to survive to be released to the river. On the average, a 5% mortality rate from sub-yearling to smolt stage is expected at the hatchery. Assuming that 95% of those that died in transit would have survived if they had not been transported, there was a loss of 38,000 fish of the 1998 brood (40,000 x 95%) as a consequence of the spill.

In sum, the spill resulted in a total estimated loss of 494,914 hatchery spring Chinook salmon, consisting of 456,914 from the 1997 brood and 38,000 from the 1998 brood.

3.2.2 Wild Chinook Salmon

The reach of Beaver Creek below the spill site contains important spawning habitat for wild (non-hatchery) Chinook salmon. Since 1986, only wild spring Chinook salmon have been allowed upstream of the Warm Springs National Fish Hatchery (ODFW, 1997), so the fish losses represent a resource of significant value. At the time of the spill, two year classes of wild salmon would have been present in Beaver Creek: the juveniles hatched from eggs laid in late 1998 would have been present in redds (gravel nests) and some of the juveniles from the eggs laid in late 1997 would have remained in the creek as yearlings. The spilled gasoline impacted wild Chinook salmon in a number of ways, including: harming juveniles still in the redds and the yearling juveniles in Beaver Creek; prematurely displacing juveniles in the Deschutes River; reducing the quality of rearing habitat in Beaver Creek; and causing multi-generational losses.

Life History Assumptions

Eggs per redd/eggs per female: Average number of eggs/female in the Warm Springs River ranges from 3,360 - 3,647 (mean of 3,470) (Howell et al., 1985).

Egg to migrant survival: Data from 1975 - 1981 show an egg to migrant survival ranging from 2.3% to 10.0% (mean of 4.81%) (Salmon and Steelhead Production Plan, 1990).

Migrant to adult return: Warm Springs River natural spring Chinook smolt to adult return rates ranged from 1.03% to 5.45% (mean of 3.07%) between 1977 and 1990 (personal communication with Earl Weber, Columbia River Intertribal Fish Commission, 05/19/99). Wild adult spring Chinook salmon return to the Warm Springs River system predominantly as 4-year old fish (77%), and the majority of the return in 2001 will consist of fish outmigrating in 1999. Because of outmigration conditions in 1999, and a favorable ocean rearing environment, a higher than average survival occurred and spring Chinook adult returns in 2001 are at record levels. Given this situation, the highest recorded migrant to adult return rate (5.45%) is used to calculate the loss of adults from juvenile migrants affected in 1999. Mean survival (3.07%) is used for later year classes.

Adult returns: Spring Chinook salmon return to the Warm Springs River as 3, 4, and 5 year old fish. The age composition of returning adults, based on 1975-1995 data (Olson, 1995), was 5% 3-year olds, 77% 4-year olds, and 18% 5-year olds.

Redds

After salmon hatch from eggs in the redds, the newly hatched fish (alevins) continue to live for a period in the gravel subsisting off nutrients in the attached yolk sac until the fish is able to capture prey on its own and emerges from the gravel. 1998 index area redd counts indicate that 42 Chinook salmon redds were located in Beaver Creek (Stream Net, 1998). Of these, 11 were in the reach most heavily affected by the spill (from above Robinson Park to Dahl Pine). The toxicity of petroleum products to salmonid embryos is dependent upon their developmental stage, with decreasing tolerance from egg to emergent fry (Moles et al., 1979). Chinook emergence in the Warm Springs system begins in mid-March (Howell et al., 1985), so the redds impacted by the spill likely contained late stage alevins. The estimate of potential effects on Chinook redds is based on the extent of benthic macroinvertebrate mortality, and areas where dead fish were recovered. The most severely impacted area appears to extend somewhere between 1.5 and 3.0 miles downstream of the spill (Polaris Applied Sciences, Inc. 1999). 100% mortality of Chinook embryos is assumed in the one redd located above Robinson Park. The exact locations of redds in the reach between Robinson Park and Dahl Pine is unknown; based on the assumption of a uniform distribution in the reach, we estimate 100% mortality of Chinook embryos in five redds and 50% mortality of Chinook embryos in the remaining five redds. Using the assumptions above, 1,419 potential migrants were lost, equivalent to a potential loss of 44 returning adult wild Chinook salmon (1998 year class).

100% mortality redds:

6 redds x 3,470 eggs per redd = 20,820 eggs/alevins
4.81% egg-to-migrant survival = 1,001 juveniles potentially produced

50% mortality redds:

5 redds x 3,470 eggs per redd = 17,350 eggs/alevins x 50% = 8,675 eggs/alevins lost
4.81% egg-to-migrant survival = 417 juveniles potentially produced

All redds = 1,419 juveniles lost (the whole numbers do not add up due to rounding)
3.07% adult return rate = 44 adult loss equivalent

Juveniles in Beaver Creek

After emerging from the gravel, a portion of spring Chinook juveniles will move downstream in the fall as sub-yearlings and overwinter in lower river reaches. The remainder will remain in the upper reaches near the redds and not move downstream until the following spring. Wild yearlings from the 1997 year class remaining in Beaver Creek would have been directly exposed to the gasoline spilled in March 1999. In the days following the spill, 404 dead juvenile spring Chinook salmon (yearlings) were recovered in the reach immediately downstream of the spill (CTWSRO, 1999). Since the efficiency of collection depends on factors such as timing, stream conditions, flow, how long it takes fish to die, carcass predation, etc., it is generally recognized that carcass recoveries represent only a portion of the fish that die. The observation of distressed fish near the Dahl Pine bridge several hours after the spill, with no fish recoveries from the area later that day (personal communication from Steve Priybl, Oregon Department of Fish and Wildlife) is a relevant example. The number of dead fish recovered represents some (unknown) percentage of the number actually killed and is useful primarily as evidence that fish were killed.

Production is estimated in the reach to determine the number of fish potentially affected by the spill. In 1997, 37 redds were counted in the reach of Beaver Creek above Dahl Pine (Stream Net, 1998). Using an estimate of 3,470 eggs per redd and a 4.81% egg to migrant survival rate, 6,176 juveniles were produced in this reach. A percentage of spring Chinook juveniles move downstream in the fall as subyearlings and overwinter in lower river reaches. The percentage that emigrate is dependent on habitat conditions and varies from year to year (Howell et. al., 1985; Fritsch, 1995). Based upon habitat conditions, the Trustees estimated that half of the 1997 wild production remained as yearlings in the vicinity of the spill. Assuming that 50% of the production left during the subyearling migration, 3,088 could have been in the vicinity of the spill in March of 1999. Habitat information for Beaver Creek indicates that higher quality rearing habitat exists in the approximately 5.5 mile reach between Beaver Butte and Coyote creeks (NWPPC 1990). Beaver Creek habitat downstream of Coyote Creek is in poor condition and it is more likely than not that juvenile Chinook would have remained in the upstream reach. Based on observations of dead fish and macroinvertebrate mortalities, we estimate that at least half of this higher quality habitat reach was impacted, and that 50% of the fish in the reach may have been killed (1,544 fish). Using a 5.45% smolt to adult return rate, this represents a potential loss of 84 adult wild Chinook salmon (1997 year class).

- 37 redds (1997 Beaver Creek) x 3,470 eggs per redd = 128,390 eggs
- 4.81% egg-to-migrant survival = 6,176 juveniles produced
- 50% non-migrating yearlings = 3,088 juveniles in affected area
- 50% loss of affected juveniles = 1,544 juveniles lost
- 5.45% adult return rate = 84 adult loss equivalent (superior returns experienced for 1997 year class)

Juveniles in Deschutes River

As a consequence of their schooling instinct, wild juvenile salmon may be prematurely "pulled" along with hatchery-produced juveniles during the downstream migration of the hatchery fish. Because fish released from hatcheries may influence premature migratory behavior of wild fish, the Warm Springs Hatchery attempts to time releases to minimize overlap with wild salmon and steelhead (Olson et al., 1995). Steward and Bjornn (1990) cite references indicating that hatchery smolts may pull wild fish with them during their downstream migration. In a study on the Wenatchee River, Hillman and Mullan (1989) documented that wild Chinook salmon aggregated with a release of hatchery Chinook and began drifting downstream, moving into areas that wild fish did not normally use. They also reported that predatory fish appeared to prey preferentially on wild fish within the downstream-moving group of hatchery fish (wild fish were smaller than hatchery fingerlings). Displacing wild juvenile Chinook salmon from the system before they are physiologically prepared to leave, especially during a time when the Columbia River projects are not being operated for safe fish passage, will result in increased mortality. The loss associated with this action is assumed to be at least comparable to that associated with the early release of the hatchery Chinook (50%). In 1997, 362 Chinook redds were counted in the Warm Springs system (Stream Net, 1998). The number of juveniles potentially affected by displacement is approximately 50% of production (noted in preceding section) that would have migrated downstream into the Deschutes River in the fall of 1998. With the eggs per redd and egg-to-migrant survival rates above, 60,420 juveniles would have been produced, and 30,210 would be expected to move downstream in the fall of 1998. Lindsay et al. (1989) indicate that fall migrants from the Warm Springs River overwinter in the Deschutes or Columbia River before entering the ocean as yearlings. They also estimated that approximately 52% of the fall migrants from the Warm Springs River survived through winter. With these assumptions, 15,709 juvenile Chinook would have remained to overwinter in freshwater, and may have been affected by the early release of hatchery fish. Assuming a 50% reduction in survival results in the loss of 7,855 juveniles. With an estimated 5.45% smolt to adult return, this represents a loss of 428 adult wild spring Chinook salmon (1997 year class).

- 362 redds (1997 Warm Springs system) x 3,470 eggs per redd = 1,256,140 eggs
- 4.81% egg-to-migrant survival = 60,420 juveniles produced
- 50% migrating juveniles = 30,210 descended to Deschutes River
- 52% overwinter survival = 15,709 juveniles present during hatchery release migration
- 50% loss due to premature migration = 7,855 juveniles lost
- 5.45% adult return rate = 428 adult loss equivalent

Juvenile Mortality as a Result of Habitat Degradation

Some of the juvenile Chinook salmon that survived the immediate effects of the gasoline spill were likely lost subsequently, due to harm done to their habitat by the gasoline. As mentioned above, the spill killed not only fish but also benthic macroinvertebrates (mayfly nymphs, caddisfly larvae, chironomids, other aquatic invertebrates and insect larvae) in the creek. Data on spawning adult-recruitment, egg-migrant, and migrant-adult relationships suggests some density-dependent survival in the Warm Springs system (Lindsay et al., 1989) indicating that habitat quality may be a limiting factor. Several physical and biological attributes are important for successful juvenile rearing. Aquatic macroinvertebrates are important intermediaries in the utilization of plant material and recycling of nutrients in aquatic environments and are a major food source for fish. Toxic effects on the macroinvertebrate community extended between 2.5 and 3.0 miles downstream of the spill (Polaris Applied Sciences, Inc. 1999). Although recolonization of affected sites may begin rapidly, the literature suggests that full recovery may not occur for 24 months (Taylor et al., 1995). Based on the potential habitat limitation resulting from the reduced aquatic macroinvertebrate community, and the potential recovery, we assume a 50% reduction in habitat quality for the first year following the spill. Given that the higher quality rearing habitat in Beaver Creek exists in the approximately 5.5 mile reach downstream of Beaver Butte Creek (1.5 to 3.0 miles of which is affected by the spill), and that habitat availability may limit survival, we express this reduction in habitat quality as reduced juvenile survival. Survival data are not broken down to enable separate calculations of eggs to fry to parr to migrants. Losses are estimated based on the egg-to-migrant survival rate, and assumed that losses to a brood year occurred only during the year following spawning. Estimating juvenile production from 1998 brood year redds in this reach not directly impacted by the spill (50% survival of expected progeny from 5 redds in the Robinson Park to Dahl Pine segment, and 100% survival of expected progeny from 18 redds in the Dahl Pine to Canyon segment, 3,470 eggs per redd, 4.81% egg-to-migrant survival) results in the potential production of 3,421 juvenile Chinook salmon in the reach in 1999. A 50% reduction in habitat quality, with a consequent 50% reduction in survival results in the loss of 1,711 juvenile Chinook salmon from the 1998 spawning migration. The equivalent adult production losses from the 1998 year class is 53 fish (3.07% smolt to adult return).

50% mortality redds:

- 5 redds x 3,470 eggs per redd = 17,350 eggs/alevins x 50% = 8.675 eggs survived
- 4.81% egg-to-migrant survival = 417 juveniles

0% mortality redds:

- 18 redds x 3,470 eggs per redd = 62,460 eggs
- 4.81% egg-to-migrant survival = 3,004 juveniles

Total juveniles affected = 3,422 x 50% loss due to habitat degradation = 1,711 juveniles lost
1,711 juveniles x 3.07 juvenile to adult return rate = 53 adult loss equivalent

Multi-generational Losses

The juvenile losses will result in an estimated loss of 609 adults that would have returned over the next several years. The loss of adult spawners that would have produced progeny represents an additional production loss from future generations. Fish populations have the ability to recover from stochastic events provided that the mortality event is below a threshold level for population elimination. Survival in the Warm Springs system appears to be density dependent (i.e., there is an inverse relationship in the number of migrants produced and the subsequent survival to adults) and it is likely that compensatory survival will return the population to an expected baseline within one additional generation. Because only a portion of each year's return is affected, and losses are not carried past one generation, a simple linear accumulation is used for losses for each generation, rather than attempting to quantify multi-generational effects using spawner-recruitment curves developed for the system.

Since wild spring Chinook salmon in the Warm Springs system tend to return in their third, fourth or fifth year, in calculating the number of lost offspring the Trustees assumed that the lost 1997 year class adults would have returned in 2000, 2001 and 2002 and the lost 1998 year class adults would have returned in 2001, 2002 and 2003. The Trustees also assumed that the distribution over those years of the 3-, 4- and 5-year-old fish would have matched that of the

1997 and 1998 year class returns. Based upon reported data the Trustees assumed that the returning fish would have produced one redd per every three adults, and used the same eggs-per-redd, and juvenile survival assumptions employed in the other calculations. Given the above calculations of numbers of adults from the 1997 and 1998 year classes that were lost as a result of the spill, the result is an estimated further loss of offspring totaling 21,865 migrant juveniles in 2001, 9,346 in 2002 and 1,001 in 2003. Based on the distribution of 3-, 4-, and 5-year old fish, the 609 adults expected to return would be distributed as in Table 4.

Table 4. Projected distribution of returning adult Chinook salmon.

Multi-generational Losses				
Year class	Adult return year			
	2000	2001	2002	2003
1997 (512 adults)[1]	26[3]	394	92	
1998 (97 adults)[2]		53	75	17
Total spawners lost		394	167	17
Redds lost[4]		131	56	6
Eggs lost[5]		454,570	194,320	20,820
Migrants lost[6]		21,865	9,346	1,001
Total migrants lost	32,212			

1 84 from direct mortality to juvenile stage in Beaver Creek + 428 from premature migration of juveniles in Deschutes River
2 44 from direct mortality to pre-emergents in Beaver Creek redds + 53 from Beaver Creek juveniles lost due to habitat degradation
3 3-year-old "jacks" assumed not to participate in spawning
4 Based on 3 adults per redd
5 Based on 3,470 eggs per redd
6 Based on 4.81% egg-to-migrant survival

Total wild spring Chinook migrant losses from all impacts

- Pre-emergent juveniles in redds (1998 year class)	1,419
- Yearling juveniles in Beaver Creek (1997 year class)	1,544
- Yearling juveniles in Deschutes River (1997 year class)	7,855
- Subyearling juveniles in Beaver Creek (1997 year class)	1,711
- Multi-generational losses (2001, 2002, 2003 year classes)	32,212

Total migrant juveniles lost	44,741

3.2.3 Wild Summer Steelhead

Beaver Creek provides important spawning and rearing habitat not only for wild Chinook salmon but also for wild steelhead. Like Chinook, steelhead have an anadromous life history, differing from Chinook in terms of the length of stream and river residence of juveniles and length of ocean residence and river migration of returning adults. Steelhead also have comparable habitat needs and were subject to similar impacts from the gasoline spill. As in the case with Chinook, the spill caused direct impacts to steelhead juveniles in Beaver Creek, indirect impacts through reduced quality of rearing habitat in Beaver Creek and caused multi-generational losses. The Warm Springs River is of particular value as a refuge for wild summer steelhead since all hatchery marked or suspected hatchery origin steelhead are not allowed to pass the barrier dam at Warm Springs National Fish Hatchery. Wild steelhead in the Warm Springs system are included in the Middle Columbia ESU, listed as a threatened species under the Endangered Species Act on March 25, 1999 (64 FR 14517).

Juveniles in Beaver Creek

A total of 338 dead juvenile steelhead/rainbow trout were among the fish recovered following the spill. Non-anadromous rainbow trout co-occur with their anadromous steelhead cousins in Beaver Creek. No attempt was made to distinguish the recovered fish and the Trustees have assumed that all the collected fish were steelhead. In the absence of specific data, the Trustees assumed that the lost juveniles were evenly distributed among the 0+ (subyearling), 1+ and 2+ age classes. Fishery managers estimate the wild steelhead smolt-to-adult survival rate at 6%. Steelhead typically smolt at age 2+. The probability of survival to adult stage will increase as a juvenile ages (i.e., survival to adult rates for younger fish are expected to be lower). To reflect the age distribution of the lost juveniles, the Trustees assumed the survival to adult rates would vary in an even, linear fashion (1%, 3% and 6% for the 0+, 1+ and 2+ juveniles respectively). Applying these figures resulted in an estimated potential loss of 43 adult fish.

Juvenile steelhead in the Deschutes River system rear for 1 to 4 years before migrating to the ocean (ODFW, 1997) and may exist as age 0+, 1+ and 2+ and older fish in Beaver Creek. Partial emigration from tributaries occurs in the spring at age 0 to age 3, with many continuing to rear in the lower Deschutes River before smolting. Outmigration occurs from April through June so it is probable that all age classes were present in Beaver Creek during the spill. Because of the existence of several age classes, the lack of data regarding the numbers of particular age classes that outmigrate and survival from hatch to age 1+ or 2+, it is not possible to calculate potential production from prior year redd counts. Surveys following the spill recovered 338 dead juvenile steelhead/rainbow. The Trustees have assumed that the steelhead and Chinook juveniles experienced similar rates of mortality as a result of exposure to the gasoline and that the numbers of collected steelhead carcasses bear the same relation to the total numbers of dead steelhead as the number of collected Chinook carcasses bear to the total dead Chinook. In the case of Chinook, 404 dead juveniles were recovered out of a total estimated 1,544 killed (26%).

Consequently, the Trustees assumed that the 338 dead steelhead were 26% of a total of 1,300 dead steelhead juveniles (338/26% = 1,300).

Non-anadromous rainbow trout co-occur with steelhead in Beaver Creek. However, the recovered carcasses were not examined to determine the relative proportions of the populations and we assume the loss represents juvenile steelhead. No age class distribution information has been determined from the carcasses and we assume an even distribution of 0+, 1+, and 2+ fish. The estimated wild smolt-to-adult survival rate is 6% (ODFW, 1997). Scale patterns from wild adult steelhead indicate that smolts enter the ocean from age 1 to age 4. With no data to estimate year to year juvenile survival, we assume a linear survival and use 1%, 3%, and 6% (3.33% average) to project juvenile to adult survival for the age 0+, 1+, and 2+ juveniles, respectively, and estimate the potential loss of 43 adult fish.

338 carcasses recovered / 26% = 1,300 juveniles lost

Age 0+ (1300/3) = 433 juveniles lost * 1% survival to adult stage = 4 adults lost

Age 1+ (1300/3) = 433 juveniles lost * 3% survival to adult stage = 13 adults lost

Age 2+ (1300/3) = 433 juveniles lost * 6% survival to adult stage = 26 adults lost

Total adults lost 43

Juvenile Mortality as a Result of Habitat Degradation

There is less information available on steelhead than Chinook salmon but it is assumed that habitat availability also affects survival of juvenile steelhead. Based on the same information used for Chinook salmon, a 50% reduction in habitat quality is assumed in the first year following the spill. This reduction in quality is expressed as reduced juvenile survival. The loss estimate is based on the number of steelhead redds expected in Beaver Creek, and the assumption that the loss occurs during the year of spawning (steelhead fry emerge in early summer) and results in an overall decrease in survival to the smolt stage. Annual steelhead redd counts over the past 10 years in the segments of Beaver Creek between Beaver Butte Creek to Canyon range from 4 (1994) to 45 (1998) (CTWSRO, 1998). Wild summer steelhead typically return after 1 or 2 years in the ocean (fish spending 1 year in the ocean are identified as “1-salt” fish, fish spending 2 years in the ocean are identified as “2-salt” fish). There is little information regarding age composition except for sampling conducted in 1971 and 1972 reporting that 1- and 2-salt fish returned in about equal proportions (Howell et al., 1985). Average fecundity is 4,680 eggs per female for 1-salt fish, and 5,930 eggs per female for 2-salt fish (ODFW, 1997). Using a 10-year average (15) to predict the number of redds in 1999, an equal distribution of 1-and 2-salt fish, their respective fecundities, a 0.75% egg-to-smolt survival (ODFW, 1997), and a 50% reduction in survival due to degraded habitat, we estimate a loss of 298 smolts from the 1999 brood year. Based on an estimated wild smolt-to-adult survival rate of 6%, this results in the projected loss of 18 adults from the 1999 brood year.

1-salt redds (7.5) * 4,680 eggs/female = 35,100 eggs

2-salt redds (7.5) * 5,930 eggs/female = 44,475 eggs

Total eggs produced = 79,575 * 0.75% egg-to-smolt survival = 597 smolts
597 smolts * 50% mortality = 298 smolts
298 smolts * 6% smolt-to-adult survival = 18 adults

Multi-generation Losses

As with Chinook salmon, the projected loss of spawning steelhead adults would result in a corresponding loss of potential offspring. To simplify the analysis, the Trustees assumed that the lost juveniles would have returned as adults in even numbers as 1-salt and 2-salt fish. We assumed that mixed-age juveniles lost in 1999 as a direct result of the spill would have migrated to the ocean in 1999; we assumed that the 1999 brood year would have migrated the year following spawning. Applying the different fecundities for 1-salt and 2-salt females, assuming half the returning adults were female and half were male with one female per redd, and applying a 0.75% egg-to-smolt survival rate (ODFW, 1997), the Trustees estimated a loss of 386 migrants for adult return year 2000, 585 for 2001 and 178 for 2002 as a result of adult losses projected from direct and indirect results of the spill (Table 5).

Table 5. Projected distribution of returning adult steelhead.

Multi-generational Losses			
Brood years	Adult return year		
	2000	2001	2002
1996, 1997 and 1998[1]	22[3]	21[4]	
1999[2]		9[3]	9[4]
1-salt redds lost[5]	11	4	
Eggs lost (4,680 eggs/1-salt female)	51,480	18,720	
2-salt redds lost[5]		10	4
Eggs lost (5,930 eggs/2-salt female)		59,300	23,720
Total eggs lost	51,480	78,020	23,720
Migrants lost[6]	386	585	178
Total migrants lost	1,149		

1 0+,1+ and 2+ age juveniles killed by direct exposure to gasoline in Beaver Creek
2 Post-spill emergents lost due to habitat degradation
3 1-salt adults (adults split 50:50 into 1-salt and 2-salt returns)

[4] 2-salt adults
[5] Based on 50:50 female:male and one female per redd
[6] Based on 0.75% egg-to-smolt survival

Total wild steelhead migrant losses from all impacts:

Juveniles in Beaver Creek (1996,1997 and 1998 brood years)	1,300
Subyearling juveniles in Beaver Creek (1999 brood year)	298
Multi-generation losses (adult return years 2000, 2001, 2002)	1,149
Total migrant juveniles lost	2,747

4.0 Restoration Planning

The Trustees' mandate under the OPA (see 33 U.S.C 2706(b)) is to make the environment and the public whole for injuries to natural resources and natural resource services resulting from the discharge of oil. This requirement must be achieved through the restoration, rehabilitation, replacement, or acquisition of equivalent natural resources and/or services. Thus, for a restoration project to be considered there must be a connection, or nexus, between the natural resource injuries and the proposed restoration actions.

Restoration actions under the OPA are termed primary or compensatory. Primary restoration is any action taken to return injured natural resources and services to their baseline condition (here assumed to be the pre-spill condition). Trustees are required to consider relying on natural recovery (i.e., no active restoration) where feasible or cost-effective active restoration actions are not available, or where the injured resources will recover quickly without human intervention following the clean up.

Compensatory restoration is any action taken to compensate for interim losses of natural resources and services that occur from the date of the incident until recovery to baseline conditions. The scale, or amount, of the required compensatory restoration will depend on the extent and severity of the initial resource injury and how quickly each resource and associated service returns to baseline. Primary restoration actions that speed resource recovery will reduce the amount of compensatory restoration. To the extent that restoration projects are implemented prior to the completion of natural recovery, there is an element of primary restoration to the project. This factor is taken into account in the scaling of the restoration project sizes.

The Trustees considered a variety of restoration concepts and alternatives with the potential to provide primary and compensatory restoration. These were evaluated based on selection criteria developed by the Trustees consistent with the legal guidelines provided in the OPA regulations (15 C.F.R. 990.54(a)). Section 4.1 of this Plan presents OPA-based selection criteria developed by the Trustees for this spill. Based on the Trustees evaluation, a suite of restoration projects has been selected for implementation. The projects are presented in detail in Section 5.2.2.

4.1 Evaluation Criteria

OPA regulations (15 CFR § 990.54) require that Trustees develop a reasonable range of primary and compensatory restoration alternatives and then identify the preferred alternatives based on the six criteria listed in the regulations (no priority is given to the criteria in the regulations):

- Cost to carry out the alternative;

- Extent to which each alternative is expected to meet the Trustees' goals and objectives in returning the injured natural resources and services to baseline and/or compensating for interim losses;

- Likelihood of success of each alternative;

- Extent to which each alternative will prevent future injury as a result of the incident and avoid collateral injury as a result of implementing the alternative;

- Extent to which each alternative benefits more than one natural resource or service; and

- Effect of each alternative on public health and safety.

In addition, the regulations allow the Trustees to consider other factors. For this spill the Trustees also considered:

- Nexus to geographic location of the injuries;

- Consistency with Tribal policies and restoration objectives; and

- Compliance with applicable federal and state laws and policies.

NEPA applies to restoration actions taken by federal trustees. To reduce transaction costs and avoid delays in restoration, the OPA regulations encourage the Trustees to conduct the NEPA process concurrently with the development of the draft Restoration Plan.

To comply with the requirements of NEPA, the Trustees analyzed the effects of each preferred alternative on the quality of the environment. NEPA's implementing regulations (40 CFR § 1508.27) direct federal agencies to evaluate the potential significance of proposed actions by considering both context and intensity. For the actions proposed in this RP/EA, the appropriate context for considering potential significance of the action is local, as opposed to national or worldwide.

With respect to evaluating the intensity of the impacts of the proposed action, NEPA regulations suggest consideration of ten factors:

1. Likely impacts of the proposed project;
2. Likely effects of the project on public health and safety;

3. Unique characteristics of the geographic area in which the project is to be implemented;
4. Controversial aspects of the project or its likely effects on the human environment;
5. Degree to which possible effects of implementing the project are highly uncertain or involve unknown risks;
6. Precedent-setting effect of the project on future actions that may significantly affect the human environment;
7. Possible significance of cumulative impacts from implementing this and other similar projects;
8. Effects of the project on National Historic Places, or likely impacts to significant cultural, scientific, or historic resources;
9. Degree to which the project may adversely affect endangered or threatened species or their critical habitat; and
10. Likely violations of environmental protection laws.

4.2 Scaling Compensatory Restoration

The Trustees are using the cost of implementing compensatory habitat restoration projects sufficient to compensate for the damages as the basis for their natural resource damage claims arising from the spill. The Trustees assume that there is a correlation between the vitality of salmon/steelhead habitat and overall ecosystem health, such that restoration of salmonid habitat will also restore other resources lost as a result of the spill. To determine the nature and amount of habitat restoration needed to compensate for the losses of juvenile Chinook salmon and steelhead, the Trustees employed a methodology known as Habitat Equivalency Analysis (HEA) often employed in natural resource damage cases. HEA uses one or more environmental metrics (scaling factors) to determine the amount of restoration needed to compensate for natural resource injuries. Because of the emphasis on increasing natural production in the Deschutes River subbasin, the Trustees decided to emphasize habitat restoration as the mechanism for compensation for anadromous fish losses, for both wild and hatchery fish. Anadromous fish production in the Warm Springs River system appears to be limited by spawning and rearing habitat quality. Compensation requirements are defined as the amount of spawning and/or rearing habitat restoration necessary to increase smolt/migrant production to a level that equals the losses. Trustees chose anadromous fish smolts/migrants as an indicator of restoration success based on the assumption that there is a correlation between salmonid habitat vitality and overall ecosystem health, so that as salmonid habitat is restored, other resources will be restored as well. Consequently, in the present case the Trustees designed the HEA to calculate the amount of salmon and steelhead spawning and rearing habitat restoration that would be needed to increase production of smolt/migrants to a level equal to the estimated losses (Table 6).

Table 6. Distribution of fish losses (expressed as smolts/migrants)

Year	Chinook salmon	Steelhead
1999	469,443 (456,914 hatchery, 12,529 wild)	1,598
2000	38,000 (hatchery)	386
2001	21,865 (wild)	585

2002	9,346 (wild)	178
2002	1,001 (wild)	0

Equating habitat restoration with fish production requires information on the amount of fish production that can be expected from different types and qualities of desired habitat. For such inputs the Trustees relied upon a salmon production model developed by the Northwest Power Planning Council (NWPPC, 1990) to scale restoration projects in Columbia River system sub-basins. That model identifies numerical increases in smolt density (number of smolts per square meter) that can be expected from increases in spawning and rearing habitat quality in the sub-basin of which Beaver Creek is a part. Smolt density estimates (smolts/m^2) used in the model for the species of concern in Beaver Creek are identified in Table 7.

Table 7. Smolt density/habitat relationships used in Habitat Equivalency Analysis

Species	**Habitat quality (density in smolts/$m^{2)}$**			
(spawning and rearing)	Excellent	Good	Fair	Poor
Spring Chinook	0.90	0.64	0.37	0.10
Summer steelhead	0.10	0.07	0.05	0.03

Potential restoration actions are assumed to result in a two step habitat quality increase (e.g. poor to good). Spawning and rearing values from the Smolt Density Model are used (0.27 smolts/m^2 and 0.02 smolts/m^2 increase per step for Chinook and steelhead, respectively). Using smolt density increases from the NWPPC model and data on average stream widths in the area (7.5 meters in Beaver Creek), and applying predictions about the length of time it would take for habitat improvement projects to produce expected gains (15 years) and assumptions about when habitat restoration projects could be initiated, the Trustees used the HEA to calculate the amount of stream area improvements needed to compensate for the Chinook and steelhead smolt/migrant losses. Using the above assumptions, compensation requirements are 40,915 m^2 (440,180 ft^2) for spring Chinook salmon and 5,299 m^2 (57,017 ft^2) for steelhead. Based on average stream widths, this requires habitat improvement on 5.45 km (3.38 miles) for Chinook salmon and 0.69 km (0.43 miles) for steelhead. While juvenile steelhead and Chinook do have some differences in habitat requirements, improving overall stream quality will benefit both, so the requirements are not additive and compensation is based on the larger Chinook requirement. Stream segments in the drainage with the potential for improvement, totaling 3.38 miles, will be selected, and restoration actions implemented, including a combination of fencing for livestock exclusion, riparian planting, culvert replacement, bank stabilization, etc. that are expected to effect an overall habitat quality improvement. Monitoring will be incorporated to monitor progress and success, and determine the need for corrective action.

The suite of actions identified by the Trustees was estimated in 2003 to cost $359,338.92. The dollar value of the Trustees' claim is based upon the estimated cost of a suite of actions that would improve stream habitat quality in Beaver Creek. The actions are aimed at reducing aquatic habitat damage caused by cattle, re-establishing riparian vegetation, protecting stream banks and floodplains, increasing stream canopy and controlling sediment from roads. Specifically, the Trustees developed cost figures for acquiring conservation easements, constructing and maintaining cattle exclusion fencing while providing off-channel cattle watering facilities, clearing and removing invasive species and planting native trees and shrubs, and implementing sediment source control measures.

5.0 Analysis of Restoration Alternatives

The overall objective of the restoration planning process is to identify restoration alternatives that are appropriate to restore, rehabilitate, replace or acquire natural resources and their services equivalent to those injured or lost as a result of incidents involving the discharge or the significant threat of a discharge of oil.

The goal of restoration under OPA is to make the environment and public whole for injuries to natural resources and services resulting from incidents involving the discharge or threat of a discharge of oil. Restoration actions under OPA are termed primary or compensatory.

Primary restoration is any action taken to accelerate the return of injured natural resources and services to their baseline condition. Natural recovery, in which no human intervention is taken to directly restore the injured natural resources and/or services to baseline conditions (following all response actions) is always considered as a primary restoration alternative (and is equivalent to the NEPA No Action alternative). Natural recovery is the appropriate restoration alternative in situations where feasible or cost-effective primary restoration actions are not available, or where the injured resources will recover relatively quickly without human intervention. Active primary restoration actions (as opposed to natural recovery) are appropriate in situations where injured resources will not recover, or will recover slowly, without taking steps to bring about or speed recovery, and where feasible and cost-effective methods exist to assist recovery to baseline.

Compensatory restoration is any action taken to compensate for interim losses of natural resources and/or services pending recovery to baseline. The no compensatory restoration action alternative (NEPA's No Action alternative) is appropriate for a resource or service which was not injured or, if injured, for which appropriate restoration actions meeting the OPA criteria (see Section 5.3) are not possible. The scale of the required compensatory restoration is dependent on both the initial size of the injury and how quickly each resource and/or service returns to baseline. Primary restoration actions that speed recovery will reduce the requirement for compensatory restoration.

5.1 Primary Restoration

Based on observations made in the impacted area and on experience gained from recovery of similar habitats from previous oil spill incidents, the Trustees determined that all affected habitats would recover to baseline condition within a reasonably short period of time. Following the spill, gasoline was visible on the surface of Beaver Butte Creek and leaching from the banks for approximately 2 weeks. Surface water chemistry results from sample sites located within

500 feet downstream of the spill site revealed rapidly diminishing values in hydrocarbon concentrations in the water over distance and time. Analytical results for BTEX compounds (benzene, toluene, ethylbenzene, and total xylenes) in Beaver Creek 1.5 miles below the spill showed levels below detection limits within 1 month of the spill. All of the injured habitats are expected to recover to baseline conditions within one year of the incident. Therefore, the natural recovery (No Action) option was selected as the primary restoration alternative for injured habitats. In addition, based on the magnitude of the estimated injury and site conditions, the Trustees determined that no additional actions were necessary to aid in the recovery of aquatic fauna. Therefore, the natural recovery (No Action) option was selected as the primary restoration alternative for these resources.

After determining the appropriate primary restoration alternative for each injury (in this case, natural recovery for all injuries), the Trustees can proceed to determine the type and size of compensatory restoration actions to make the environment and public whole for interim losses to injured resources and/or services (i.e., affected habitats, birds, aquatic fauna, and human use). The evaluation of compensatory restoration alternatives is addressed below.

5.2 Compensatory Restoration

Trustees considered a range of compensatory restoration alternatives intended to provide additional resource services to compensate the public for losses pending natural recovery.
To comply with the requirements of NEPA, the Trustees analyzed the effects of each alternative on the quality of the human environment. NEPA's implementing regulations direct federal agencies to evaluate the potential significance of proposed actions by considering both context and intensity. For actions proposed in this RP/EA, the appropriate context for considering potential significance of the actions is local, as opposed to national or worldwide.

This RP/EA includes a suite of proposed restoration actions that provides appropriate types and quantities of restoration actions necessary to address the natural resource injuries resulting from the incident. Natural production of anadromous fish in Beaver Creek is limited by high water temperatures and high levels of fine sediment in spawning and rearing habitat. Restoration actions such as livestock exclusion fencing, establishing and improving riparian vegetation, protecting and improving streambanks, increasing stream canopy cover, eliminating sediment-producing sources such as roads and unstable banks, and other actions that will promote natural recovery of the ecosystem are being proposed with this Restoration Plan. The following discussion is divided into three sections: 1) Evaluation of the No-Action Alternative, 2) Discussion of the Proposed Preferred Alternative, and 3) Discussion of the Non-Preferred Alternatives.

5.2.1 Evaluation of the No-Action/Natural Recovery Alternative

NEPA requires the Trustees to consider a "no action" alternative and the OPA regulations require consideration of an equivalent natural recovery option (15 CFR § 990.53). Under this alternative, the Trustees would take no direct action to restore injured natural resources or compensate for lost services pending natural recovery. Instead, the Trustees would rely on natural processes for recovery of the injured natural resources. While natural recovery would occur over varying time scales for injured resources, the interim losses suffered would not be compensated under the No Action alternative.

The principal advantages of the No Action approach are the ease of implementation and limited monetary costs because natural processes rather than humans determine the trajectory of recovery. This approach recognizes the capacity of ecosystems to self-heal.

OPA, however, clearly establishes Trustee responsibility to seek compensation for interim losses pending recovery of natural resources (15 CFR § 990.53(3)(c)(1)). This responsibility cannot be addressed through a No Action alternative. Therefore, the No Action alternative is rejected for compensatory restoration. Losses were and continue to be suffered during the period of recovery from this incident and technically feasible, cost-effective alternatives exist to compensate for these losses.

5.2.2 Selected Alternatives

The restoration concepts and projects described were developed by representatives of the CTWSRO, with other Trustee input, and are consistent with Tribal policies and watershed objectives. All Trustees concurred with the selection of preferred restoration projects. These projects are located on the Warm Springs Indian Reservation. Each of the proposed projects is described and information provided regarding restoration techniques and potential benefits to fish and other aquatic resources. Maps (Section 8) are used to outline the watershed area and as locators of proposed restoration project sites in the watershed. Given the availability of information on habitat conditions in the Beaver Creek drainage, restoration alternatives were developed to specifically address factors limiting anadromous fish production.

The following discussion describes the suite of selected projects that the Trustees believe can be implemented within the next 3 years. The restoration alternatives range from localized stream treatment actions that can be readily implemented within the available settlement funds, to more comprehensive actions that will be accomplished through partnering with other sources of funding, using the settlement funds as leverage. Cost sharing has already been secured for the Lower Beaver Creek Riparian Enhancement Project, with the Natural Resource Conservation Service (NRCS) allocating $90,000 for project construction.

Project construction will be performed by the CTWSRO. The intent of this RP/EA is to describe a suite of restoration actions that can be implemented as opportunities arise. The Trustees conclude that the proposed restoration package will result in ecosystem restoration comparable to habitat improvement on at least 3.38 miles of stream (HEA calculated compensation requirement) and is sufficient compensation for the natural resource injuries that resulted from the incident. It is anticipated that the cumulative effect of implementation of the alternatives will be a significant improvement in the quality of spawning and rearing habitat for Chinook salmon, steelhead, and other aquatic resources in Beaver Creek.

In the event that circumstances arise that prevent one or more of the projects identified in the restoration suite from being done, or cost sharing sufficient to fund the majority of the projects is secured, a contingency restoration project is identified. Any settlement funds that remain unspent will be directed to the Watershed Project Maintenance Program. Description of this contingency alternative is described in Section 5.2.2.6.

5.2.2.1 Lower Beaver Creek Riparian Habitat Enhancement Project

This project builds on a riparian livestock exclusion fence project that was completed in the fall of 2005. Specific restoration actions include expansion of the existing floodplain and riparian planting. This project will address the following objectives:

- Improve spawning and rearing habitat conditions for spring Chinook salmon and summer steelhead
- Expand existing floodplain and enhance riparian vegetation
- Reduce sediment loads through stabilization of streambanks

It will accelerate the natural expansion process of an evolving floodplain along approximately 1,400 linear feet of eroding stream bank on lower Beaver Creek at two locations in the Fawn Flat area (Figure 2). As described earlier in the watershed description section, Beaver Creek has incised into deep fine grained material at these two sites and a new floodplain is evolving within these incised segments albeit at the expense of this fine grained material. Approximately 531 linear feet of unstable, eroding stream bank in this area will be planted with native riparian vegetation. Two gallon rooted willows will be planted after peak flows in 2008. In 2009, other riparian species including dogwood and alder will be planted to compliment the vegetation recovery. The riparian fence will also be moved back to include more of the floodplain terrace, and perennial grass species with vigorous rooting characteristics will be planted to provide additional stability and erosion control. This will allow for natural channel processes to continue at these sites and will preclude the use of rock or wood structures for "protection" of the toe of the outside bends. The CTWSRO will be cost sharing with the NRCS on this project. The NRCS has already allocated $90,000 towards this project. The NRCS will also be providing survey and design for the implementation of this project.

5.2.2.1.1 Description of Environmental Impacts

Ecological benefits that would result from this project would include reduced sediment loads to Beaver Creek, reduced water temperatures, and increased overhead cover for spring Chinook salmon and summer steelhead. The expansion of the actively evolving floodplain with techniques that would allow for natural stream channel processes would result in a reduction of sediment loads in Beaver Creek. A reduction in sediment loads to Beaver Creek could greatly improve spawning and rearing habitat for spring Chinook salmon and summer steelhead for a distance downstream that extends considerably past the immediate project footprint. The establishment of healthy riparian vegetation will provide shade in the project area that will assist in maintaining lower water temperatures in the project area and beyond. Establishment of healthy and vigorous riparian vegetation will also increase overhead cover for both adult and juvenile spring Chinook salmon and summer steelhead in the project area.

Native vegetation planted in riparian areas will be obtained from commercial suppliers. Willow (*Salix* spp.) may be obtained from existing natural stands. The gathering of willow cuttings should not affect any existing natural stand. Plants purchased from suppliers will be selected to grow in the environmental conditions at the project site. Relocation of the riparian fence will not involve heavy equipment and there will be no in-channel work. Impacts related to soil compaction, erosion, de-stabilization of soils and slopes, and turbidity, are expected to be negligible.

No significant adverse impact is anticipated for fish or wildlife species. Overall, fish and wildlife are expected to benefit from the project but fish and wildlife may be temporarily disturbed during the 2 – 3 months of construction due to short term increases in dust, noise, and human activity.

No significant adverse impacts are anticipated for endangered or threatened species. Seasonal construction windows, avoidance of in-water work, and erosion control measures will address protection measures for threatened Middle Columbia steelhead and Bull trout. Seasonal construction windows are developed to allow work during the time period that is least likely to affect listed fishes. Both Mid-Columbia steelhead and Bull trout will benefit from the aquatic habitat improvements associated with the alternative. Bald eagle nesting/feeding is associated primarily with the main stem Deschutes River and basin reservoirs. The closest known nest site is on the Deschutes River. Bald eagle occurrence in the project area would be incidental and no adverse impact to this species is anticipated.

The project area is not within the known occupied range of Canada lynx (70 Fed. Reg. 216, Nov. 9, 2005. Proposed Designation of Critical Habitat for the Contiguous United States Distinct Population Segment of the Canada lynx). Impacts on Canada lynx would be associated primarily with clearing vegetation that serves as habitat for snowshoe hares or other small mammals that constitute the lynx diet. The alternative proposes to re-establish a healthy functioning riparian corridor and floodplain; no impact to this species is anticipated. The project area is within the range of the Northern Spotted Owl but not in an area designated as critical habitat (critical habitat designated only on federal lands). Nesting, roosting, and foraging habitat may exist in the project area and owl presence is assumed. The population of Northern Spotted Owls is declining on the Warm Springs Reservation due to habitat loss associated with wildfire and continued logging of older forests ("Status and Trends in Demography of Northern Spotted Owls, 1985-2003" – draft report submitted to Interagency Regional Monitoring Group). The noise associated with construction activities may disturb spotted owls but construction activity will not likely occur during owl nesting season (generally February through June) so impact should be minimal.

Significant cultural resources may be a concern in the project area. The softer engineering approach selected for this project, which involves minimal ground disturbance and relies on enhancement of the natural processes for development of improved aquatic habitat will minimize any potential impact. The activities will be implemented in consultation with the CTWSRO and steps will be taken to ensure that any discovered sites will remain undisturbed by the proposed action.

5.2.2.1.2 Cumulative and Socioeconomic Impacts

No adverse cumulative impacts are anticipated from this component. Improved aquatic habitat resulting from the restoration action is expected to increase anadromous fish production in Beaver Creek, providing additional recreational and Tribal harvest opportunities. The project is located in a riparian zone and the area is identified for livestock exclusion. No impacts on grazing or timber harvest are anticipated.

5.2.2.1.3 Probability of Success

The project has a high probability of success and Trustees believe that as the additional habitat develops, it will serve as an important component of the suite of projects necessary to compensate for the impacts to aquatic resources resulting from the incident. The restored habitats will take some time to reach maturity but will begin providing functional benefits to aquatic resources soon after they are constructed. While the anticipated sediment and temperature reduction benefits of this project will extend a considerable distance along Beaver Creek, this component alone will provide the equivalent of 0.26 miles of habitat improvement and will serve as part of the overall restoration package.

5.2.2.2 Beaver Creek (Robinson Park) Floodplain/ Riparian Habitat Restoration

This project will involve removing a section of unused road and the associated road material, removing two culverts, side channel realignment, and riparian vegetation plantings. This work will occur in the riparian/floodplain area of Beaver Creek impacted by the fuel spill. This project will address the following objectives:

- Improve and increase rearing habitat for spring Chinook salmon and summer steelhead in Beaver Creek
- Enhance riparian vegetation
- Restore riparian/floodplain function and processes
- Improve water temperature

This project will involve the elimination of approximately 400 feet of the S-501 Road located in the riparian/floodplain area of Beaver Creek in an area known as Robinson Park (Figure 3). This will entail removal of old bridge abutments, and the removal of existing road material down to existing riparian area grade (2-4 feet). Along with the road material, two culverts would also be removed in this section of the S-501 Road. A side channel of Beaver Creek is presently flowing into the S-501 and flowing along the north edge of this road and then back into Beaver Creek. Removal of the road material to grade and redirecting the side channel back into its historic channel located on the downstream side of the S-501 Road will also occur under this project.

Riparian vegetation will be planted along the side channel realignment area as well as at the bridge abutment removal area on both sides of the channel. The former S-501 Road bed will also be planted with a mixture of riparian and upland plant species, primarily shrubs and trees.

5.2.2.2.1 Description of Environmental Impacts

Redirecting the side channel back to its historic channel will improve year round flows into the channel network located in a wetland area just downstream of the S-501 Road thus improving off channel rearing habitat for spring Chinook salmon and summer steelhead. This project would result in approximately 0.3 miles of side-channel rearing habitat and improved riparian/floodplain function. Approximately 8,700 square feet of side channel habitat would be improved. There are several channels off the main side channel not used by anadromous fish that would be improved by increased flows totaling 13,050 square feet of aquatic habitat improvement.

Ecological benefits that would result from this project would include reduced sediment loads to Beaver Creek, reduced water temperatures, and increased overhead cover for spring Chinook salmon and summer steelhead. The obliteration of 400 ft of S-501 Road and removal of existing road material and expansion of the actively evolving floodplain with techniques that would allow for natural stream channel processes would result in a reduction of sediment loads in Beaver Creek. A reduction in sediment loads to Beaver Creek could greatly improve spawning and rearing habitat for spring Chinook salmon and summer steelhead for a distance downstream that extends considerably past the immediate project footprint. The establishment of healthy riparian vegetation will provide shade in the project area that will assist in maintaining lower water temperatures in the project area and beyond. Establishment of healthy and vigorous riparian vegetation will also increase overhead cover for both adult and juvenile spring Chinook salmon and summer steelhead in the project area.

There is the potential for localized impacts due to the use of heavy equipment during construction. Negative impacts may include soil compaction, damage or removal of understory vegetation, de-stabilization of soils and slopes, and decreased water quality due to erosion. Habitat impacts will be restricted to the local environment around project sites. All negative impacts are expected to be temporary (i.e. no permanent long lasting impacts). These impacts will be minimized through careful design and appropriate construction practices, including seasonal construction windows, erosion protection, and sediment control structures.

Native vegetation planted in riparian areas will be obtained from commercial suppliers. Willow (*Salix* spp.) may be obtained from existing natural stands. The gathering of willow cuttings should not affect any existing natural stand. Plants purchased from suppliers will be selected to grow in the environmental conditions at the project site. Plants may be salvaged from areas where ground disturbance will be occurring. They will be re-planted on the sites following the construction activities.

No significant adverse impact is anticipated for fish or wildlife species. Overall, fish and wildlife are expected to benefit from the project but fish and wildlife may be temporarily disturbed during the 2 – 3 month construction period.

No significant adverse impacts are anticipated for endangered or threatened species. Seasonal construction windows, avoidance of in-water work, erosion control measures, and heavy equipment spill control measures will address protection measures for threatened Middle Columbia steelhead and Bull trout. Seasonal construction windows are developed to allow work during the time period that is least likely to affect listed fishes. Both Mid-Columbia steelhead and Bull trout will benefit from the aquatic habitat improvements associated with the alternative. Bald eagle nesting/feeding is associated primarily with the main stem Deschutes River and basin reservoirs. The closest known nest site is on the Deschutes River. Bald eagle occurrence in the project area would be incidental and no adverse impact to this species is anticipated. The project area is not within the known occupied range of Canada lynx (70 Fed. Reg. 216, Nov. 9, 2005. Proposed Designation of Critical Habitat for the Contiguous United States Distinct Population Segment of the Canada lynx). Impacts on Canada lynx would be associated primarily with clearing vegetation that serves as habitat for snowshoe hares or other small mammals that constitute the lynx diet. The alternative proposes to re-establish a healthy functioning riparian corridor and floodplain; no impact to this species is anticipated. The project area is within the range of the Northern Spotted Owl but not in an area designated as critical habitat (critical habitat designated only on federal lands). Nesting, roosting, and foraging habitat may exist in the project area and owl presence is assumed. The population of Northern Spotted Owls is declining on the Warm Springs Reservation due to habitat loss associated with wildfire and continued logging of older forests ("Status and Trends in Demography of Northern Spotted Owls, 1985-2003" – draft report submitted to Interagency Regional Monitoring Group). The noise associated with construction activities may disturb spotted owls but construction activity will not likely occur during owl nesting season (generally February through June) so any impact should be minimal.

No known archaeological sites are located in the project area. There is, however, the potential that construction may unearth a site. Projects will be implemented in consultation with the CTWSRO and steps will be taken to ensure that any discovered sites will remain undisturbed by the proposed action.

5.2.2.2.2 Cumulative and Socioeconomic Impacts

No adverse cumulative impacts are anticipated from this component. Since this section of road at Robinson Park is presently closed and unused, no impact on transportation is anticipated. Improved aquatic habitat resulting from the restoration action is expected to increase anadromous fish production in Beaver Creek, providing additional recreational and Tribal harvest opportunities. The project is located in a riparian zone and the area is identified for livestock exclusion. No impacts on grazing or timber harvest are anticipated.

5.2.2.2.3 Probability of Success

The project has a high probability of success and Trustees believe that as the additional habitat develops, it will serve as an important component of the suite of projects necessary to compensate for the impacts to aquatic resources resulting from the incident. The restored habitats will take some time to reach maturity but will begin providing functional benefits to aquatic resources soon after they are constructed. The project will result in making 0.3 miles of side channel habitat available to rearing anadromous fishes. While the anticipated sediment and temperature reduction benefits of this project will extend a considerable distance downstream along Beaver Creek, this component alone will provide 0.3 miles of habitat improvement and will serve as part of the overall restoration package.

5.2.2.3 Beaver Creek (Robinson Park) Floodplain/ Channel Development and Large Wood Placement

This project will place large diameter logs into strategically located bends in Beaver Creek below Robinson Park. The logs will be locally recruited and be placed in a series of complexes, groups and single pieces to encourage overhead cover, increase invertebrate production, pool development and floodplain access.

Pool development will also be created through active development of channel reconstruction through increased sinuosity, large wood and boulder placements throughout this reach. The number of pools needed would be determined through surveys and comparisons of reference reaches. Pool dimensions would also be determined through the use of reference reach analysis.

5.2.2.3.1 Description of Environmental Impacts

The benefits of the large wood and pool construction component include an increase in holding habitat for adults and an increase in refuge habitat for juveniles prior to emigration. This project also would benefit the proper functioning condition of the channel and floodplain.

There is potential for localized impacts due to the use of heavy equipment during construction. Negative impacts may include soil compaction, damage or removal of understory vegetation, de-stabilization of soils and slopes, and decreased water quality due to erosion. Habitat impacts will be restricted to the local environment around project sites. All negative impacts are expected to be temporary (i.e. no permanent long lasting impacts). These impacts will be minimized through careful design and appropriate construction practices, including seasonal construction windows, erosion protection, and sediment control structures.

Natural materials used in this project will be either purchased or salvaged. Logs, rootwads, and boulders will be obtained from lands of the Warm Springs Reservation. No trees will be harvested specifically to provide materials for this project. Boulders will be obtained from non-streambed sources. Any wood or boulder materials collected for restoration purposes will be collected during appropriate seasonal periods to eliminate or reduce soil and slope disturbances.

No significant adverse impact is anticipated for fish or wildlife species. Overall, fish and wildlife are expected to benefit from the project but fish and wildlife may be temporarily disturbed during the 2 – 3 month construction period.

No significant adverse impacts are anticipated for endangered or threatened species. Seasonal construction windows, avoidance of in-water work, erosion control measures, and heavy equipment spill control measures will address protection measures for threatened Middle Columbia steelhead and Bull trout. Seasonal construction windows are developed to allow work during the time period that is least likely to affect listed fishes. Both Mid-Columbia steelhead and Bull trout will benefit from the aquatic habitat improvements associated with the alternative. Bald eagle nesting/feeding is associated primarily with the main stem Deschutes River and basin reservoirs. The closest known nest site is on the Deschutes River. Bald eagle occurrence in the project area would be incidental and no adverse impact to this species is anticipated. The project area is not within the known occupied range of Canada lynx (70 Fed. Reg. 216, Nov. 9, 2005. Proposed Designation of Critical Habitat for the Contiguous United States Distinct Population Segment of the Canada lynx). Impacts on Canada lynx would be associated primarily with clearing vegetation that serves as habitat for snowshoe hares or other small mammals that constitute the lynx diet. The alternative proposes to re-establish a healthy functioning riparian corridor and floodplain; no impact to this species is anticipated. The project area is within the range of the Northern Spotted Owl but not in an area designated as critical habitat (critical habitat designated only on federal lands). Nesting, roosting, and foraging habitat may exist in the project area and owl presence is assumed. The population of Northern Spotted Owls is declining on the Warm Springs Reservation due to habitat loss associated with wildfire and continued logging of older forests ("Status and Trends in Demography of Northern Spotted Owls, 1985-2003" – draft report submitted to Interagency Regional Monitoring Group). The noise associated with construction activities may disturb spotted owls but construction activity will not likely occur during owl nesting season (generally February through June) so any impact should be minimal.

No known archaeological sites are located in the project area. There is, however, the potential that construction may unearth a site. Projects will be implemented in consultation with the CTWSRO and steps will be taken to ensure that any discovered sites will remain undisturbed by the proposed action.

5.2.2.3.2 Cumulative and Socioeconomic Impacts

No adverse cumulative impacts are anticipated from this component. Improved aquatic habitat resulting from the restoration action is expected to increase anadromous fish production in Beaver Creek, providing additional recreational and Tribal harvest opportunities. The project is located in a riparian zone and the area is identified for livestock exclusion. No impacts on grazing or timber harvest are anticipated.

5.2.2.3.3 Probability of Success

The project has a high probability of success and Trustees believe that as the additional habitat develops, it will serve as an important component of the suite of projects necessary to compensate for the impacts to aquatic resources resulting from the incident. The created habitats will take some time to reach maturity but will begin providing functional benefits to aquatic resources soon after they are constructed. The addition of large wood and boulders will increase pool development and floodplain functioning over a 0.5 mile reach of Beaver Creek. This component will serve as part of the overall restoration package.

5.2.2.4 Quartz Creek Riparian Habitat Restoration and Sediment Reduction Project

The majority of the Quartz Creek stream channel is incised and provides a significant source of sediment to Beaver Creek that degrades downstream spawning and rearing habitat for spring Chinook and summer steelhead. The specific restoration action in this drainage involves construction of livestock exclusion fencing and planting native vegetation in the riparian corridor. This project will address the following objectives:

- Improve spawning habitat conditions for spring Chinook salmon and summer steelhead in Beaver Creek downstream of Quartz Creek
- Reduce sediment loading to Beaver Creek
- Restore riparian vegetation and rearing habitat in Quartz Creek
- Decrease rate of water temperature increases

This project proposes to construct a pasture fence along 5 miles of Quartz Creek (Figure 4) to protect riparian vegetation and stream banks from cattle and horses. The new fence will be 4.7 miles in length and encompass approximately 420 acres. In addition, 5 miles of Quartz Creek stream bank and channel will be planted with native riparian vegetation. The purpose of the pasture fence and riparian planting is to help stabilize the new channel that is forming inside the incised channel so as to reduce erosion and sediment production.

5.2.2.4.1 Description of Environmental Impacts

This project is intended to stabilize an eroding channel system and reduce the input of sediment that adversely affects spawning and rearing habitat in Beaver Creek. Only the lower 300-400 feet of Quartz Creek is used as rearing habitat by juvenile spring Chinook salmon during late winter and early spring, so the primary benefit of the project is reduction of sediment input to the Beaver Creek system. The 8.4 mile reach of Beaver Creek from its mouth to the confluence with Quartz Creek is rated as poor quality habitat due to sedimentation, poor gravel quality, and high temperatures (NWPPC, 1990). The pasture fencing and planting will allow the recovery of riparian habitat in Quartz Creek, resulting in additional channel stabilization. Quartz Creek is a significant source of this sediment so erosion control in Quartz Creek will have a beneficial effect on improving habitat in Beaver Creek.

Fence construction will not involve heavy equipment and there will be no in-channel work. Impacts related to soil compaction, erosion, de-stabilization of soils and slopes, and turbidity, are expected to be negligible.

Native vegetation planted in riparian areas will be obtained from commercial suppliers. Willow (*Salix* spp.) may be obtained from existing natural stands. The gathering of willow cuttings should not affect any existing natural stand. Plants purchased from suppliers will be selected to grow in the environmental conditions at the project site. Plants may be salvaged from areas where ground disturbance will be occurring. They will be re-planted on the sites following the construction activities.

No significant adverse impact is anticipated for fish or wildlife species. Overall, fish and wildlife are expected to benefit from the project but fish may be temporarily disturbed during the 2 – 3 month construction period.

No significant adverse impacts are anticipated for endangered or threatened species. Threatened Middle Columbia steelhead and Bull trout do not occur in the project area and downstream impacts will be minimized by seasonal construction windows, avoidance of in-water work, erosion control measures, and heavy equipment spill control measures. Seasonal construction windows are developed to allow work during the time period that is least likely to affect listed fishes. Both Mid-Columbia steelhead and Bull trout will benefit from the aquatic habitat improvements associated with the alternative. Bald eagle nesting/feeding is associated primarily with the main stem Deschutes River and basin reservoirs. The closest known nest site is on the Deschutes River. Bald eagle occurrence in the project area would be incidental and no adverse impact to this species is anticipated. The project area is not within the known occupied range of Canada lynx (70 Fed. Reg. 216, Nov. 9, 2005. Proposed Designation of Critical Habitat for the Contiguous United States Distinct Population Segment of the Canada lynx). Impacts on Canada lynx would be associated primarily with clearing vegetation that serves as habitat for snowshoe hares or other small mammals that constitute the lynx diet. This component proposes to re-establish a healthy functioning riparian corridor and floodplain; no impact to this species is anticipated. The project area is within the range of the Northern Spotted Owl but not in an area designated as critical habitat (critical habitat designated only on federal lands). Northern Spotted Owls are not known to occur in the Quartz Creek watershed.

No known archaeological sites are located in the project area. There is, however, the potential that construction may unearth a site. Projects will be implemented in consultation with the CTWSRO and steps will be taken to ensure that any discovered sites will remain undisturbed by the proposed action.

5.2.2.4.2 Cumulative and Socioeconomic Impacts

No adverse cumulative impacts are anticipated from this component. Improved aquatic habitat resulting from the restoration action is expected to increase anadromous fish production in Beaver Creek, providing additional recreational and Tribal harvest opportunities. The Quartz Creek drainage is used for livestock grazing and the pasture fencing will exclude livestock from the stream. Previous actions of this nature in the drainage have included the provision of off-stream water sources for livestock. This project will also include off-stream watering sources and no adverse effect on livestock production is anticipated. The project is consistent with Tribal watershed planning objectives.

5.2.2.4.3 Probability of Success

The erosion/sedimentation problems in the Quartz Creek drainage have been recognized by the CTWSRO as a major contributor to limited fish production in Beaver Creek and the Warm Springs River. A watershed planning effort has occurred and limited actions have been undertaken over the past several years to control the problem. In some segments of Quartz Creek a fairly healthy riparian plant community has established itself. These segments are located primarily within a small riparian exclusion fence and demonstrate the recovery potential for riparian habitat in Quartz Creek with proper management. Pasture fencing in this area is expected to be more successful than a riparian corridor fence in this area as it will be easier to maintain due to a shorter length (4.7 miles vs. 10 miles for a corridor fence), will receive less pressure from livestock, and less of a nuisance and hazard to wildlife. Pasture fencing to limit livestock access and enhance reestablishment of vegetation in the riparian corridor will not resolve all of the problems in the Quartz Creek drainage but it will make a significant contribution to reducing sediment and improving stream temperatures. In combination with the anticipated sediment reduction project on Coyote Creek, the project has a high probability of success and will serve as an important component of the suite of projects necessary to compensate for the impacts to aquatic resources resulting from the incident. Large inputs of fine sediment can bury spawning gravel, cementing the substrate and impeding redd construction. Excessive fine sediment within gravel has been shown to reduce egg-to-fry survival due to a reduction of inter-gravel water flow. Excessive sediment may also physically prevent fry from emerging from the gravel in the spring. Reduction of one of the major sediment sources to Beaver Creek will allow annual spring runoff flows to flush fine sediment out of the 8.4 mile segment of lower Beaver Creek, improving gravel quality and spawning and rearing habitat for anadromous and resident fishes. The improvement in habitat quality will occur over a period of years, depending on flow and gradient. While not easily quantifiable in terms of square feet or stream miles, habitat improvement associated with the Quartz and Coyote creeks projects, which will result in improved spawning and rearing conditions in an 8.5 mile segment of Beaver Creek, is sufficient to provide the remaining compensatory requirement for injuries associated with the incident.

5.2.2.5 Coyote Creek Riparian Habitat Restoration and Sediment Reduction Project

The restoration action in this drainage will address the following objectives:

- Improve spawning habitat conditions for spring Chinook salmon and summer steelhead in Beaver Creek downstream of Coyote Creek
- Reduce sediment loading to Beaver Creek
- Restore riparian vegetation and rearing habitat in Coyote Creek

The project will include fencing the entire Coyote Creek Meadow complex and removal of the berms that bisect the meadow in several places (Figure 5). This will allow for a more holistic restoration plan to be implemented over the coming years, and restoration of the watershed to its fullest ecological potential. The new fence will be approximately 7.3 miles in length and create a 1,600 acre exclosure or meadow pasture for future use.

5.2.2.5.1 Description of Environmental Impacts

This project is intended to augment the stabilization of an eroding channel system by limiting livestock access, and reduce the input of sediment that adversely affects spawning and rearing habitat in Beaver Creek. Only the lower 0.25 mile of Coyote Creek is used as rearing habitat by juvenile spring Chinook salmon during late winter and early spring so the primary benefit of the project is reduction of sediment input to the Beaver Creek system. The 8.5 mile reach of Beaver Creek from its mouth to the confluence with Coyote Creek is rated as poor quality habitat due to sedimentation, poor gravel quality, and high temperatures (NWPPC, 1990). Fencing the meadow complex to contain livestock will reduce damage to banks caused by livestock, and riparian planting will help stabilize the incised channel so as to reduce erosion and sediment production and allow for a new stable channel to develop within the incised trench. This would help to increase the quality of spring Chinook salmon and summer steelhead spawning and rearing habitat in Beaver Creek downstream of the confluence with Coyote Creek.

Fence construction will not involve heavy equipment and there will be no in-channel work. Impacts related to soil compaction, erosion, de-stabilization of soils and slopes, and turbidity are expected to be negligible.

Native vegetation planted in riparian areas will be obtained from commercial suppliers. Willow (*Salix* spp.) may be obtained from existing natural stands. The gathering of willow cuttings should not affect any existing natural stand. Plants purchased from suppliers will be selected to grow in the environmental conditions at the project site. Plants may be salvaged from areas where ground disturbance will be occurring. They will be re-planted on the sites following the construction activities.

No significant adverse impact is anticipated for fish or wildlife species. Overall, fish and wildlife are expected to benefit from the project but may be temporarily disturbed during the 2 – 3 month construction period.

No significant adverse impacts are anticipated for endangered or threatened species. Threatened Middle Columbia steelhead and Bull trout do not occur in the project area and downstream effects will be minimized by seasonal construction windows, avoidance of in-water work, erosion control measures, and heavy equipment spill control measures. Seasonal construction windows are developed to allow work during the time period that is least likely to affect listed fishes. Both Mid-Columbia steelhead and Bull trout will benefit from the aquatic habitat improvements associated with the alternative. Bald eagle nesting/feeding is associated primarily with the main stem Deschutes River and basin reservoirs. The closest known nest site is on the

Deschutes River. Bald eagle occurrence in the project area would be incidental and no adverse impact to this species is anticipated. The project area is not within the known occupied range of Canada lynx (70 Fed. Reg. 216, Nov. 9, 2005. Proposed Designation of Critical Habitat for the Contiguous United States Distinct Population Segment of the Canada lynx). Impacts on Canada lynx would be associated primarily with clearing vegetation that serves as habitat for snowshoe hares or other small mammals that constitute the lynx diet. The alternative proposes to re-establish a healthy functioning riparian corridor and floodplain; no impact to this species is anticipated. The project area is within the range of the Northern Spotted Owl but not in an area designated as critical habitat (critical habitat designated only on federal lands). Northern Spotted Owls are not known to occur in the Coyote Creek watershed or in the project area.

No known archaeological sites are located in the project area. There is, however, the potential that construction may unearth a site. Projects will be implemented in consultation with the CTWSRO and steps will be taken to ensure that any discovered sites will remain undisturbed by the proposed action.

5.2.2.5.2 Cumulative and Socioeconomic Impacts

No adverse cumulative impacts are anticipated from this component. Improved aquatic habitat resulting from the restoration action is expected to increase anadromous fish production in Beaver Creek, providing additional recreational and Tribal harvest opportunities. The Coyote Creek drainage is used for livestock grazing and fencing the entire Coyote Creek Meadow Complex will exclude livestock from the stream. Previous actions of this nature in the drainage have included provision of off-stream water sources for livestock. This project will also include off-stream watering sources and no adverse effect on livestock production is anticipated. No adverse impact to transportation or access is anticipated. The project is consistent with Tribal watershed planning objectives.

5.2.2.5.3 Probability of Success

The erosion/sedimentation problems in the Coyote Creek drainage have been recognized by the CTWSRO as a major contributor to limited fish production in Beaver Creek and the Warm Springs River. A watershed planning effort has occurred and limited actions have been undertaken over the past several years to control the problem. In October 2008 the Tribes submitted a watershed assessment grant application to the Oregon Watershed Enhancement Board (OWEB) for the Coyote Creek Watershed. The intent of the watershed assessment is to develop a list of prioritized projects to improve the overall health of the Coyote Creek Watershed. The assessment will be developed by a team of specialists from the Tribes Branch of Natural Resources assigned to inventory and analyze their specific resource and develop that specific portion of the assessment. The assessment will be written using the guidelines set forth in the OWEB watershed assessment handbook (http://oregon.gov/OWEB/docs/pubs/OR_wsassess_manuals.shtml). The natural resource disciplines included in the team will be fisheries, wildlife, hydrology, soils, range and agriculture, roads, and forest fuels. The National Resources Conservation Service (NRCS) has committed staff time to assist the Tribes with the development of the assessment and the projects as they are developed. This watershed assessment will benefit the Beaver Creek Restoration Plan by directing funding within the Coyote Creek watershed to a suite of projects that will address sediment delivery to Beaver Creek at the watershed scale rather than the project level.

It is anticipated that restoration of the Coyote Creek Watershed will be ongoing and be implemented over the next five years or more. Currently, the Fish Habitat Program will be implementing a portion of the road obliterations identified for the watershed in 2008 (Figure 6) with funding secured through the Pelton Round Butte Fund and the NRCS Wildlife Habitat Incentives Program. The watershed assessment will result in a watershed wide road inventory and address road density issues for several resource concerns including fisheries and wildlife.

The project has a high probability of success and, in combination with the sediment reduction project on Quartz Creek, will serve as an important component of the suite of projects necessary to compensate for the impacts to aquatic resources resulting from the incident. Large inputs of fine sediment can bury spawning gravel, cementing the substrate and impeding redd construction. Excessive fine sediment within gravel has been shown to reduce egg-to-fry survival due to a reduction of inter-gravel water flow. Excessive sediment may also physically prevent fry from emerging from the gravel in the spring.

Reduction of major sediment sources to Beaver Creek will allow annual spring runoff flows to flush fine sediment out of the 8.5 mile segment of lower Beaver Creek, improving gravel quality and spawning and rearing habitat for anadromous and resident fishes. The improvement in habitat quality will occur over a period of years, depending on flow and gradient. While not easily quantifiable in terms of square feet or stream miles, habitat improvement associated with the Quartz and Coyote creeks projects, which will result in improved spawning and rearing conditions in an 8.5 mile segment of Beaver Creek, is sufficient to provide the remaining compensatory requirement for injuries associated with the incident.

5.2.2.6 Watershed Project Maintenance Program

The primary purpose of the Watershed Project Maintenance Program (WPMP) is to maintain riparian fence projects that have been completed as separate projects. The CTWSRO has constructed nearly 70 miles of riparian exclosure fencing and has implemented over $120,000 of solar water developments to keep livestock away from sensitive streambank areas. Projects were constructed with funding from the Pacific Coastal Salmon Recovery Fund (PCSRF), Deschutes River Conservancy, Bonneville Power Administration, and other sources.

The riparian fences were built to protect important Chinook salmon and summer steelhead spawning habitat on the Warm Springs Reservation. Many of the fences are located along Beaver Creek and the Warm Springs River. The long term objective for riparian exclosures is for establishment of deciduous woody species and the enhancement of herbaceous plants for improved streambank stability and to provide shade and cover needed by all life history stages of target salmon species spawning, rearing and migrating through the protected stream reaches. Stream sections treated include:

Deschutes River: Sanders Heath (8.8 miles river left bank), Lower Moody (9 miles river left bank), Moody (1.3 miles river left bank), In Between/Rosnagle (4 miles river left bank), Kaskela, Skookum Creek allotments (4.5 miles river left bank), Whiskey Dick to North Junction (4.0 miles river left bank);

Warm Springs River: Lower Warm Springs allotment (3 miles both banks), McKinley Arthur (1.8 miles both banks);

Beaver Creek: Dahl Pine allotment (2.5 miles both banks), Fawn Flat (2.5 miles both banks); Mill Creek: Potters Pond allotment (1.2 miles both banks); Badger Creek (1.0 miles both banks).

Many of these exclosures are located in areas where there is year round open range livestock grazing, which puts considerable pressure on the riparian fence from livestock, especially during the summer months. Noxious weeds and juniper encroachment present a problem in several areas. Also, in some areas, cutting of the fence by tribal members is a chronic problem. As such, maintenance of fences is a weekly requirement, especially during the summer season. Fence maintenance is provided using WPMP funds. Funding for WPMP has been provided through the Pacific Coast Salmon Recovery Fund (PCSRF) and the Columbia River Intertribal Fish Commission. However, this funding extended only through 2007. Any unspent settlement funds will be used to continue the fence patrol and maintenance/improvement of exclosures so that trespassing livestock do not destroy vegetation being protected.

5.2.2.6.1 Description of Environmental Effects

Environmental evaluation of activities associated with maintenance of riparian exclosures were included in the Watershed Management Program EIS (DOE/EIS-0265), prepared by the Bonneville Power Administration, and finalized in July 1997. Maintaining riparian fence projects and monitoring their effect on improvement of riparian and associated aquatic habitats will result in improved habitat and production of salmon, steelhead, and other species. No significant adverse impact is anticipated for fish or wildlife species. Overall, fish and wildlife are expected to benefit from the project but wildlife may be temporarily disturbed during maintenance activities.

5.2.2.6.2 Cumulative and Socioeconomic Impacts

No adverse cumulative impacts are anticipated from this component. Improved aquatic habitat resulting from the restoration action is expected to increase anadromous fish production in Beaver Creek, providing additional recreational and Tribal harvest opportunities. The project is located in a riparian zone and the area is identified for livestock exclusion. No impacts on grazing or timber harvest are anticipated.

5.2.2.6.3 Probability of Success

The primary purpose of the Watershed Project Maintenance Program is to maintain riparian fence projects that have been completed as separate projects. As a result of maintenance issues, these projects are not demonstrating the expected levels of effectiveness. Maintaining fence patrol and treatments for noxious weeds and juniper encroachment improve effectiveness and allow for optimal performance of these riparian protection investments.

5.3 Non-Preferred Alternatives

5.3.1 Relocation of Highway 26 Away from Beaver Creek.

The location of Highway 26 along Beaver Creek puts this stream and its aquatic resources at great risk of chemical contamination, as evidenced by the March 1999 gasoline tanker truck accident that spilled over 5,300 gallons of gasoline into Beaver Creek. This fuel spill resulted in substantial damage to the aquatic resources in Beaver Creek downstream of the spill including direct mortality of several thousand wild juvenile spring Chinook salmon and indirect mortality of several hundred thousand hatchery spring Chinook salmon. The proximity of Highway 26 to Beaver Creek also results in the input of large volumes of sediment to Beaver Creek as a result of cinder application on Highway 26 during winter months. Sediment input due to cinder application has resulted in the degradation of spring Chinook salmon and summer steelhead spawning habitat in Beaver Creek. The removal of Highway 26 from Beaver Creek and its floodplain and relocation to a more suitable site would result in greater fish habitat complexity through increased stream channel sinuosity, increased pool habitat and availability, and increased large woody debris recruitment. This increase in fish habitat would result in a greater capacity for spring Chinook salmon and summer steelhead production in Beaver Creek. It would also increase highway traffic safety, as a more suitable site could result in access to a warmer location, reducing icy winter road conditions.

The realignment of US 26 away from Beaver Creek was identified in the Warm Springs (US 26) Transportation Plan as a need that required additional analysis to identify a preferred alignment for the highway. A refinement analysis in the Draft Statewide Transportation Improvement Program 2008-2011 will provide more specificity around the future re-alignment of US 26 than was provided in the local Transportation Plan. The refinement plan will provide an estimate of the timing and cost of the improvements. It is expected that the recommended transportation improvements will be funded through a partnership with the Confederated Tribes of Warm Springs and the settlement funds could be used to offset this cost. The Trustees did not select this alternative because 1) it is unclear where the proposed highway realignment would be located and, consequently, what length of Beaver Creek would be affected; and 2) planning, which will identify the location of the realignment and costs, is proposed for completion in the 2008-2011 time frame, making the timing of implementation uncertain.

5.3.2 Removal of Old Settling Ponds at the Water Treatment Plant Near the Mouth of Shitike Creek

Shitike Creek originates in Harvey Lake near Mt. Jefferson, and flows 34 miles through the Warm Springs Indian Reservation, before entering the Deschutes River at river mile 96.8 (the

Warm Springs River enters the Deschutes River at RM 84.4). At this location, two settling ponds were constructed in association with a water treatment plant. Removal of the settling ponds would increase flood plain access, increase stabilization / proper function of the system, and remove the risk of bank failure, which is already occurring. The settled material would have to be removed from the ponds before the ponds and walls could be removed; then, a restored floodplain would be created with proper elevations and channel dimensions. Species benefiting would be the same as those in Beaver Creek (spring Chinook, summer steelhead, bull trout). Total stream length affected would be about 500 to 1000 ft. Removal of the two settling ponds would allow about 2 acres of flood plain restoration. Additional engineering would likely be required to protect the remaining wastewater treatment facility immediately downstream of the proposed restoration site. This is estimated to be a costly alternative; the settlement dollars could be used to match Federal Emergency management flood damage or Natural Resource Conservation Service Wildlife Habitat Incentives Program funds. Costs of this alternative would likely require the entire settlement amount, although the dollars could be used to match dollars from other sources. The Trustees did not select this alternative because: 1) it was not considered cost-efficient, i.e. the amount of restoration accomplished is small relative to the cost requirements; 2) this alternative does not focus on restoring resources in the Beaver Creek/Warm Springs River drainages, where the impacts occurred; and 3) similar, more cost-effective alternatives are available in the Beaver Creek drainage.

5.3.3 Warm Springs National Fish Hatchery Upgrades

The Trustees considered improvements to the hatchery infrastructure to increase rearing efficiency/capacity and provide additional Chinook salmon smolts for release into the system. Warm Springs National Fish Hatchery (NFH) is located at river mile 10 of the Warm Springs River, within the Warm Springs Indian Reservation. The hatchery currently maintains one program: Warm Springs River spring Chinook. Rearing of summer steelhead at Warm Springs NFH was attempted previously but discontinued due to unsuitability of the hatchery water supply for this purpose. The hatchery management objectives are to support tribal and non-tribal fisheries in the Warm Springs and Deschutes rivers and return as many harvestable adults as possible. This is done consistent with production objectives and escapement goals for natural-origin adults, once wild escapement is achieved. The emphasis in the Deschutes River basin is on increasing natural production. Warm Springs NFH is fully funded by the U.S Fish and Wildlife Service. The current production level at Warm Springs NFH is meeting management goals for this stock. Increases in the size of the present hatchery program would pose risks to the current integrated broodstock strategy and are not recommended. For this reason, and the Trustees' decision to focus on restoration of wild Chinook salmon, this alternative was not selected.

6.0 Coordination with Other Programs, Plans and Regulatory Authorities

6.1 Overview

Two major federal laws guiding the restoration of the injured resources and services are the Oil Pollution Act (OPA) and the National Environmental Policy Act (NEPA). OPA and its regulations provide the basic framework for natural resource damage assessment and restoration. NEPA sets forth a specific process of impact analysis and public review. In addition, the Trustees must comply with other applicable laws, regulations, and policies at the federal, state, tribal, and local levels. The potentially relevant laws, regulations, and policies are set forth below.

In addition to laws and regulations, the Trustees must consider relevant environmental or economic programs or plans that are ongoing or planned in or the near the affected environment. Streams on the Warm Springs Reservation, including those in the Beaver Creek drainage, have been the focus of restoration actions implemented by the CTWSRO, through programs funded by the Bonneville Power Administration, Environmental Protection Agency, etc. The Trustees propose to work with the sponsors of the ongoing restoration projects to ensure that proposed restoration activities for the incident neither impede nor duplicate such programs or plans. By coordinating restoration with other relevant programs and plans, the Trustees can enhance the overall effort to improve the environment of the creek.

6.2 Key Statutes, Regulations and Policies

There are a number of federal, state, and tribal statutes, regulations, and policies that govern or are relevant to damage assessment and restoration.

Oil Pollution Act of 1990, 33 U.S.C. §§ 2701, et seq.; 15 CFR Part 990
The Oil Pollution Act (OPA) establishes a liability regime for oil spills that injure or are likely to injure natural resources and/or the services that those resources provide to the ecosystem or humans. Federal and state agencies and Indian Tribes act as Trustees on behalf of the public to assess the injuries, scale restoration to compensate for those injuries, and implement restoration. Section 1006(e)(1) of OPA (33 U.S.C § 2706 (e)(1)) requires the President, acting through the Under Secretary of Commerce for Oceans and Atmosphere (NOAA Administrator), to promulgate regulations for the assessment of natural resource damages resulting from a discharge or substantial threat of a discharge of oil. Assessments are intended to provide the basis for restoring, replacing, rehabilitating, and acquiring the equivalent of injured natural resources and services.

National Environmental Policy Act, as amended 42 U.S.C. §§ 4321, et seq., 40 CFR Parts 1500-1508
Congress enacted the National Environmental Policy Act (NEPA) in 1969 to establish a national policy for the protection of the environment. NEPA applies to federal agency actions that affect the quality of the human environment. NEPA established the Council on Environmental Quality (CEQ) to advise the President and to carry out certain other responsibilities relating to implementation of NEPA by federal agencies. Pursuant to Presidential Executive Order, federal agencies are obligated to comply with the NEPA regulations adopted by the CEQ. These regulations outline the responsibilities of federal agencies under NEPA and provide specific procedures for preparing environmental documentation to comply with NEPA. NEPA requires that an Environmental Assessment (EA) be prepared in order to determine whether the proposed restoration actions will have a significant effect on the quality of the human environment.

Generally, when it is uncertain whether an action will have a significant effect, federal agencies will begin the NEPA planning process by preparing an EA. The EA may undergo a public review and comment period. Federal agencies may then review the comments and make a determination. Depending on whether an impact is considered significant, an Environmental Impact Statement (EIS) or a Finding of No Significant Impact (FONSI) will be issued.

The Trustees have integrated this RP/EA with the NEPA process to comply with those requirements. The integrated process allows the Trustees to meet the public involvement requirements of OPA and NEPA concurrently. This RP/EA is intended to accomplish NEPA compliance by:

- Summarizing the current environmental setting;
- Describing the purpose and need for restoration action;
- Identifying alternate actions;
- Assessing the preferred actions' environmental consequences, and;
- Summarizing opportunities for public participation in the decision process.

The Trustees anticipate that this RP/EA will meet the required NEPA compliance requirements for the proposed restoration projects described herein.

Clean Water Act (Federal Water Pollution Control Act), 33 U.S.C. §§ 1251, *et seq*.
The Clean Water Act (CWA) is the principal law governing pollution control and water quality of the nation's waterways. Section 404 of the law authorizes a permit program for the disposal of dredged or fill material into navigable waters. The U.S. Army Corps of Engineers administers the program. In general, restoration projects that move significant amounts of material into or out of wetlands (e.g. hydrologic restoration of marshes) require Section 404 permits. Under Section 401 of CWA, restoration projects that involve discharge or fill into wetlands or navigable waters must obtain certification of compliance with state water quality standards. Generally, wetland projects with minor wetland impacts (i.e. a project covered by a U.S. Army Corps of Engineers general permit) do not require Section 401 certification, while projects with potentially large or cumulative impacts do. The proposed restoration projects focus primarily on upland/floodplain actions involving livestock exclusion fencing, riparian vegetation planting, and road obliteration. Streamside actions involve removal of gabions, earthen dams, and culverts; bank protection with biodegradable, geo-textile erosion cloth; and placement of large woody debris. The Trustees anticipate that many of the proposed restoration actions will be covered under Nationwide Permit 27 (Wetland and Riparian Restoration and Creation Activities) and will not need individual Section 404 Permits.

Magnuson-Stevens Fishery Conservation and Management Act, 16 U.S.C. §§ 1801, *et seq*., 50 CFR Part 600
In 1996, the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) was reauthorized and changed by amendments to emphasize a new standard by requiring that fisheries be managed at maximum sustainable levels and that new approaches be taken in habitat conservation. This habitat is called essential fish habitat (EFH), defined broadly to include "those waters and substrate necessary for fish for spawning, breeding, feeding, or growth to maturity" (62 Fed. Reg. 66551, § 600.10 Definitions). MSFCMA requires consultation for all federal agency actions that may adversely affect essential fish habitat. Under Section 305(b)(4) of the Act, the NOAA Fisheries Service is required to provide advisory essential fish habitat conservation and enhancement recommendations to federal and state agencies for actions that adversely affect essential fish habitat. These essential fish habitat consultations will be combined with existing interagency consultations and environmental review procedures that may be required under other statutes. In the situation where federal agency actions are subject to the Endangered Species Act Section 7 consultations, such consultations will be combined to accommodate the substantive requirements of both the Endangered Species Act and essential fish habitat. The Trustees will consult with NOAA Fisheries prior to implementation any restoration project occurring in an area covered by the Pacific Fishery Management Council.

Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. §§ 9601, *et seq.*
The Comprehensive Environmental Response, Compensation and Liability Act (CERLCA) provides the basic legal framework for cleanup and restoration of the nation's hazardous substances sites. Generally, parties responsible for contamination of sites and the current owners or operators of contaminated sites are liable for the cost of cleanup and restoration. CERCLA establishes a hazard ranking system for assessing the nation's contaminated sites with the most contaminated sites being placed on the National Priorities List (NPL). To the extent that restoration projects are proposed for areas containing hazardous substances, the Trustees will avoid exacerbating any potential risk posed by such hazardous substances and will undertake no actions that might constitute "arrangement for disposal of hazardous substances". At this time, the Trustees are not aware of any potential hazardous substance problems associated with the areas where proposed restoration projects will occur.

Endangered Species Act, 16 U.S.C. §§ 1531, *et seq*., 50 CFR Parts 17, 222, 224
The Endangered Species Act (ESA) directs all federal agencies to conserve endangered and threatened species and their habitats and encourages such agencies to utilize their authority to further these purposes. Under ESA, NOAA, through the National Marine Fisheries Service, and the Department of the Interior, through the USFWS, publish lists of endangered and threatened species. Section 7 of the Act requires that federal agencies consult with these agencies to minimize the effects of federal actions on endangered and threatened species. The Trustees have determined that all of the preferred alternatives will benefit some threatened species, notably Middle Columbia Basin steelhead and bull trout. Projects that require significant construction activity may disturb threatened species, although the management conditions typically set forth a number of operating measures designed to prevent or mitigate any such disturbances. Section 7 consultations will be conducted as part of the process.

Fish and Wildlife Coordination Act, 16 U.S.C. §§ 661, *et seq.*
The Fish and Wildlife Coordination Act (FWCA) requires that federal agencies consult with the USFWS, NOAA Fisheries, and state wildlife agencies for activities that affect, control, or modify waters of any stream or bodies of water, in order to minimize the adverse impacts of such actions on fish and wildlife resources and habitat. This consultation is generally incorporated into the process of complying with Section 404 of CWA, NEPA, or other federal permit, license, or review requirements.

In the case of restoration actions for this incident, the fact that two of the three consulting agencies (NOAA and USFWS) are represented by the Trustees means that FWCA compliance will be inherent in the Trustee decision-making process.

Executive Order 12898: Environmental Justice, as amended
On February 11, 1994, President Clinton issued Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. This Executive Order requires each federal agency to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations. The Environmental Protection Agency and the Council on Environmental Quality have emphasized the importance of incorporating environmental justice review in the analysis conducted by federal agencies under NEPA and of developing mitigation measures that avoid disproportionate environmental effects on minority and low-income populations.

The CTWSRO constitutes a distinct, separate community of Native Americans who rely on Treaty-reserved fish and wildlife resources for subsistence, economic, and spiritual purposes. The Trustees have not identified any disproportionate adverse impacts on human health or environmental effects on implementation of the preferred alternatives on Native Americans and believe that these projects will be beneficial to this community. The CTWSRO are Trustees for this incident and their representation will be inherent in the Trustee decision-making process.

Executive Order 11988: Construction in Floodplains
This 1977 Executive Order directs federal agencies to avoid to the extent possible the long- and short-term adverse effects associated with the occupancy and modification of floodplains, and to avoid direct or indirect support of development in floodplains wherever there is a practicable alternative. Each agency is responsible for evaluating the potential effects of any action it may take in a floodplain.

Before taking an action, the federal agency must determine whether the proposed action will occur in a floodplain. For major federal actions significantly affecting the quality of the human environment, the evaluation will be included in the agency's NEPA compliance document(s). The agency must consider alternatives to avoid adverse effects and incompatible development in floodplains. Several of the proposed restoration alternatives will occur in floodplains but their effect will be to re-connect the stream-floodplain system and enhance the ecological functioning of the floodplain. No adverse effects are anticipated.

6.3 Wy-Kan-Ush-Mi Wa-Kish-Wit (Tribal Salmon Restoration Plan)

In addition to potentially applicable federal, state, and local laws and regulations, the Trustees have also considered Tribal policies, priorities, and guiding principles. Wy-Kan-Ush-Mi Wa-Kish-Wit: The Columbia River Anadromous Fish Restoration Plan of the Nez Perce, Umatilla, Warm Springs and Yakama Tribes provides a framework to restore the Columbia River salmon. Essential goals are:

• Restore anadromous fishes to the rivers and streams that support the historical cultural and economic practices of the Tribes. (These are generally areas above Bonneville Dam.)

• Emphasize strategies that rely on natural production and healthy river systems to achieve this goal.

• Protect tribal sovereignty and treaty rights.

• Reclaim the anadromous fish resource and the environment on which it depends for future generations.

Specific recommendations in the framework for the Deschutes River subbasin that are applicable to the preferred restoration alternatives are:

> Maximize the protection and enhancement of aquatic and riparian habitat on all lands bordering the Deschutes River and its tributaries to result in a net increase in habitat quality and quantity over time.
>
> Maintain or improve watershed conditions for the sustained, long-term production of fisheries and high quality water.
>
> Summer Steelhead – enhance natural production in Trout, Shitike, Bakeoven, and Buckhollow creeks, and the Warm Springs River.
>
> Begin improving in-channel stream conditions for anadromous fish by improving or eliminating land-use practices that degrade watershed quality.
>
> Restore riparian vegetation and re-create wetlands.
>
> Actively restore watersheds where salmon populations are in imminent danger of extirpation.

The restoration alternatives proposed in this plan were developed with the input of representatives of the CTWSRO, and reflect the guidance provided in Wy-Kan-Ush-Mi Wa-Kish-Wit.

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8.0 Figures and Photographs

Figure 1: Map of Beaver Creek System

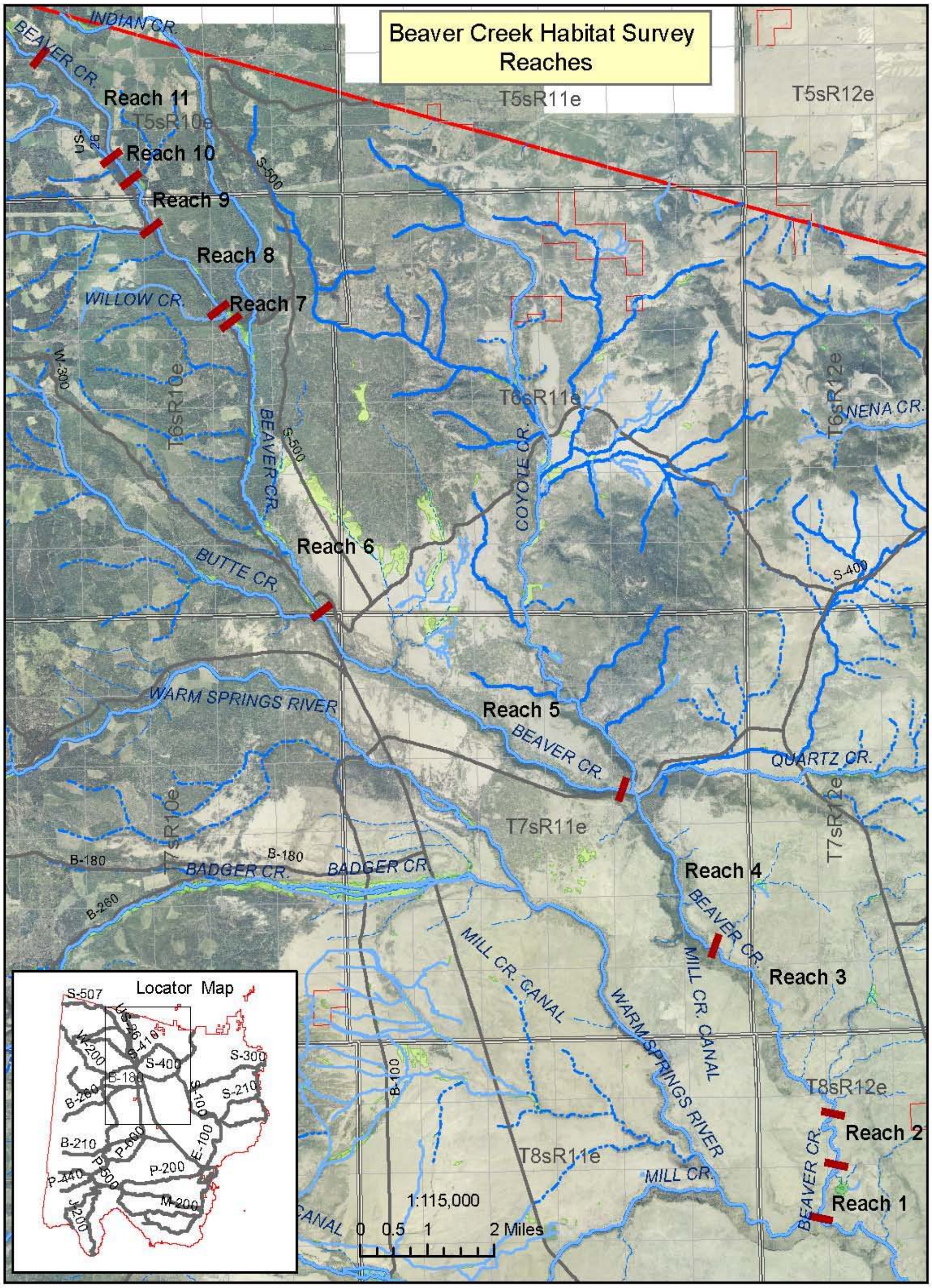


Figure 2. Lower Beaver Creek Riparian Enhancement Project Map

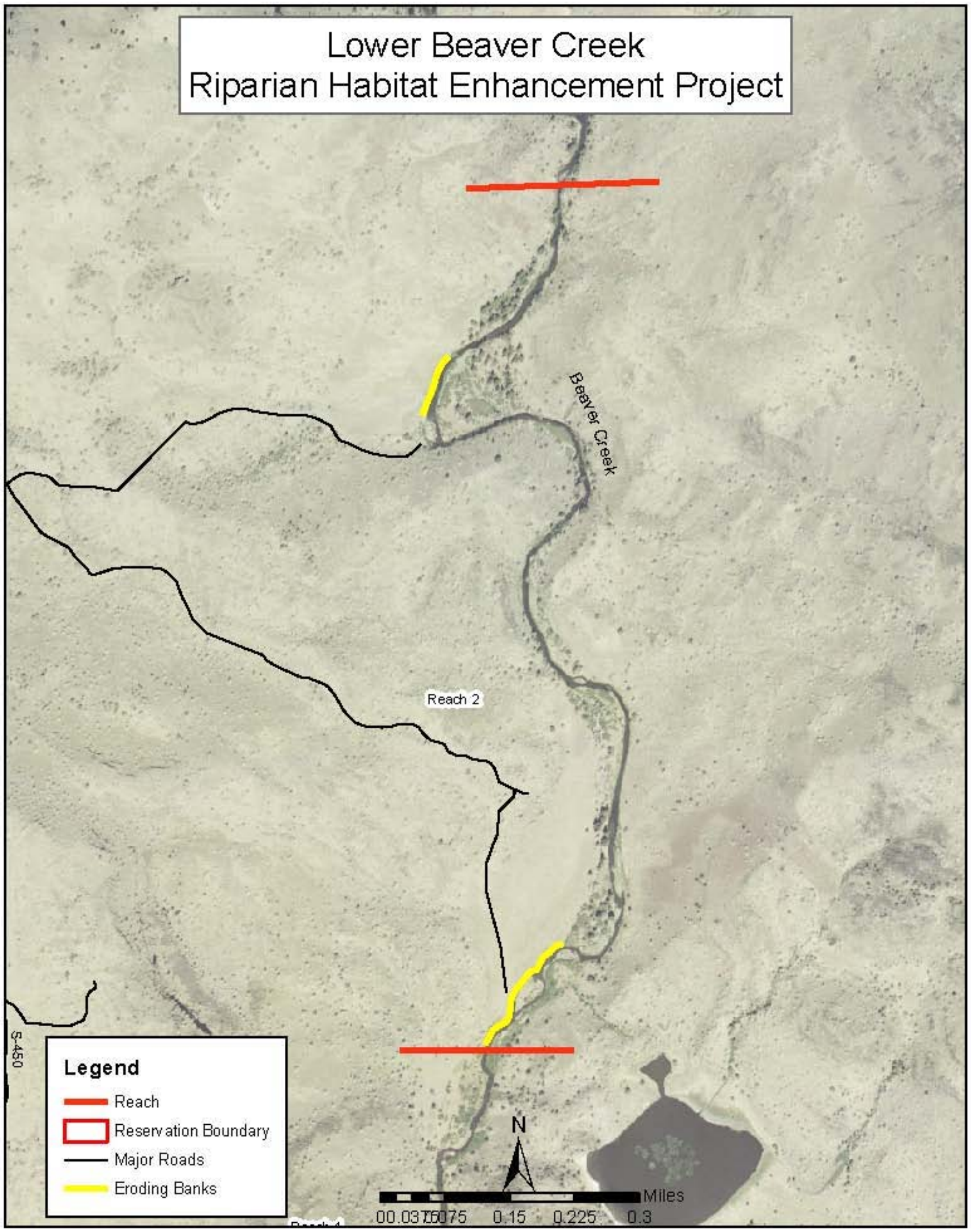


Figure 3. Beaver Creek (Robinson Park) Floodplain/Riparian Habitat Restoration Project Map

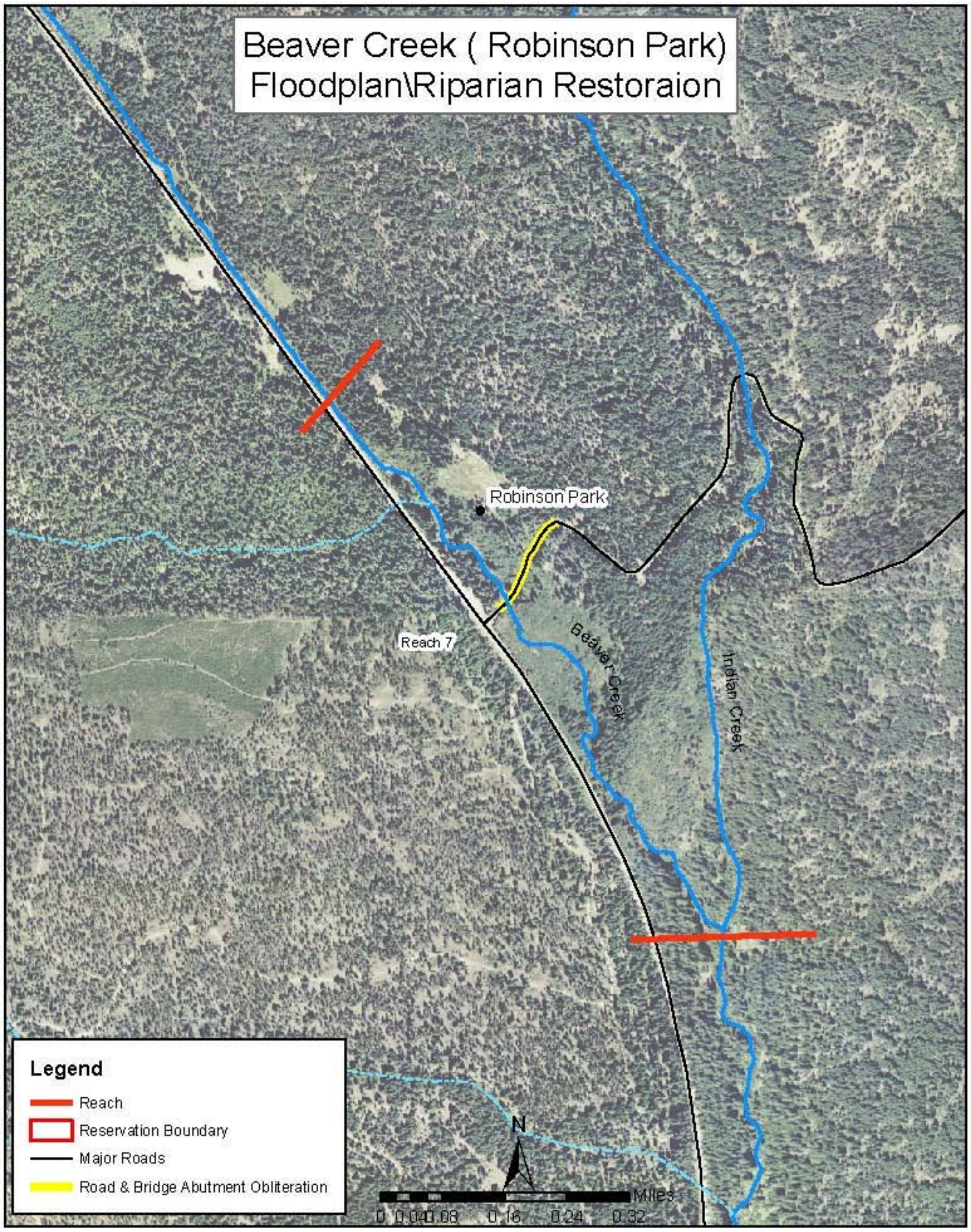


Figure 4. Quartz Creek Riparian Habitat Restoration and Sediment Reduction Project Map

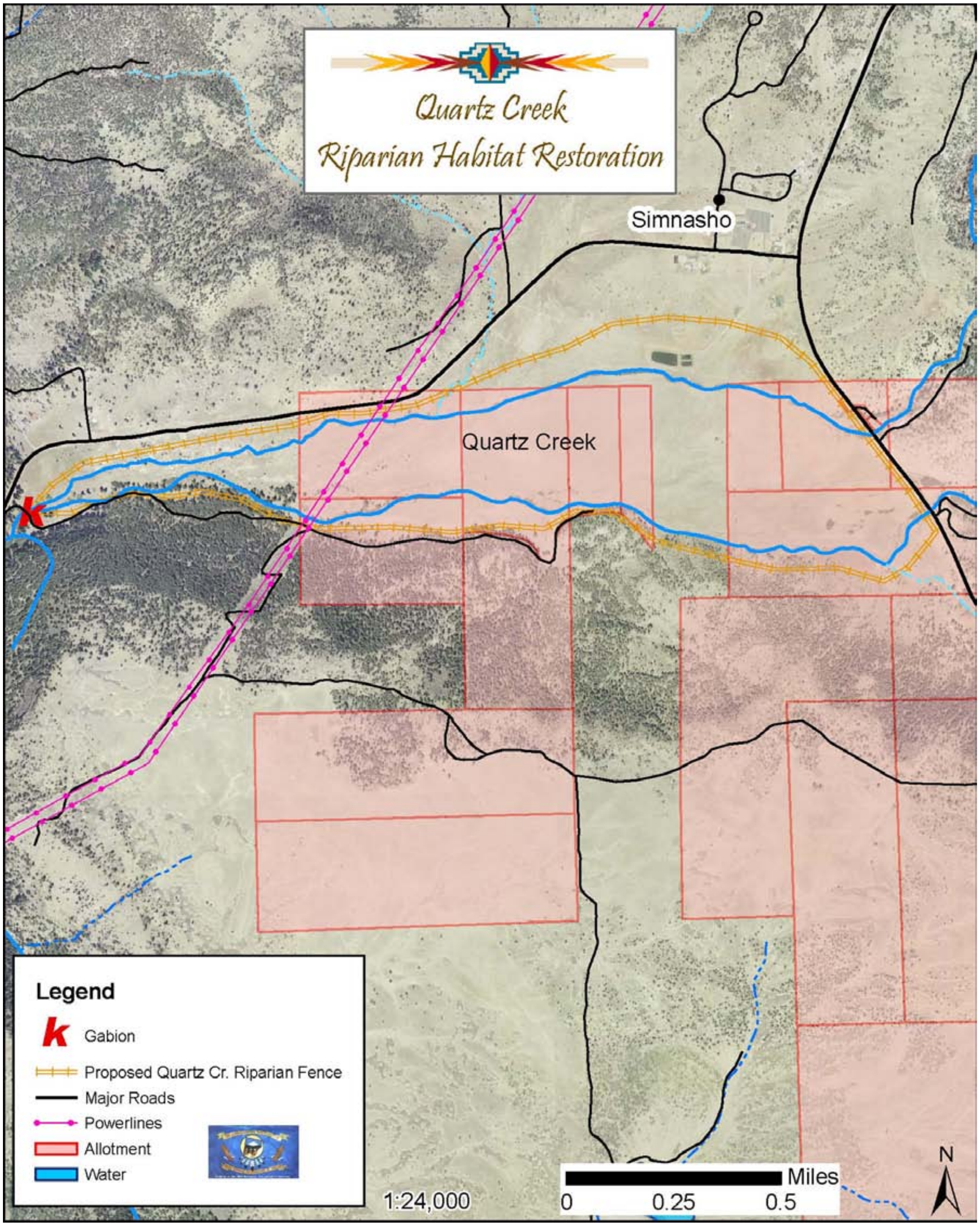


Figure 5. Coyote Creek Riparian Habitat Restoration and Sediment Reduction Project Map

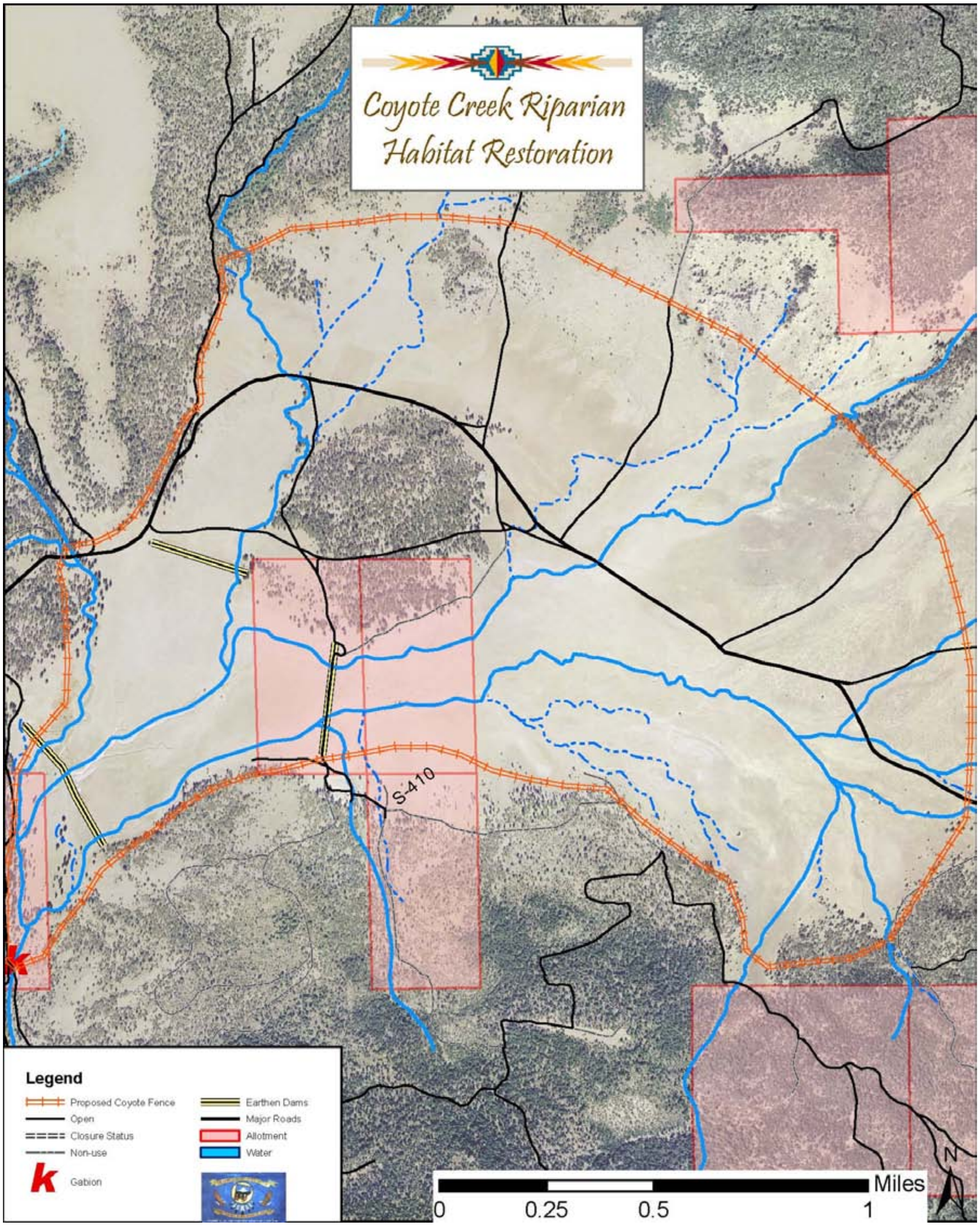
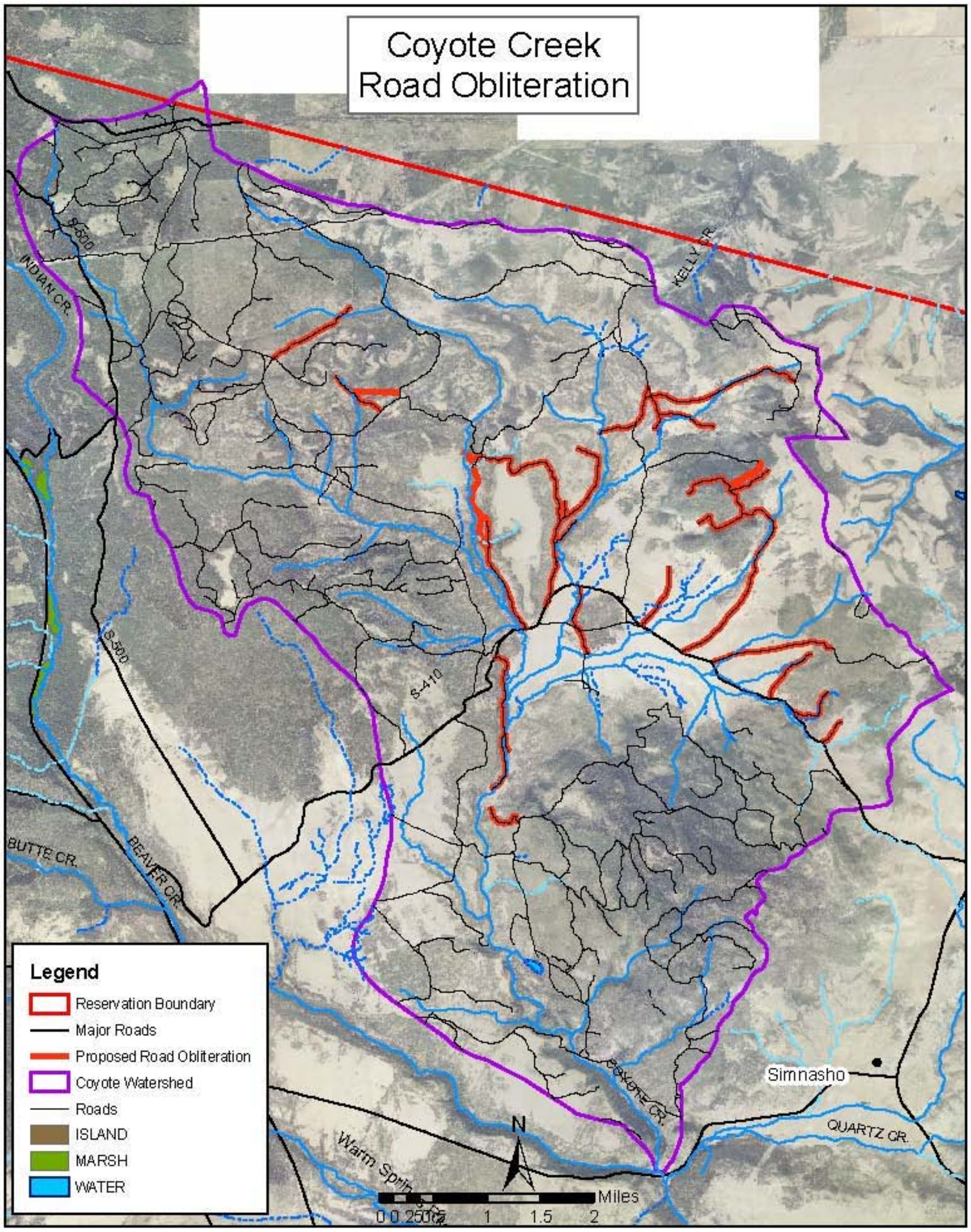


Figure 6. Coyote Creek Watershed Road Obliteration Map



Finding of No Significant Impact for the Damage Assessment and Restoration Plan/Environmental Assessment for the Beaver Creek Gasoline Spill

National Marine Fisheries Service

National Oceanic and Atmospheric Administration Administrative Order 216-6 (May 20, 1999) contains criteria for determining the significance of the impacts of a proposed action. In addition, the Council on Environmental Quality regulations at 40 C.F.R. 1508.27 state that the significance of an action should be analyzed both in terms of 'context' and 'intensity.' Each criterion listed below is relevant to making a finding of no significant impact and has been considered individually, as well as in combination with the others. The significance of this action is analyzed based on the NAO 216-6 criteria and CEQ's context and intensity criteria. These include:

1) Can the proposed action reasonably be expected to cause substantial damage to the ocean and coastal habitats and/or essential fish habitat as defined under the Magnuson-Stevens Act and identified in FMPs?

Response: No. NMFS has determined that although there may be temporary localized adverse impacts during the construction of the projects under this plan (such as increased turbidity), any such adverse impacts will be minimized through the use of best management practices (BMPs). Further, the preferred alternative is expected to lead to improved function of anadromous fish riverine habitat. Therefore, the proposed action is not expected to negatively impact ESA-listed species or their habitats, or cause damage to the ocean and coastal habitats and/or essential fish habitat as defined under the Magnuson-Stevens Act and identified in Fisheries Management Plans (FMPs).

2) Can the proposed action be expected to have a substantial impact on biodiversity and/or ecosystem function within the affected area (e.g., benthic productivity, predator-prey relationships, etc.)?

Response: No. Projects under this action will not have a substantial impact on biodiversity or ecosystem function within the affected area, but the net effect will be incrementally beneficial to ecosystem function and biodiversity in the area over time. Projects under the preferred alternative will restore lost or degraded riverine habitat in the Warm Springs watershed in order to restore biological productivity and to return lost function.

3) Can the proposed action reasonably be expected to have a substantial adverse impact on public health or safety?

Response: No. In the EA NMFS analyzed potential adverse impacts to or changes in air quality, noise, water quality, environmental justice, energy, recreation, and traffic patterns when evaluating the potential impacts to public health and safety. Based on the proposed location of the projects, and the equipment and techniques anticipated to be employed, NMFS believes there will be no adverse impacts to public health and safety from the proposed actions.

4) Can the proposed action reasonably be expected to adversely affect endangered or threatened species, their critical habitat, marine mammals, or other non-target species?

Response: No. NMFS has determined that the projects implemented under this plan are not likely to adversely affect ESA-listed species or adversely modify their critical habitat, or adversely affect marine mammals or non-target species. Construction, which will occur over a limited time period, will occur within appropriate fish life history windows to minimize potential adverse impacts and all appropriate precautions will be taken to avoid adverse impacts. In the long term, these projects will benefit ESA-listed and other species by increasing the quality of critical habitat.

5) Are there significant social or economic impacts interrelated with natural or physical environmental effects?

Response: No. There will be no adverse social impacts and no adverse impacts to any commercial activities from these projects, however, there will be minor temporary social and economic benefits from the local spending during construction.

6) Are the effects on the quality of the human environment likely to be highly controversial?

Response: No. NMFS has determined that the action will have no substantial adverse effects on the quality of the human environment and thus the proposed action is not likely to generate any public controversy. The proposed projects are located entirely within the Warm Springs Reservation of Oregon; the Confederated Tribes of Warm Springs are a co-Trustee with NOAA and took the lead in developing restoration options. No comments were received during the 30-day public comment period on the draft Restoration Plan/Environmental Assessment.

7) Can the proposed action reasonably be expected to result in substantial impacts to unique areas, such as historic or cultural resources, park land, prime farmlands, wetlands, wild and scenic rivers, essential fish habitat, or ecologically critical areas?

Response: No. There are no unique or rare areas or resources that will be affected. There are no listed or potentially eligible national historic sites, or other significant cultural resources located in the area of potential effect of the action. Therefore, NMFS believes the action will have no substantial adverse effect on any of these resources. As the Confederated Tribes of Warm Springs is a co-Trustee, the Tribes' integrated resource management plan, which includes designation of areas of known cultural significance, was compared with the Restoration Plan to ensure that no sensitive areas would be impacted. As project implementer, the Tribes may take additional, site-specific actions to ensure protection of cultural resources as they deem necessary.

8) Are the effects on the human environment likely to be highly uncertain or involve unique or unknown risks?

Response: No. The preferred action is unlikely to have uncertain effects or involve unique or unknown risks to the human environment associated with its immediate construction or in the long-term. The restoration techniques to be employed are standard, proven, accepted approaches with few uncertainties involved in implementation or outcome.

9) Is the proposed action related to other actions with individually insignificant, but cumulatively significant impacts?

Response: No. There are no other actions within the area of the proposed projects that are directly related to this action. The proposed action is consistent with NOAA's public trust management mandate and it will help restore ecosystem function that will provide long-term benefits to both terrestrial and aquatic organisms.

10) Is the proposed action likely to adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural or historical resources?

Response: None of the project locations have anything listed or eligible to be listed on the National Register of Historic Places, and there are no known historic, cultural, or scientific resources that would be lost as a result of this action. The proposed projects are all located on the Warm Springs Reservation, so requirements to consult with the State Historic Preservation Officer do not apply. The Tribe, as lead implementer, has evaluated the sites and determined that the activities will not adversely affect cultural or historic resources of interest to them.

11) Can the proposed action reasonably be expected to result in the introduction or spread of a non-indigenous species?

Response: No. Eradication and replacement of invasive, non-native species is an element of the preferred restoration alternative. Only native species will be planted as part of the proposed restoration activities and there would be no potential to introduce or spread non-indigenous species.

12) Is the proposed action likely to establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration?

Response: No, this action is not likely to establish any precedents for future actions with significant effects. The proposed action is similar to other past and current restoration actions, and any future similar action with potential significant effects would require additional environmental compliance prior to implementation.

13) Can the proposed action reasonably be expected to threaten a violation of Federal, State, or local law or requirements imposed for the protection of the environment?

Response: No. All Federal, State, and local environmental compliance requirements have been met or addressed as part of the DARP and NEPA processes, therefore the proposed action will be implemented in full compliance with all legal requirements.

14) Can the proposed action reasonably be expected to result in cumulative adverse effects that could have a substantial effect on the target species or non-target species?

Response: No. The proposed action will not result in a substantial cumulative adverse effect on any species. A long-term minor to moderate beneficial effect to listed and non-listed species that inhabit the project area is expected; however, the primary goal of the proposed action is to compensate for injured natural resources or services lost due to the release of hazardous substances and, as such, the net effects are incrementally beneficial.

DETERMINATION

In view of the information presented in this document and the analysis contained in the supporting Restoration Plan/Environmental Assessment for the Beaver Creek Gasoline Spill Project, it is hereby determined that the Selected Restoration Alternative (Beaver Creek Restoration Plan) identified for implementation will not significantly impact the quality of the human environment as described above and in the Environmental Assessment. In addition, all beneficial and adverse impacts of the proposed action have been addressed to reach the conclusion of no significant impacts. Accordingly, preparation of an Environmental Impact Statement for this action is not necessary.

for

Brian T. Pawlak
Acting Director, Office of Habitat Conservation
NOAA National Marine Fisheries Service

3/14/12
Date