

4.0 RESTORATION PLANNING

4.0 Restoration Planning

Restoration of the affected resources in the Whatcom Creek watershed requires an approach that focuses on several interconnected resources, including water quality, fish and wildlife habitat, living resources, and recreational resources. The Trustees have evaluated potential restoration options that will restore the affected natural resources to pre-Incident or baseline levels and compensate for interim losses.

In developing this final RP/EA, the Trustees have taken into consideration the restoration concepts proposed by the Company as well as proposals submitted by each of the Trustees. The Trustees have also taken into consideration the activities that were conducted or are ongoing as part of the response operations. These include emergency restoration actions already taken to address injuries to Whatcom and Hanna creeks and riparian habitats.

The Oil Pollution Act and NEPA regulations require that the Trustees state their preferred alternative(s) and explain the basis for their selection or rejection of other alternatives. These Trustee determinations may be modified based on public input and comment.

4.1 Restoration Strategy

The goal of the NRDA process is restoration of the injured natural resources and compensation for the interim lost uses of those resources. The Oil Pollution Act requires that this goal be achieved by returning injured natural resources to their pre-Incident condition, and by compensating for any interim losses of natural resources and services during the period of recovery to baseline.

Restoration actions under the Oil Pollution Act regulations are either primary or compensatory. Primary restoration is action(s) taken to return the injured natural resources and services to baseline on an accelerated time frame by directly replacing the resource or service. As one form of primary restoration, the Oil Pollution Act regulations require that Trustees consider natural recovery of the resource. Trustees may select natural recovery under three conditions: 1) if feasible; 2) if cost-effective primary restoration is not available; or 3) if injured resources will recover quickly to baseline without human intervention. Primary restoration alternatives can range from natural recovery, to actions that prevent interference with natural recovery, to more intensive actions expected to return injured natural resources and services to baseline faster or with greater certainty than natural recovery alone. For example, rather than rely on dispersion of seeds and natural succession of plant species after the fire, the Company planted conifer seedlings in the burn zone. These actions should return the forest canopy to pre-Incident condition faster than natural recovery.

Compensatory restoration includes actions taken to compensate for the interim losses of natural resources and/or services pending recovery. In the tree-planting example above, the primary restoration of planting trees will accelerate the rate of recovery, but the forest canopy will still

take decades to mature. During the time frame necessary for the forest to recover, ecological functions and human uses will be reduced. Compensatory restoration is designed to make up for the interim loss of services. The type and scale of compensatory restoration depends on the nature of the primary restoration action and the level and rate of recovery of the injured natural resources and/or services, given the primary restoration action. When identifying compensatory restoration alternatives, Trustees must first consider actions that provide services of the same type and quality and that are of comparable value as those lost. If a reasonable range of compensatory actions of the same type and quality and comparable value cannot be found, Trustees then consider other compensatory restoration actions that will provide services of at least comparable type and quality as those lost.

Compensatory restoration alternatives must be scaled to ensure that the size or quantity of the proposed project reflects the magnitude of the injuries from the spill. The Trustees selected different scaling approaches for the lost ecological and human uses, which are explained with the restoration alternatives in Section 5.

Because the Trustees are in the preliminary stages of restoration planning, several of the restoration alternatives included in Section 5 are based on conceptual designs rather than detailed engineering design work or operational plans. Therefore, details of specific projects may require additional refinements or adjustments to reflect site conditions or other factors. The Trustees assume that implementation of restoration will begin in 2002. Should actual implementation occur after this period, the Trustees may revise their calculations of losses and scale of appropriate restoration.

4.2 Evaluation Criteria

Oil Pollution Act 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:

- 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 and/or service; and
- Effect of each alternative on public health and safety.

In addition, the Trustees considered several other factors including:

- Nexus to geographic location of the injuries; and
- Compliance with applicable federal and state laws and policies.

The NEPA applies to restoration actions taken by Federal Trustees. To reduce transaction costs and avoid delays in restoration, the Oil Pollution Act regulations encourage the Trustees to conduct the NEPA process concurrently with the development of the final 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 final RP/EA, the appropriate context for considering potential significance of the action is local, as opposed to national or worldwide.²³

With respect to evaluating the intensity of the impacts of the proposed action, the 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. Precedential 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.

4.3 Summary of the Restoration Alternatives

The Trustees evaluated a range of primary and compensatory restoration alternatives intended to enhance the recovery of the Whatcom Creek watershed and/or to provide additional resource

²³ While the Incident generated broad national interest and concern, the restoration actions are expected to have only local benefits.

services to compensate the public for losses pending natural recovery. The Trustees developed some of the restoration concepts and the Company proposed other projects. In evaluating these preliminary alternatives, the Trustees have also taken into consideration the activities that were conducted as part of response operations and the potential for natural recovery. These actions include restoration projects already implemented by the Company to address injuries to stream sediments, enhance spawning habitats, control erosion, remove invasive vegetation, and restore riparian vegetation (AR #1, 15).

Although the Incident resulted in substantial impacts to the resources in the Whatcom Creek watershed, the Trustees believe that the prompt actions taken to respond to and remediate the Incident will allow these resources to recover over time. In some instances, natural recovery will be preferable to return resources to their pre-Incident condition. This recovery, depending on the injury category, may take years to occur, however. Therefore, many of the restoration alternatives evaluated in this document are focused on compensating for the interim losses resulting from the Incident.

As mentioned above, the Trustees focused on restoration projects that addressed the five categories of injury and loss: 1) Vegetation; 2) Water Quality; 3) Fisheries; 4) Wildlife; and 5) Human Uses. A total of thirty-six restoration alternatives (including many alternatives that were implemented as emergency projects) were considered.

These alternatives are summarized below in Tables 1, 2, and 3. The Trustees' evaluation of the alternatives is discussed in detail in Section 5.

| Table 1: Summary of the Preferred Restoration Alternatives | | |
|---|---|---|
| Preferred Alternative | Proposed Action | Project Description |
| No Action/Natural recovery (Section 5.1) | No Action | Allow natural recovery to occur to compensate for all and/or specific lost resources and/or services. This alternative is proposed as part of some preferred alternatives. |
| Land Acquisition and Park Enhancements (Section 5.2.1) | Acquire Park Land | Acquire lands to compensate for loss of human uses and loss of riparian and wildlife habitat. |
| | On-site Land Acquisition | Acquire riparian lands in Whatcom Creek watershed to prevent future development and promote ecological and recreational uses to compensate for losses to anadromous and resident fish, loss of riparian and wildlife habitat, and loss of human uses. |
| | Entrance Road, Rest-room & Parking Facility | Build access road, restroom facility and parking lot on acquired parklands to compensate for loss of human uses. |
| Fish Habitat Projects (Section 5.2.2) | Cemetery Creek Restoration | Develop off-channel spawning, rearing, over-wintering habitat and summer cool-water refugia to compensate for losses of anadromous and resident fish. |
| | Salmon Park | Develop off-channel spawning, rearing and over-wintering habitat by excavation and reconnection of historic meander to compensate for losses to anadromous and resident fish and loss of human uses. |
| Soil Stabilization and Revegetation Actions²⁴ (Section 5.2.3) | Control Vegetation | Remove invasive plants such as Himalayan blackberry that degrade habitats along Whatcom Creek to compensate for loss of riparian and wildlife habitat. |
| | Planting Native Vegetation | Promote native plant communities through planting and enhancement of native tree seedlings and other native species to compensate for loss of riparian and wildlife habitat and loss of human uses. |
| | Erosion Control | Implement erosion control measures to minimize sedimentation of Whatcom Creek to compensate loss of habitat in the Creek and loss of riparian and wildlife habitat. |
| | Invasive Plant Mapping and Guide to Control | Identify problem areas and develop treatment plans where invasive plants degrade portions of the Whatcom Falls Park and Whatcom Creek outside of the impacted area to compensate for loss of riparian and wildlife habitat. |
| Long-Term Monitoring and Maintenance (Section 5.2.4) | Management Account | Establish an account that will allow the City Parks Department to manage the impacted resources (<i>i.e.</i> , remove hazard, dead or diseased trees, manage in-stream structures, maintain plantings, etc.) in the future to compensate for loss of human uses. |
| | Monitoring of the Creek Recovery | Implement monitoring plan for injured resources and emergency restoration projects, including plants, in-stream structures, invertebrates, anadromous and resident fish to compensate for all lost resources and/or services. |

²⁴ Certain actions were started under emergency restoration.

Table 2: Summary of the Non-Preferred Restoration Alternatives (Section 5.3)

| Alternative | Project Description |
|--|--|
| No Action | Allow natural recovery to occur to compensate for all and/or specific lost resources and/or services. |
| Interpretive Center | Create an interpretive center describing the recovery of Whatcom Creek and the impact of human activities on the health of the Creek to compensate for loss of human uses. |
| Carcass Planting | Increase the nutrient base of Whatcom Creek by adding spawned-out salmon carcasses to compensate for losses to anadromous and resident fish. |
| Additional Channel Habitat Modifications | Construct in-stream modifications (in addition to those constructed during emergency restoration) to Whatcom Creek, including gravel bars, pools, additional woody debris |
| Additional Debris Removal | Remove garbage and debris from Whatcom Creek (in addition to actions taken during response and emergency restoration) to benefit habitat and aesthetic values |
| Fish Passage | Create increased upstream passage for anadromous salmonids at Middle Falls, thereby increasing available spawning habitat and potentially greater fish production to compensate for losses of anadromous and resident fish. |
| Sewer Line Upgrades | Upgrade the sewer line on the lower section of Whatcom Creek to make fish passage easier to compensate for losses to anadromous and resident fish. |
| Temperature Modifications | Reduce summer water temperatures to levels that are preferred by salmonids by adding ground water flow to creek to compensate for losses to anadromous and resident fish. This alternative also included consideration of alternative sources of cold water in Lake Whatcom and management of spilled water to reduce water temperatures to compensate for loss of water quality and losses of anadromous and resident fish. |
| Off-site Land Acquisition | Acquire riparian lands in nearby watersheds to prevent future development and promote ecological and recreational uses to compensate for loss of riparian and wildlife habitat, losses of anadromous and resident fish, and loss of human uses. Multiple parcels of land were evaluated. |
| Alternative Designs for Cemetery Creek and Salmon Park | These alternatives varied in size, location and orientation of pools and stream channels, amount of woody debris, and preservation of trees on the site locations |
| Stocking | Plant catchable-size sterile trout to enhance the recreational fishery in Whatcom Creek prior to what may be achieved naturally to compensate for loss of human uses. |
| Hatchery Upgrades | Upgrade trout production by the hatchery in Whatcom Falls Park for recreational stocking of lakes in the area by increasing access to colder water to compensate for loss of human uses. |
| Plant Large Trees | Promote recovery of burned lands by planting large trees to compensate for loss of riparian habitat and loss of human uses. |
| Gabion Removal | Remove "rock basket" gabions placed on the stream banks in the past as flood levees or for bank stabilization purposes. The benefits of this option include increased riparian vegetation structure and possibly some flood flow alteration to compensate for loss of riparian and wildlife habitat, loss of human uses, and losses of anadromous and resident fish. |
| Automobile Use Reduction and Watershed Pledge Project | Encourage commuters to ride their bikes, walk or take the bus instead of driving their cars to reduce the automotive inputs to the watershed to compensate for loss of water quality. This suggestion was proposed as part of the watershed pledge project to maintain and expand the existing voluntary pollution reduction program with the watershed to compensate for loss of water quality. |

Table 3: Summary of the Emergency Restoration Alternatives
 Alternatives implemented in whole or part during emergency restoration

| Alternative | Project Description |
|---|---|
| Channel Habitat Modifications | Creation and enhancement of instream features such as pools, gravel bars, riffles, glides and runs to compensate for losses of anadromous and resident fish. |
| Control Vegetation | Removal of invasive plants such as Himalayan blackberry that degrade habitats along Whatcom Creek to compensate for loss of riparian and wildlife habitat. |
| Debris Removal | Removal of garbage and debris from the Creek to benefit aesthetics and prevent flood-flow alteration to compensate for loss of human uses and loss of water quality. |
| Erosion Control | Implementation of erosion control measures to minimize sedimentation of Whatcom Creek to compensate loss of habitat in the Creek and loss of riparian and wildlife habitat. |
| Extend Hiking Trails | Extension of the Whatcom Creek trail system to allow greater public use to compensate for loss of human uses. |
| Stream and soil remediation | Agitation of gravel in Whatcom Creek to accelerate dispersion and weathering of trapped gasoline to compensate for loss of water quality and losses of anadromous and resident fish, and removal of contaminated soils |
| Invasive Plant Mapping and Guide to Control | Identification of problem areas and development of treatment plans where invasive plants degrade portions of the Whatcom Falls Park and Whatcom Creek outside of the impacted area to compensate for loss of riparian and wildlife habitat. |
| Planting Native Vegetation | Promote native plant communities through planting and enhancement of native tree seedlings and other native species to compensate for loss of riparian and wildlife habitat and loss of human uses. |
| Reconstruction of Hiking Trails | Repair hiking trails that were affected by the reconstruction of the Valencia Street Bridge to compensate for loss of human uses. |
| Reconstruction of Valencia Street Bridge and Fever Creek trail bridge | Reconstruction of the Valencia Street Bridge destroyed by the fire to provide increased opportunity for public use passage on a trail system below the bridge, on bike lanes crossing the bridge, and increased vehicular traffic support to compensate for loss of human uses. |
| Tree and Branch Removal | Removal of burned trees representing a public safety hazard in the park and other public use areas in order to allow public use of these areas to compensate for loss of human uses and loss of wildlife habitat. Removal was done in such a way as to preserve wildlife habitat value of standing snags. |
| Addition of Woody Debris | Insertion and cabling logs and stumps in stream to enhance habitat complexity and increase habitats for spawning and juvenile salmonids to compensate for losses of anadromous and resident fish. |

4.4 Environmental Consequences (Indirect, Direct, Cumulative)

To restore resources and/or services lost as a result of the Incident, the Trustees examined a variety of proposed projects under the following restoration alternatives: 1) no-action and natural recovery, 2) ecological restoration, and 3) lost human-use restoration. The Trustees intend to

avoid or reduce negative impacts to existing natural resources and services to the greatest extent possible. However, in implementing or approving the implementation of restoration actions, the Trustees could undertake actions that may have short- or long-term effects upon existing habitats or non-injured species. Project-specific environmental consequences for each project are provided in Section 5.2. This section addresses the potential overall cumulative, direct, and indirect impacts and other factors to be considered in both the Oil Pollution Act and NEPA regulations.

The Trustees believe that the projects selected in this final RP/EA will not cause significant impacts to natural resources or the services they provide. Further, the Trustees do not believe the projects will affect the quality of the human environment in ways deemed significant.

Indirect Impacts—Environmental consequences will be limited to the Incident location. Indirect beneficial impacts will occur in other parts of Whatcom County, primarily due to enhancement of fish and wildlife populations.

Direct Impacts—Overall, preferred restoration actions included in this final RP/EA will enhance functionality of ecosystems. There will be, however, some short-term impacts from the projects such as:

- **Noise and Air Pollution**—Machinery and equipment used during construction and other restoration activities will generate noise. This noise may temporarily disturb wildlife and humans.
- **Threatened, Endangered, and Candidate Species**—As discussed in more detail in the following sections, there may be short-term impacts on fish and wildlife species as a result of construction activities. In accordance with state and federal permit conditions, in-water work will only take place in the absence of endangered or threatened species and during regulated time periods when no major fish runs occur. Impacts on mobile species (*e.g.*, birds, and mammals) will be minor, consisting of short-term displacement. Overall, the construction of the fish habitat projects as part of the Preferred Alternative will benefit fish and wildlife species dependent on these types of habitat.
- **Water and Sediment Quality**—Although implementation of the projects should result in no violations of water quality standards, there will be temporary increases in sedimentation and turbidity related to certain projects. Best management practices along with other avoidance and mitigation measures required by the regulatory agencies will be employed to minimize any water quality and sedimentation impacts.
- **Visual**—There will be temporary visual impacts during implementation of some of the projects. Once the Trustees complete those projects, the visual impacts will cease. Beneficial aesthetic impacts would then extend to the users of the park and trail system.

- **Public Access/Recreation**—Public access may be temporarily affected during construction activities. Because implementation time for these projects will be relatively short, the impact will be short-lived.
- **Other (e.g., economic, historical, land use, transportation)**—No significant adverse effects are anticipated to soil, geologic conditions, energy consumption, wetlands, or floodplains. The restoration projects will have no adverse social or economic impacts on neighborhoods or communities. General land-use patterns will not be affected by the Preferred Alternative. The projects will not adversely affect any known archaeological sites or sites of cultural significance.

Cumulative Impacts—Since the Trustees designed the projects primarily to improve recovery of injured natural resources and/or services, the cumulative environmental consequences will be beneficial. These cumulative impacts include restoration of the injured ecosystem by increasing wildlife, fish, and invertebrate habitats and providing additional recreational lands. Certain projects may also provide educational opportunities. The Trustees anticipate that monitoring of projects funded under this final RP/EA will confirm that cumulative impacts will be beneficial rather than adverse. Any unanticipated cumulative adverse effect on an area or other area program, plan, or regulatory regime from a project identified prior to implementation of a project will result in reconsideration of the project by the Trustees.

5.0 ANALYSIS OF RESTORATION ALTERNATIVES

5.0 Analysis of Restoration Alternatives

This final RP/EA includes a suite of restoration actions, which, in combination with the emergency response and restoration activities,²⁵ provides appropriate types and quantities of restoration actions necessary to address the natural resource injuries resulting from the Incident. The following discussion explains the projects and outlines the Trustees' explanation of why the restoration package is necessary and sufficient compensation for the natural resource injuries that resulted from the Incident.

The following discussion is divided into three sections: 1) Evaluation of the No-Action Alternative; 2) Discussion of the Preferred Alternative; and 3) Discussion of the Non-Preferred Alternatives. For the second section, each of the preferred projects is described in terms of the primary category of injury that will be addressed, along with the expected collateral benefits. As discussed elsewhere, this Preferred Alternative was subject to public review and comment and comments received have been addressed by the Trustees in Section 7.

5.1 Evaluation of the No-Action/Natural Recovery Alternative

The NEPA requires the Trustees to consider a "no-action" alternative and the Oil Pollution Act 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 environmental 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 the 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 the absence of monetary costs because natural processes rather than humans determine the trajectory of recovery. This approach, more than any other, recognizes the tremendous capacity of ecosystems to self-heal.

After evaluation of the environmental tradeoffs, the Trustees selected natural recovery for a limited number of the injuries. For example, the Trustees considered options for restoration of contaminated groundwater resources in lower Hanna Creek. The Trustees discussed options and decided the chance of success of any option other than natural recovery was low to moderate and the environmental injury would be high. The option discussed included building a road out to the ridge separating Hanna and Whatcom creeks in order to put in recovery wells. This option would

²⁵ Trustees must take into consideration the benefits of the response and emergency restoration actions when determining the need for, and amount of, longer-term restoration. Those efforts taken to mitigate the impacts from response or as part of the permit process are not to be credited as restoration under the NRDA process. Certain actions taken after emergency restoration, but before the release of this final RP/EA, are proposed as restoration because those actions are not being credited as mitigation actions.

have resulted in removal of the vegetation and other collateral impacts from the road construction. Because of the potential adverse effects and concerns about feasibility, the Trustees decided that natural recovery was the best alternative.²⁶

The Oil Pollution Act, however, clearly establishes Trustee responsibility to seek compensation for interim losses pending recovery of the natural resources (15 CFR § 990.53 (3)(c)(1)). This responsibility cannot be addressed through a no-action alternative. While the Trustees have determined that natural recovery is appropriate as primary restoration for some of the injuries, the "no-action" alternative as the sole 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, which are discussed in the next section.

5.2 Preferred Alternatives

The Trustees will implement the following suite of restoration projects to address the ecological and human-use losses from the Incident. The list of Preferred Alternatives includes completion of certain restoration projects already implemented or underway as a part of emergency restoration, as well as additional projects for future implementation. The Trustees base this selection on the injury information summarized in Chapter 3 and the restoration evaluation criteria outlined in Section 4.2. The Preferred Alternative includes four categories of projects:

1. **Land Acquisition and Park Enhancements**—This element of the restoration plan includes the transfer from the Company to the City of Bellingham of a 9.5-acre parcel along the Creek and Woburn Street that was proposed for multiple-occupancy housing. Transferring this parcel to the City of Bellingham's ownership will protect it from being commercially developed and allow it to return to its natural state. The site will also increase public access to park trail systems and other outdoor recreation uses. An access road, parking lot, and restroom facility will be constructed on a small portion of the site. Leaving the site undeveloped, except for the improvements listed above, will enhance fish and wildlife habitat, prevent pollution that would further degrade the Creek and environment, and avoid future increases to stormwater runoff within the Whatcom Creek watershed.

The restoration plan also involves the transfer from the Company to the City of Bellingham of a 4-acre property along Whatcom Creek, near the mouth of Cemetery Creek and adjacent to an industrial park. This property will provide a buffer area that will enhance the natural setting and recreational experiences on the pending trail system. The buffer will allow for a greater setback from the Creek for recreational trails and vegetative plantings, and provide corridors for wildlife habitat.

²⁶ The last sample to exceed water quality standards was taken July 6, 2000 (AR #15).

Other park enhancements include giving the Company restoration credit for construction of a recreational trail bridge over Fever Creek and trail replacement and improvements within the Park; public-use improvements as part of the Valencia Street Bridge reconstruction; and park improvements to the property above Woburn Street. (See Section 5.2.1 for more information.)

2. **Fish Habitat Projects**—Continuation of the construction of in-channel riffle-pool habitat, introduction of woody debris, backwatering of fish passage barriers; reconstruction of Hanna Creek; construction of off-channel salmon habitat at the Salmon Park project near Racine Street; and construction of pools, wetlands and salmon rearing habitat on Cemetery Creek. (See Section 5.2.2 for more information.)
3. **Soil Stabilization and Revegetation Projects**—Continuation of soil stabilization, revegetation, invasive-species control actions, and removal of hazardous trees and limbs. (See Section 5.2.3 for more information.)
4. **Long-term Monitoring and Maintenance**—Establishment of a dedicated fund to support monitoring and maintenance of the emergency and long-term restoration projects and to conduct periodic maintenance of the burned parklands (e.g., removal of hazardous snags). The City of Bellingham, pursuant to an agreement among the Trustees, would administer the fund. (See Section 5.2.4 for more information.)

As noted previously, several of the restoration activities have collateral benefits. For example, the property acquisitions and salmonid projects will benefit water quality by preventing development and the associated degradation of water quality from construction and non-point runoff from vehicles and storm drains. The land preservation and vegetation projects will also provide shade to the stream, provide sedimentation filtration, and increase stormwater retention.

5.2.1 Preferred Alternative: Land Acquisition and Park Enhancements

Project Description

The Trustees will accept the transfer from the Company to the City of Bellingham of lands for use as parklands and for park improvements (Figures 33, 34, 39, 40).²⁷ The primary purpose of these projects is to compensate for recreational losses resulting from the Incident. As the plantings mature and other improvements are made, the Trustees expect that the parcels will be a seamless addition to the Whatcom Falls Park and Trail System. The Trustees expect that these projects will also generate benefits for water and sediment quality, fish and other stream biota, wildlife, aesthetics, and provide opportunities for future restoration projects. Specifically, the Trustees will implement or oversee the following actions:

- Accept the transfer of a 9.5-acre property along the Creek off Woburn Street (Figure 40).

²⁷ Restrictive covenants will be required to ensure the properties are kept in perpetuity as restoration sites.

- Build recreational improvements. The majority of the 9.5-acre site would remain undeveloped, but an access road, an approximately 20-stall parking lot, and a restroom facility with two men's and two women's stalls, would be built near an existing access road off Woburn Street (AR #23, 110).
- Accept the transfer of a 4-acre property along Whatcom Creek near the confluence with Cemetery Creek (Figure 39). The primary purpose of this acquisition is to make the land available for long-term fish, wildlife, and riparian habitat restoration projects by the City of Bellingham.²⁸ Only minimal park improvements are planned for this parcel as part of this restoration plan, but the acquisition of the land will allow for a greater setback from the Creek for recreational trails and provide a continuous wildlife corridor and buffer the stream from development-related impacts.
- Give restoration credit to the Company for reconstruction and improvement to trails and overlooks within the Park areas (completed as part of emergency restoration but will be monitored and maintained by the long-term monitoring and maintenance plan being conducted under this final RP/EA).
- Give restoration credit to the Company for the construction of a trail bridge over Fever Creek (Figure 35) and for improvements during reconstruction of the Valencia Street Bridge (Figure 36) to provide continuity with the Whatcom Creek Trail system and provide space for bike/pedestrian lanes (completed as part of emergency restoration but will be monitored and maintained by the long-term monitoring and maintenance plan being conducted under this final RP/EA).

Scaling Approach and Justification

One of the important injuries documented by the Trustees was closure and destruction of park resources and properties. The property acquisition, combined with park improvements and recreational trails, is expected to compensate for these injuries and loss of services by increasing park visitation and trail usage opportunities without increasing congestion and user density. The Trustees prefer these projects because they directly compensate for recreational lost use of parklands and help compensate for biological injuries to the riparian and forest habitats. The Trustees considered land parcels outside the Whatcom Creek watershed but decided that on-site restoration would benefit the habitats and park users most directly affected by the Incident. The property acquisitions are adjacent to the Creek and existing public lands, and are expected to add substantially to the connectivity of wildlife habitat and greenways. In addition to increasing total park acreage, the improvement of trails, construction of overlooks, and acquisition of properties adjacent to proposed trail segments will further enhance park access and usage.

²⁸ The City of Bellingham has indicated a preference for land acquisition and protection, in part to provide a location for future restoration opportunities.

The Oil Pollution Act regulations specify that restoration efforts should attempt to match directly the same type and quality of services lost as a result of the Incident to those generated by the restoration effort (15 CFR § 990.53 (3)(c)(2)).²⁹ The Trustees believe that the acquired lands, being adjacent to the existing park, would provide the same type of services. In order to ensure that the public is not under-compensated, an equivalency must be established between the quantity of services provided by the acquired lands and an estimate of the loss of park use resulting from the Incident.

The public clearly lost access to Whatcom Falls Park, but because no fees are charged to enter the park and there are many access points to the park, there was little data on record which the Trustees could draw upon to quantify that loss. In the absence of detailed information regarding pre-Incident park use, the Trustees relied upon available data and assumptions and inferences that can be drawn from the data. The City of Bellingham Parks Department's preliminary estimate³⁰ is that approximately 186,000 visits occur each year in the Park, with about half of those visits (96,000) during the summer (June through September) (AR #2). The chronology of the park area closures and re-openings is complicated, but, to be conservative, the Trustees assumed that the entire park was closed for the full summer period after the Incident resulting in 96,000 lost user-days.

Relying upon a simple count of lost user-days does not address the nature and quality of the user's experience, and could lead to inaccurate assumptions about the scale and type of restoration actions that would be adequate to compensate for the losses. Other important factors, such as location and use patterns, must be taken into account in addition to the actual number of days lost to accurately account for the actual injury. To use an extreme example, offering a one-day pass for 96,000 local residents to visit a remote park on the same day would clearly generate 96,000 user-days, but would be unlikely to be viewed by the public as adequate compensation for lost use of Whatcom Park. Factors such as location, distance, accessibility, amenities, physical setting, user density and the like must be taken into account in judging the comparability of park use opportunities offered in compensation for lost user-days. Likewise, the Trustees assume that an important aspect of park use experience is the user's knowledge that the park property belongs to the public and will remain permanently available for continued open access use by the public in the future. The Trustees assume it is factors such as these, and other intangibles, that determine park user satisfaction, and that those factors should weigh as heavily

²⁹ OPA regulations state "To the extent practicable, when evaluating compensatory restoration actions, Trustees must consider compensatory restoration actions that provide services of the same type and quality, and of comparable value as those injured. If, in the judgment of the Trustees, compensatory actions of the same type and quality and comparable value cannot provide a reasonable range of alternatives, Trustees should identify actions that provide natural resources and services of comparable type and quality as those provided by the injured natural resources."

³⁰ As noted in the Preassessment Data Report, this preliminary estimate is conservative and may be a low-end estimate of direct use.

in the scaling of compensatory restoration for lost park user-days as numerical calculations of user-days lost and gained.

The entire park is approximately 240 acres with many areas that are much more difficult to access than the parcel being acquired. Although usage is not uniform throughout the park, it is reasonable to assume that the overall quality of a park visit results from both access paths and undeveloped open space. This would indicate that an acre of parkland supports 775 visits per year. The property acquisition is 13.5 acres, with similar access and open-space design as the existing parkland.

Given current and future demands for open-space recreation within easy access of the City Center, it is assumed that the additional parkland will be used in a similar manner and frequency as the pre-Incident parkland. Based on the average utilization rates of the Park, the expansion of the Park would result in an additional 10,463 visits per year without increasing congestion. The new parkland may in fact generate more use because of its easy access and stream frontage of the acquired properties, as well as the trail and visitor facilities to be constructed. At this rate, the acquired property would compensate for the estimated loss in visitation in approximately nine years and then provide benefits in perpetuity. By increasing the size and integrity (i.e., continuity) of parklands, the property acquisitions also compensate for interim losses associated with passive lost uses of the Park and Creek resources.

In addition to the primary goal of compensating the public for recreational losses, the Trustees anticipate that substantial ecological benefits will accrue from the acquisition and preservation of the acquired properties. The Creek flows through an urbanized residential and commercial area with an extensive urban road system and expanses of impervious parking lots and business complexes that limit groundwater recharge and contribute oil, gas, and other waste runoff to the stream. In some locations only a narrow protective buffer separates the stream from surrounding uses, and below the existing Park there are few undeveloped parcels. Current land-use regulations affecting new development require wider streamside buffers, but they are often not sufficient to fully protect the stream from urban runoff and other non-point pollution. Because the stream is channelized throughout much of its length and the adjacent property is privately owned, there is little opportunity for habitat development projects. Vegetated floodplain areas provide valuable habitat for many fish, bird, and mammal species and can serve as connecting corridors that enable wildlife to move safely from one habitat to another. They are productive areas and help reduce erosion, contain non-point source runoff, and recycle nutrients.

Acceptance of the transfer of the 4-acre property near Cemetery Creek will create a 150- to 200-foot-wide streamside buffer, in which commercial development is prohibited, along 1,200 feet of the Creek. This will not only preclude the expansion of the commercial business-park development proposed for the property (AR #124) but will also make it available for future habitat restoration projects by the City of Bellingham. Such projects could include revegetation with a diverse floodplain forest mixture of trees and shrubs, as well as other floodplain and off-

channel restoration projects. This acquisition also provides a more extensive buffer along the greenbelt trail system to be constructed to enhance the experience of public use.

Acceptance of the transfer of the 9.5-acre property near Woburn Street will preserve the property for restoration, as opposed to a residential development (AR #125),³¹ thus providing potential for future riparian habitat restoration projects by the City of Bellingham on the floodplain adjacent to the Creek. The property acquisition actions will preserve areas important for groundwater infiltration and not increase other adverse impacts associated with site development, such as stormwater runoff to the Creek, turbidity, siltation, and non-point pollution.

The Trustees believe that a more intensive data collection and analysis effort to determine the losses and benefits would be unreasonable. The Trustees believe that the project, in conjunction with the other restoration actions and emergency restoration projects, is sufficient compensation for recreational and ecological losses to the Park resulting from the Incident.

Restoration Objectives

The Incident resulted in the injury and/or interim loss of parklands and riparian and wildlife habitats along the Creek. The objective of this restoration project is to compensate for those losses. This property acquisition will provide functions and services similar to those that were lost, resulting in compensatory restoration of those resources. Furthermore, the acquisition will ensure prevention of commercial development, which will benefit birds, fish, and other animals in the watershed.

Probability of Success

The Trustees expect to meet the restoration objectives discussed above because of the characteristics chosen for the projects. The parcels to be acquired are similar to the adjacent parklands, and, as the plantings mature and other improvements are completed, the recreational and habitat services provided should be comparable with those that were lost. Since the parcels are adjacent to the stream and the existing park, public use is expected to be high. The performance criteria and monitoring will help ensure the success of the projects and allow for adjustments if necessary.

Performance Criteria and Monitoring

The acquired lands will be surveyed prior to conveyance to City ownership. The Company will develop plans for all Park improvements included within the scope of this final RP/EA, subject to review and approval by the City of Bellingham and in accordance with all necessary permits. All construction activities will be monitored by the Trustees and permitting agencies to ensure that the work is implemented appropriately and in accordance with permits. Restrictive

³¹ The Whatcom Creek property has been proposed for a multi-unit housing development. Thus, acquisition of this property represents the further benefit of making its resources available to the public and preventing these resources from being degraded through potential future development.

covenants will be required to ensure the properties are kept in perpetuity as restoration sites. Projects such as the bridge and trail construction will be documented using video and still photography.

Benefits and Environmental Impacts

Acquisition of the property is not anticipated to have any deleterious environmental or socioeconomic impacts. Potential impacts from the project are summarized here.

- **Erosion**—Certain construction activities that the Trustees are considering would cause some short-term construction-related environmental impacts. The Trustees would minimize these impacts through early coordination with the federal, state and city regulatory agencies and by direct oversight of the project to ensure implementation of construction site erosion and chemical control BMPs.
- **Endangered Species**—No adverse impacts are expected for endangered species. No endangered plants are in the project area. Endangered salmon will be protected through erosion control measures and other permit requirements, and will benefit from the shade and habitat provided by a healthy riparian zone.
- **Wildlife Impacts**—No adverse impacts are expected for wildlife. Overall, wildlife are expected to benefit from the land acquisition, but wildlife activity may be temporarily disturbed during the construction of the restroom and parking lot structures. If sensitive wildlife species are found during the project (e.g., nesting birds), the work may be modified or stopped to minimize impacts to wildlife.
- **Archaeology**—No known archaeological sites are on the lands to be acquired. Overall, any archaeological resources on the sites would benefit from the acquisition, as commercial and residential development will be precluded. There is, however, a potential that construction work may unearth a site. The Trustees are in consultation with the Tribes and the Office of Archaeology and Historic Preservation to outline steps that would be taken to ensure that any sites discovered would remain undisturbed by the proposed actions (AR #139, 140).

Evaluation

The Trustees' policy is to look first at on-site and in-kind restoration options. The activities to be conducted meet this goal by providing recreational and habitat benefits of the same types that were lost and at the location where the losses occurred. The projects are consistent with the City's long-term park improvement and trail system plans (AR #8, 9, 19). The Trustees believe that the projects will, over time and in conjunction with the vegetation and fish habitat projects, compensate for human and ecological losses resulting from the Incident.

5.2.2 Preferred Alternative: Fish Habitat Projects

Project Description

One of the major impacts documented by the Trustees was injury to anadromous and resident salmonids, fish, and other aquatic resources. Emergency instream restoration actions were undertaken in conjunction with sediment remediation and resulted in fish habitat enhancements in Whatcom and Hanna creeks.³² Pools were increased in number, size and depth (Figure 26). The Creek channel was modified in some areas to provide more spawning habitat (pool/bar enhancement). Large woody debris was added (Figures 28, 29). These actions improved the quality of the existing instream habitat, increased the quantity of some habitats (e.g., pools), and added some channel structure. The habitat improvements associated with the sediment remediation effort will result in a potential increase in survival of the progeny of returning adults and juveniles that may have been in Whatcom Creek tributaries during the Incident.

The Trustees will oversee the implementation of two long-term habitat rehabilitation and enhancement projects, Salmon Park and Cemetery Creek, as compensatory restoration for injuries to salmonids, other fish, amphibians, aquatic invertebrates, and freshwater and riparian habitats that resulted from the Incident (AR #118). These projects are also expected to generate benefits for water quality, recreation, vegetation, and wildlife, and will substantially build upon the emergency restoration projects already completed. The Trustees considered a number of restoration alternatives for fisheries impacts and several alternative designs for the Salmon Park and Cemetery Creek projects (AR #119-122), and believe the projects will provide the most direct and beneficial compensation with the least potential for adverse impacts. While the Trustees are interested in prompt implementation of restoration actions for the Creek, there is also a recognition that many salmonid restoration efforts elsewhere have resulted in mixed and sometimes adverse effects (AR #127). Therefore, the Trustees have attempted to balance the desire for rapid restoration with appropriate caution.

More detail and draft plans can be found in Appendix 10.5. A final detailed design plan will be included in the Administrative Record. Specifically, the restoration projects include:

Salmon Park Project—This project involves creation of a backwater channel within a historic meander of the Creek to improve winter refuge habitat for juvenile salmonids (Figure 37). The project site is in the Salmon Park area just north of the Creek and east of Racine Street. The City of Bellingham already owns the project land.

Cemetery Creek Project—This project involves creation of salmonid rearing ponds and habitat enhancements in Cemetery Creek upstream of its confluence with Whatcom Creek (Figure 38).

³² These actions are not formally part of this final RP/EA, but are described here to explain that a significant amount of restoration work has already been conducted as emergency restoration. The amount of long-term restoration necessary depends, in part, on the success of the response and emergency restoration actions. To the extent that response and emergency restoration actions result in more rapid recovery of natural resources, the need for long-term restoration is reduced.

The project site is along the south bank of the Creek and north of Fraser Road. The City of Bellingham already owns the project land.

Scaling Approach and Justification

The primary purpose of these projects is to compensate for injuries to salmonids due to the Incident. The Salmon Park and Cemetery Creek projects will directly address two known limiting factors: 1) the limited availability of cool water refugia during the summer months, and 2) the limited availability of off-channel habitat that is normally provided when streams are allowed to meander onto the floodplain and form secondary channels. The complexity of stream channel margins can be an important factor influencing early rearing success, and ecologically healthy streams contain complex margins that include backwaters and secondary channels (AR #123, 134, 136). Juvenile fish use different habitats seasonally, and periods of high runoff and low food availability during winter force them to seek overwintering locations adjacent to, but not in, stream main stems, making floodplain channels extremely important to juvenile survival. Floodplains serve an important purpose in the health of streams (AR #123). During over-bank flows, the stream can capture the organic matter stored on the floodplain and deliver it to the main channel, enhancing trophic and food web complexity by increasing the quantity and diversity of detrital input to the stream. Hydrological connectivity also enhances water quality by trapping and retaining sediment, and recharges local groundwater, contributing to the maintenance of cooler inflow. Water temperature is related to the subsoil environment, and deep channels that interact with cool groundwater can provide important thermal refugia during summer periods of high water temperatures.

The Trustees prefer these projects because they directly compensate for fish habitat losses and help compensate for biological injuries to the riparian and forest habitats. Additionally, the construction of these restoration projects may reduce future losses to the stream due to encroaching urban activities that might otherwise occur in these areas.

The Trustees' priority in selecting these restoration options as preferred alternatives was to identify projects that provide services of comparable type, quality, and value as those provided by the lost ecological services. The Trustees believe that the increased freshwater rearing habitat provided by the Salmon Park and Cemetery Creek habitat creation and enhancement projects will provide services of the same types as those lost as a result of the Incident. These projects are in the Whatcom Creek watershed and are within the Incident zone (Figure 32). The project sites currently provide valuable but limited benefits to the same species of fish, invertebrates, and amphibians that were affected by the Incident. The enhancements will substantially increase the size and ecological value of the habitats for fish, invertebrates, and amphibians. Specifically, the improvements are expected to provide:

- Increased salmonid rearing habitat during summer months by creating thermal refuge habitat;
- Increased salmonid rearing habitat during winter months by creating backwater habitats during winter rainfall events; and

- Improved habitat complexity for all life stages of salmonids, resident fish, and amphibians.

In order to determine whether the size and benefits of the projects would be sufficient compensation, the Trustees evaluated the results of the preliminary studies, reviewed the applicable restoration ecology literature to help quantify the potential benefits of the response and emergency restoration actions, and considered the estimates of the fish kill from the Incident and the results of the post-spill fish recovery monitoring surveys (AR #87). The Trustees conducted a preliminary Habitat Equivalency Analysis (HEA) using simplifying assumptions to estimate the magnitude of restoration required to compensate for injuries resulting from the Incident.

HEA is a methodology used to determine scale of restoration projects for resources injured by oil and chemical releases (AR #81). The principal concept underlying the method is that the public can be compensated for past losses of habitat resources through habitat replacement projects providing additional resources of the same type. Natural Resource Trustees have employed HEA for groundings, spills, and hazardous waste sites. Habitats involved in these analyses include seagrasses, coral reefs, tidal wetlands, salmon streams, and estuarine soft-bottom sediments. In this Incident, the Trustees used HEA to evaluate the adequacy of the Cemetery Creek and Salmon Park projects for injuries to fish habitat.

Natural resource damage claims have three basic components: 1) the cost of restoring the injured resources to baseline, or "primary restoration," 2) compensation for the interim loss of resources from the time of injury until the resources recover to baseline "compensatory restoration," *plus* 3) the reasonable costs of performing the damage assessment. To ensure full compensation for interim losses, the Trustees determine the scale of the proposed compensatory restoration actions for which the gains provided by the actions equal the losses due to the injury. The process of scaling a project involves adjusting the size of a restoration action to ensure that the present discounted value of project gains equals the present discounted value of interim losses.

HEA is an example of the service-to-service approach to scaling. The implicit assumption of HEA is that the public is willing to accept a one-to-one trade-off between a unit of lost habitat services and a unit of restoration project services (i.e., the public equally values a unit of services at the injury site and the restoration site). HEA does not necessarily assume a one-to-one trade-off in the resources themselves, but instead in the services they provide.

HEA takes into consideration the amount and quality of habitat lost or restored and the time frame of the losses and gains to determine the scale of restoration action needed to compensate for the losses. In this case, the Trustees assume that the proposed restoration project will generate habitat services of the same type and quality and of comparable value per acre as were lost due to the injury. Consequently, the HEA need only address the size of project (in acres) and the years the project will produce the expected benefits in order to determine the adequacy of compensation.

Injury Assumptions—Gasoline and the resulting fire killed much of the aquatic biota in lower Whatcom Creek. As a first-order assumption, the Trustees estimated that 3 miles of stream habitat were completely destroyed. The average width of the Creek is 15 feet. The total aquatic injury was therefore 237,600 square feet, or 5.45 acres of lost stream habitat. The Trustees estimated that the stream provided no resource services for one year, and that recovery of the aquatic habitat will take 5 years. The recovery of the stream was assumed to be linear (i.e., that the stream will recover at a constant rate per year until full recovery is reached).

Projects Benefit Assumptions—The Trustees have identified a feasible restoration action for compensation: creation of off-channel salmon habitat at a nearby site. The project is expected to restore the same type and quality of resources and services per acre as did Whatcom Creek before the Incident. The Trustees assumed that the project would be built in the present year (2002), and that it would take 20 years to reach full maturity.³³ The rate of recovery was assumed linear. Because of the proximity and similarity of injured and created habitats, the Trustees assumed that after 20 years, the created habitat would provide the same amount of environmental services per acre as the injured stream habitat. (In other words, the mature created habitat would provide 100% of the services per acre provided by the pre-spill stream habitat.) Based on the preliminary conceptual drawings of the project, the project is estimated to provide approximately 0.9 acres of aquatic habitat.^{34,35} The Trustees believe that the habitat creation project will last (i.e., will provide the expected environmental services) between 50 and 100 years.³⁶

Discounting—The injured habitats will slowly recover, and the created projects will also take time to reach full function. Because losses and gains are occurring in different years, the Trustees discount the losses and gains so that units reflect what they are worth in the present year, 2002. Past losses are compounded and future losses and gains are discounted at a fixed rate to make units from different time periods comparable.³⁷ Discounting also effectively provides a premium for restoration actions taken sooner rather than later.

³³ The projects will provide ecological services sooner, but full functionality, including regrowth of vegetation and fish utilization, will take time.

³⁴ Jason Smith, Inter-Fluve, Inc., personal communication.

³⁵ The project site is considerably larger because of enhancement of upland areas. The 0.9 acres refers to the size of the pools and stream channels alone.

³⁶ The project site will be protected in perpetuity, but the aquatic functions provided will change naturally over time as the ponds and stream undergo natural succession.

³⁷ The discount rate incorporates the standard economic assumptions that people place a greater value on having resources available in the present than on having their availability delayed until the future. (This process is analogous to financial calculations in which, if a dollar is put into the bank today at 3% interest, there will be \$1.03 in one year.) The annual discount rate used in an HEA calculation represents the public's preference towards having a restoration project in the present year, rather than waiting until next year. The economics literature supports a discount rate of approximately 3%.

Taking into consideration the services provided by the affected habitat, the size of the injured and restored habitat, and the time frame of the losses from injuries and gains from restoration, the HEA calculates results in terms of *discounted service acre-years (DSAYs)*. DSAYs thus serve as the common currency for determining the adequacy of compensatory restoration.

Calculation of the Habitat Equivalency—The underlying HEA calculation is to solve the following problem: Will the proposed aquatic habitat project (0.9 acres) provide the same number of DSAYs as those lost? To answer this question the HEA requires two calculations: the calculation of losses from the injuries, and the calculation of gains from the restoration.

The HEA calculation of losses of the approximate 5.45 acres of stream habitat for 5 years, with compounding, equates to 16.69 DSAYs. Table 4 lists the factors employed in this calculation. The assumed linear recovery of the injured area over a five-year period is reflected in the “% Services Lost” column by the loss decreasing from 100% (1.0) to 0% over five years. When the percent services lost are multiplied by the affected area, the result yields the number of service-acres lost per year. Multiplying this result by the discount factor applicable to the year of loss generates a present value, or discounted service-acres lost figure. Adding the discounted losses for all years in which the effects of the injury are experienced yields a total of discounted service acre-years (DSAYs) lost.

| A | B | C | D | E | F |
|------|------------------------------|----------------|--|-------------------------------------|----------------------------------|
| Year | % Services Lost (% / 100) | Acres Affected | Service-acres Lost Per Year (B x C) | Discount Factor (@ 3% per annum) | Present Value of Loss (D x E) |
| 1999 | 1.0 | 5.45 | 5.45 | 1.06 | 5.78 |
| 2000 | 0.8 | 5.45 | 4.36 | 1.03 | 4.49 |
| 2001 | 0.6 | 5.45 | 3.27 | 1.00 | 3.27 |
| 2002 | 0.4 | 5.45 | 2.18 | 0.97 | 2.12 |
| 2003 | 0.2 | 5.45 | 1.09 | 0.94 | 1.03 |
| 2004 | 0 | 5.45 | 0 | 0.92 | 0 |
| | | | | Sum | 16.69 |

The habitat-creation project needs to produce a similar gain in DSAYs to create an equivalency. The discounted calculation of gains in the HEA showed that the 0.90-acre project will generate 15.78 DSAYs if the project functions for 50 years, and up to 20.74 DSAYs if it functions for 100 years. The project will generate the approximate equivalent of the losses (16.84 DSAYs) after 56 years, well within the project's expected lifespan. The HEA calculations that generated these results is shown in Table 6 included as Appendix 10.4.

The calculations of injuries and benefits are preliminary and based on simplified assumptions. The size of the affected area and recovery rates are approximations, and the size of the restoration projects may be modified through permitting requirements. Based on the first-order assumptions in this analysis, however, the preliminary HEA suggests that the proposed projects will be reasonable compensation for the aquatic impacts in Whatcom Creek. Further studies and analytical approaches to evaluate the losses from the Incident and the likely benefits from the restoration projects were considered, but it was determined that further studies would not provide results in a timely and cost-effective manner. More-comprehensive studies would also delay implementation of the restoration projects. Additionally, because of year-to-year natural variability and the complicated life history of salmon and other injured species in the Whatcom Creek watershed, it was uncertain whether the outcome of studies conducted in any one year would provide information that would support a more accurate scaling calculation.

Restoration Objectives

The goals for restoration in Salmon Park and Cemetery Creek are to create new aquatic habitats and enhance and restore existing salmonid habitat to a level greater than that which existed prior the Incident. Due to the fact that stream temperature has been identified as one of the more important environmental factors affecting salmonid habitat in the Creek, the restoration has focused primarily on providing cool-water refuge and rearing habitat during the summer months.

The Salmon Park site has been identified by the City of Bellingham as a location in which winter rearing habitat and high-flow refuge could be created through reconnection and construction of backwater rearing channels. This will enhance juvenile salmonids' opportunities to escape and survive flood events in the Whatcom Creek watershed. A secondary goal will be to restore the ability of this section of the Creek to meander naturally. In the long term, these conditions will benefit spawning and rearing habitat by creating a larger floodplain area with greater riparian complexity than that which currently exists. The backwater channel will be created by breaching the berm adjacent to the Creek and allowing water to flow back up the channel. At the upstream end of the backwater channel, the berm elevation will be reduced so that flood flows will overtop the berm and eventually erode through it. Thus, creation of the backwater rearing channel in Salmon Park will promote long-term enhancements to spawning and rearing habitat through the progression of natural channel processes.

One of the factors that limits fish production in Cemetery Creek is the availability of rearing habitat, especially due to the warm stream temperatures that occur each summer (AR #15). Therefore, the Trustees have concluded that one of the best ways to increase fish production in the Creek is to increase the amount of cool-water rearing habitat. Temperature studies of the watershed show that Cemetery Creek has cool water available for fish refuge, running from 2° to as much as 5°C colder than Whatcom Creek (AR #15). Therefore, the primary objective of the Cemetery Creek Project is to increase the availability of cool-water summer rearing habitat. A secondary objective is to improve access to these cool-water habitats during all stream flow levels and improve the quality and complexity of the existing habitats. The Cemetery Creek project involves grading incised portions of the stream channel in Cemetery Creek, placing large woody debris to stabilize head cuts, and excavating several deep off-channel pools. This will result in the creation of cool-water rearing habitat and the restoration of 1,200 feet of stream channel, improving rearing habitat and making it more accessible to anadromous fish.

The restoration projects have also been designed to address other limiting factors in Cemetery Creek. These include reduced availability of high-flow refuge and overwintering habitat for juvenile salmon, and the loss of natural habitat-forming processes.³⁸ Specific project objectives have been identified to achieve the overall goal as follows:

- Provide for increased thermal refuge and summer rearing habitat for salmonids by increasing available living space in Cemetery Creek;
- Provide for increased high-flow refuge and winter rearing habitat by creating backwatered off-channel habitats during frequent floods;
- Improve habitat complexity for all life stages of salmonids in the lower portion of Cemetery Creek (limited to the area within park boundaries and City easements);

³⁸ The dam at the outlet of Lake Whatcom that regulates flows, lack of natural riparian floodplain, and limited natural sources of large woody debris, especially large and rot-resistant cedar trees, combine to preclude the habitat-forming processes that would otherwise naturally occur.

- Create instream conditions favorable to the production of fish prey (benthic macroinvertebrates) in Cemetery Creek;
- Remove man-made gravel berms where appropriate to restore geomorphic processes within the confines of Salmon Park;
- Provide enhanced habitat conditions while minimizing impacts to surrounding vegetation and ground surfaces;
- Provide/improve access to available fish habitat by addressing known impediments to fish passage in Cemetery Creek; and
- Provide environmental conditions favorable to the creation and establishment of additional wetland habitats adjacent to the Creek, and the establishment of conifers including Western red cedar.

To achieve these goals and objectives, work will take place within Cemetery Creek and the Salmon Park portion of Whatcom Creek. The project includes a reconstructed channel alignment in place of the current ditched segment of Cemetery Creek and the creation of three on-line cool-water rearing ponds. Ponds will vary between 1 and 6 feet deep. Large woody material will be utilized to create complex channel, pond, and floodplain habitat.

In Salmon Park, a backwater channel will be constructed within a historic meander of the Creek to improve winter high-flow refuge habitat for juvenile salmonids. This channel will be free draining (0.0025 slope) and the extent of inundations will expand and retract as the floodwater stage changes in the creek. The free-draining nature of the channel will prevent fish stranding as flows diminish. Large woody material will be a major cover component for juvenile salmon using this area.

To restore natural river processes within the Salmon Park segment of the Creek, the gravel pushup berms adjacent to the Creek will be removed and the banks modified. Currently, these human-constructed berms are a landscape feature that prevents frequent over-bank flows into the existing historic meander feature. Lowering the berm will facilitate natural channel processes such as planform adjustment and gravel recruitment.

A wetland swale will be constructed where an old Cemetery Creek channel enters Whatcom Creek approximately 600 feet upstream of the existing confluence. The swale will function in a manner similar to the Salmon Park backwater habitat by providing high-flow rearing and refuge habitat during average winter flows. The wetland swale area will be excavated and planted to establish emergent wetland and scrub shrub plant communities. The swale will be free draining to prevent any fish entrapment.

An important component of enhancement work on Cemetery Creek, Cemetery Creek ponds, Salmon Park, and the wetland swale consists of an aggressive re-vegetation plan with a diverse assemblage of native plant species and a variety of plant material types. The installed native

plants will initiate the development of productive and diverse riparian plant communities that will help achieve project goals related to salmonid habitat complexity, salmonid thermal refuge, erosion control, and aesthetics. Throughout Salmon Park and Cemetery Creek, cedar plantings will accelerate the establishment of a valuable cedar component that is missing now but occurred historically.

Probability of Success

These projects have a high probability of success. The land is already under public ownership. The projects are expected to be successful because the project sites were once part of the Whatcom Creek and Cemetery Creek watershed, and, although degraded, the project sites already provide some limited fisheries habitats. The projects will address known limiting factors and provide habitat features and functions needed by juvenile salmonids.

The objectives for the rehabilitation have been specifically chosen to address environmental parameters known to limit habitat of salmonid fishes generally and are currently identified as limiting factors in the Creek. For instance, the annual fish habitat in the Creek may be limited by existing thermal regimes in the creek that are a consequence of the seasonally warm surface waters from Lake Whatcom. Maximizing the availability of seasonal thermal refugia for salmonids during periods of elevated stream temperatures would serve to reduce natural mortality or other sub-lethal effects adversely affecting salmonid life stages. Furthermore, the specific location of the rehabilitation has been chosen to maximize the potential for success. For instance, the WDFW indicates that the Cemetery Creek confluence and Whatcom Creek near Salmon Park are important spawning areas. Enhancement of fish habitat in these areas is preferred, since there is known salmonid use and restoration potential that serves to achieve the overall goal of increased quality salmonid habitat. Once the projects are complete, fish utilization of the sites is expected to be high.

Performance Criteria and Monitoring

The project areas will be surveyed prior to construction, and detailed construction plans will be prepared. All construction activities will be monitored to ensure that the work is implemented appropriately and in accordance with permits. Fish surveys will be conducted following completion of the projects to monitor recovery and need for any mid-course corrections.

Benefits and Environmental Impacts

There are short- and long-term benefits from the restoration work to be conducted within Salmon Park and Cemetery Creek. In the short term, physical habitat improvements will provide cold-water rearing habitat in Cemetery Creek and high-flow refuge within Salmon Park and Cemetery Creek for juvenile and resident salmonids to improve survival of floods. In the long term, the restoration of natural stream channel processes within Salmon Park will improve habitat complexity for both fish and wildlife. Intensive re-vegetation efforts will accelerate the development of a climax cedar wetland forest within Cemetery Creek and portions of Salmon Park.

The Salmon Park and Cemetery Creek projects are not anticipated to have any significant and deleterious environmental or socioeconomic impacts. Overall, the projects are expected to directly benefit fish, and provide collateral benefits to invertebrates, birds, terrestrial wildlife, water quality, vegetation, and recreation. Potential impacts from the project are summarized here.

- **Erosion and Sedimentation**—The Trustees expect short-term impacts to water quality (sedimentation) as a result of construction-related activities. These impacts will be minimized through careful design and appropriate construction practices, including seasonal construction windows and sediment control structures. These potential impacts will be addressed through the permit conditions for the project.
- **Endangered Species**—No significant adverse impacts are expected for endangered species. There are no endangered plants in the project area. The permit conditions and construction plans for the project will address protection measures for endangered salmon, including seasonal construction windows, rescue and relocation of juvenile fish prior dewatering areas, screening on pumps to prevent fish entrapment, erosion control measures, and spill containment for heavy equipment.
- **Wildlife Impacts**—No significant adverse impacts are expected for wildlife. Overall, wildlife are expected to benefit from the projects but wildlife activity may be temporarily disturbed during the construction phase of the project. If sensitive wildlife species are found during the project (e.g., nesting birds), the work may be modified or stopped to minimize impacts to wildlife.
- **Archaeology**—No known archaeological sites are on the lands selected for the project. There is, however, the potential that construction work may unearth a site. The Trustees are in consultation with the Tribes and the Office of Archaeology and Historic Preservation to outline steps that would be taken to ensure that any sites discovered would remain undisturbed by the proposed actions (AR #139, 140).
- **Wetlands**—The projects have the potential to impact wetlands near the confluence of Cemetery and Whatcom creeks. These impacts include the potential temporary loss of vegetation, sedimentation, erosion, changes in hydrology, and changes in wetland functions. While overall wetland functioning and services are expected to improve as a result of the projects, some existing wetland areas will be affected. To reduce the potential for wetland impacts, the Trustees considered several alternative designs for the Salmon Park and Cemetery Creek projects (AR #119-122). A wetland delineation was also conducted for the proposed enhancement areas (AR #126). Based on the delineation and preliminary discussions with state and local regulatory officials, the project was further revised to minimize wetland impacts. The permit conditions and construction plans for the project will

also mandate techniques to minimize collateral impacts during the construction phase of the project, including salvage and re-use of native vegetation, minimization of vehicle and heavy equipment impacts, and reseeded of disturbed areas.

Evaluation

The projects have a high probability of success and the Trustees believe the additional habitat will, as they develop, compensate for the impacts to fisheries resulting from the Incident. The activities will also provide multiple benefits for the natural resources along Whatcom and Cemetery creeks. The created habitats will take some time to reach full maturity, but should begin to provide habitat functions shortly after they are constructed.

5.2.3 Preferred Alternative: Soil Stabilization and Revegetation Actions

Project Description

During the emergency response phase of the Incident, the Company, the EPA, and the Trustees worked together to develop and implement a series of emergency restoration actions. The revegetation projects will be completed, specifically the planting efforts near the break site and maintenance of the vegetation (Figure 32). The revegetation plan is intended to restore the area's terrestrial and riparian vegetation to pre-Incident or better condition. The plan involves:

- Completion of the planting of native tree seedling stock to quickly produce a closed canopy (Figure 31) and to remove or control weedy invasive species using a combination of chemical and mechanical methods (completed except for area around the water treatment facility);
- Give restoration credit to the Company for development of a watershed-wide invasive-plants hot-spot map and control strategy (AR #100) and implementation of this strategy in areas directly and indirectly impacted by the Incident (plan completed as part of emergency restoration; maintenance is ongoing);
- Give restoration credit to the Company for removal of hazardous trees and limbs injured by the Incident, for the purposes of protecting public safety and improving public access to the impacted areas (largely completed as part of emergency restoration; maintenance is ongoing); and
- Give restoration credit to the Company for stabilization of burned soils to prevent erosion and provide a stable and fertile soil for planting of replacement trees (completed, except for area around the water treatment facility).

Scaling Approach and Justification

Approximately 17% of the burned area, located on the floodplain terrace of the Creek downstream of Whatcom Falls Canyon, is dominated by invasive species, such as Himalayan

blackberry, and has no tree canopy cover (AR #15, 100). These invasive-weed-dominated stands of shrubs and low-growing vegetation will be replaced with native vegetation and converted to mixed evergreen and deciduous forest canopy, increasing the quality of riparian habitat on this segment of the Creek to above pre-Incident conditions.

The Trustees have selected this project as a preferred alternative because it directly restores resources and services affected by the Incident. The overall scale of the project (in terms of number of trees planted) is based on the size of the burn area and the intensity of the replanting efforts. The Trustees determined that approximately 26 acres of vegetation was injured as a result of the Incident, and all of the burn areas have been targeted for replanting of native species and control of invasive species. Most of the affected areas have already been planted as part of the emergency restoration effort, but a few areas near the break site still need to be planted. Watering, thinning, and other follow-up maintenance activities are also ongoing in the replanted areas.

Other key factors in scaling the replanting effort were intensity of the planting effort (number of seedlings planted per square meter) and the age/size of the seedlings. The optimal planting density is a function of pre-Incident vegetation types, terrain, shade, slope, access, soil type, seedling size, and seedling species. Using these factors, the Trustees recommended a clumped planting pattern of mixed species, with an approximate density of 25 square feet per tree or 5.8 feet on center (AR #108). A total of eight species were planted. Conifers, including Western red cedar (*Thuja plicata*), Douglas fir (*Psuedotsuga menziesii*), Sitka spruce (*Picea sitchensis*), and Western hemlock (*Tsuga heterophylla*) accounted for 72% of the plantings. Deciduous trees accounted for the remaining trees, including big leaf maple (*Acer marcophyllum*), red alder (*Alnus rubra*), paper birch (*Betula papyrifera*), and cottonwood (*Populus balsamifera*) (AR #109).

The age/size of the seedlings is a factor in recovery of the forest canopy. Planting older and larger trees was considered as a means to accelerate recovery, but, for the reasons outlined in section 5.4, the Trustees chose to use the smaller seedlings.

Restoration Objectives

The overall goal of the emergency revegetation projects was to protect the burned areas from further injury and restore the area's terrestrial and riparian vegetation to pre-Incident or better condition. By restoring the vegetation lost in the fire, erosion was reduced, shade was created for the stream, and better habitats were available for fish, birds, and terrestrial species. The emergency restoration efforts also helped reduce the duration of the park closures and will help reduce the period of time that will elapse until the forest is re-established. While considerable progress was made during the emergency phase, completion of the plantings near the break site and maintenance of the revegetation efforts will be necessary to ensure the recovery of functioning forest and riparian habitats.

Probability of Success

The probability of success for this revegetation project is high. The emergency work conducted to date has been successful and the same techniques and approaches will be used. No major implementation problems are anticipated. As part of the restoration approach, the Trustees have chosen factors such as age, size, species, and density to ensure the success of the restoration objectives.

Performance Criteria and Monitoring

An overview of the technical specifications for the project is included in the Emergency Restoration Plan prepared the Company (AR #1). Those specifications cover the protocols for stabilization of soils and removal of non-native vegetation, including the species that will be removed and the areas of removal. Similar information is available for the planting of native vegetation. Long-term maintenance of the plantings and monitoring/removal of invasive-plant species would be provided through the maintenance fund to be managed by the City³⁹. (See Section 5.2.4)

Benefits and Environmental Impacts

Potential impacts from the project are summarized here:

- **Erosion**—Revegetation efforts will involve digging, planting, and minor mechanical disturbance of soils. Therefore, the project has the potential to temporarily increase erosion in the watershed. These impacts are expected to be minor and temporary in nature. Work near the stream will be conducted in a manner to limit erosion and control sedimentation. Foot and vehicle disturbance will be kept to a minimum. When non-native vegetation is removed, the areas will be rapidly replanted to ensure that native species will be able to thrive.
- **Endangered Species**—No adverse impacts are expected for endangered species. Endangered salmon will be protected through erosion control measures and will benefit from the shade and habitat provided by a healthy riparian zone.
- **Wildlife Impacts**—No adverse impacts are expected for wildlife. Overall, wildlife are expected to benefit from healthy native vegetation, but wildlife activity may be temporarily disturbed because of the presence of field workers. If sensitive wildlife species are found during the project (e.g., nesting birds), the work may be modified or stopped to minimize impacts to wildlife.
- **Archaeology**—No known archaeological sites are planned for treatment work is not expected to unearth any sites. The Trustees are in consultation with the Tribes and the Office of Archaeology and Historic Preservation to outline steps that would be taken to ensure that any sites discovered sites would remain undisturbed by the proposed actions.

³⁹ AR #141

Evaluation

The Trustees find that the benefits of the project far outweigh any negative impacts. The project will provide ecological services of the same types lost as a result of the Incident. The revegetation and non-native plant control efforts will help compensate for injuries sustained by riparian habitats and provide habitat for terrestrial wildlife and birds. As the vegetation matures, the plantings will provide shade, reduce erosion, and minimize sedimentation of the Creek. As a collateral benefit, the mature vegetation will provide recreational and aesthetic benefits for hikers, fishermen, and joggers that utilize the area.

5.2.4 Long-term Monitoring and Maintenance

Monitoring and maintenance are essential elements of any restoration project. Each of the restoration projects will have a monitoring and maintenance element to document recovery, evaluate long-term performance, and provide for routine repairs and upkeep. In addition, other restoration projects that develop over time will also have monitoring and maintenance components. The monitoring actions will help to document the recovery of the Creek and the success of the individual projects. The monitoring will also help to detect problems at an early stage, when repairs and adjustments may yet be relatively simple and inexpensive. Similarly, routine maintenance of the project sites will help prevent small problems from growing. The Trustees believe that these maintenance and monitoring efforts will help to advance the effectiveness of the overall restoration plan and help ensure public health, safety, and enjoyment of the restoration sites.

Rather than attaching a small fund to each project, the Trustees and the Company will establish a \$500,000 fund to cover all long-term monitoring and maintenance actions.⁴⁰

The primary goals of the monitoring and maintenance activities are to ensure that the habitat projects function as designed and are maintained and repaired as necessary. In the restoration ecology and wetland engineering literature, this process of monitoring and mid-course adjustment is known as adaptive management.⁴¹ Monitoring is also important for measuring success, informing the local public and other interested parties regarding the progress of the

⁴⁰ A number of monitoring actions are routinely attached to permit approvals for projects conducting work in wetlands and streams. Monitoring that is required for compliance with the permits for the Cemetery Creek and Salmon Park projects, or other proposed construction activities, are directly covered under those projects. These compliance conditions are intended to assure the regulatory agencies that the project will be constructed as planned and to minimize construction-related environmental impacts. For example, compliance monitoring and maintenance may include: use and maintenance of temporary erosion controls (e.g., silt fences); use and maintenance of fish screens to exclude fish from the project area; testing of fill materials to demonstrate they do not contain contaminants; monitoring of water quality and turbidity during construction; cleanup and restoration of staging and parking areas; watering and monitoring to ensure survival of plantings; and submission of an As-Built Report after project completion.

⁴¹ <http://www.epa.gov/owow/wetlands/restore/principles.html#17> and <http://www.epa.gov/owow/wetlands/restore/>.

projects, and improving the understanding of restoration science and design of future restoration projects.⁴²

The restoration activities will use commonly accepted monitoring protocols and typical maintenance practices. The maintenance and monitoring projects are not anticipated to have any deleterious impacts. Unless a need for major repairs or mid-course corrections is identified, the monitoring and maintenance actions are anticipated to cause only minimal disturbance to the restoration sites—primarily through foot traffic of the scientific and maintenance crews. The occasional removal of hazardous trees may require use of trucks and other equipment. Maintenance crews will attempt to minimize impacts to sensitive areas when such upkeep is required.

The specific details of the monitoring and maintenance projects (i.e., primary and reference locations, frequency, sample size, etc.) will depend on specific project objectives, whether changes to this plan become necessary, and the completion of the detailed design documents for each of the plan elements. The Trustees anticipate that the maintenance fund will be used for the following actions:

Monitoring

The main objectives of monitoring are to ensure that the habitat restoration projects function as designed and to identify corrective actions to ensure that these projects continue to function over time. Monitoring will be used to assess long-term effectiveness of the restoration and to determine the need for corrective actions. It is anticipated that a variety of biological, physical, and chemical parameters will be monitored to meet these objectives.

Biological Parameters

- Vegetation surveys to determine species composition, density, plant health, mortality, percentage cover, canopy closure percentage, presence of invasive species, and herbivore damage (e.g., girdling by beaver) in impact and restoration areas;
- Fish community surveys to assess use of the stream and restoration sites by anadromous and resident fish. Such monitoring will include surveys of fish spawning areas (e.g. redd and carcass surveys) and use of the restoration areas by adult and juvenile fish;
- Macroinvertebrate community surveys to assist our understanding of the recovery of the stream ecology, habitat quality, and also to serve as indicators of the quality and quantity of food resources available to salmon, trout, and other aquatic animals; and

⁴² Periodic monitoring and maintenance reports will be prepared for the various projects.

- Riparian wildlife/terrestrial community surveys to document the presence, relative abundance, and habitat utilization of birds and terrestrial wildlife.

Physical and Chemical Parameters

- Riparian and stream habitat surveys to assess the persistence and function of instream wood structures (e.g. large woody debris), pool/riffle ratios, and channel characteristics;
- Surveys to identify the presence of dead and dying trees in the impact zone that may pose a safety hazard to the public;
- Erosion surveys to identify problem areas within the burn zone and restoration sites; and
- Water quality monitoring in the creek and restoration sites, which may include parameters such as temperature, turbidity, pH, dissolved oxygen, etc.

Photodocumentation

- Permanent photo points will be located at each restoration site to document seasonal and annual changes.

Maintenance

Results from the monitoring surveys will be used to help identify problem areas so that corrective actions can be taken to ensure recovery of the creek and riparian zone, and restoration projects function as intended. These actions include maintenance of:

Riparian Restoration Areas

- Riparian plantings throughout the Whatcom Creek corridor will require maintenance until they are established;
- Typical maintenance activities include removal of dead material, replanting, removal of invasive species, and protection from small mammal predation.

Stream Restoration Sites

- Habitat modifications and log structures placed in Whatcom Creek and at the Salmon Park and Cemetery Creek restoration sites to create habitat, trap sediment, and influence stream dynamics will be maintained to ensure their continued function for the intended purposes;
- Other structures such as ponds or connecting channels will be maintained to ensure they continue to function as designed.

Removal of Hazard Trees

- Removal of dead trees in the impact area to reduce safety hazards to the public.

Erosion Control

- Riparian areas impacted by the fire may need ongoing erosion control (e.g., mulching, plantings, cribbing) during recovery.

5.3 Non-Preferred Alternatives

The Trustees considered the following restoration projects to replace ecological and human-service losses resulting from the Incident. All of the non-preferred projects were expected to be beneficial, but the Trustees rejected these projects because better alternatives existed or because the alternative did not meet one or more of the evaluation criteria discussed above.

No Action—The Trustees considered the no-action alternative but rejected this option as the sole alternative because although natural recovery would occur over varying time scales for the various injured resources, the interim losses suffered would not be compensated under the no-action alternative.

Interpretive Center—This proposal involved creating an interpretive environmental center. The Trustees agree with many of the goals of this project but have determined that other proposed projects would more effectively restore fish and wildlife injuries and losses resulting from the Incident. The Trustees do intend to incorporate educational features and opportunities, where feasible, into the project designs. For example, the Salmon Park and Cemetery Creek projects will be designed to provide access, viewing, and recreational, and educational opportunities for the public by integrating trails, stream overlooks, and educational kiosks and markers.

Carcass Planting—Distributing salmonid carcasses in the Creek was considered as a strategy to restore the nutrient base and macroinvertebrate communities in the stream (AR #111-113). These nutrients and macroinvertebrates would, in turn, provide an increased food source for juvenile salmonids. Although this was a viable alternative, the return of many chum salmon to the Creek in the late summer and fall of 1999 provided a natural source of nutrients. Nutrients, in general, are not thought to be a limiting factor to creek restoration. Therefore, this proposal was determined to be unnecessary.

Additional Channel Habitat Modifications and Woody Debris in Whatcom Creek—These options involve creation or enhancement of instream features such as pools, gravel bars, riffles, glides, and runs (AR #114, 123, 134, 136). Most of these actions were conducted during the emergency phase of the Incident to reposition gravel that was disturbed during the streambed agitation work and replace woody debris that was removed (AR #1). Further channel habitat modifications in the Creek are not preferred because better restoration alternatives are available and because the necessary heavy machinery in the streambed has a potential to set back the recovery process. The Cemetery Creek and Salmon Park restoration projects identified in the preferred alternative involve modifications of existing or historical stream channels and placement of woody debris to enhance fish habitat. These projects are discussed in Section 5.2.2.

Debris Removal—The purpose of this project was to remove garbage and debris from the Creek to benefit habitat and aesthetic values. The Trustees have determined that much of the garbage was removed during the emergency response phase of the Incident and a specific restoration project focused on debris removal does not appear to be necessary at this time. If debris does become an issue, the maintenance fund could be utilized to address the problem. (See Section 5.2.4.)

Fish Passage—This project involved creating upstream passage for anadromous salmonids at Middle Falls, thereby increasing available spawning habitat and potentially greater fish production. The proposal involved creating a logjam below the falls to form a step pool. This would reduce the height of the falls to a level that salmon could jump. The Trustees have rejected this specific alternative because better restoration alternatives are available. The Trustees had concerns about the technical feasibility and life span of the step pool (AR #114, 134), competition with resident fish above the falls (AR #25, 115, 135), and potential aesthetic impacts to the falls.

Sewer Line Upgrades—This option involved upgrading the sewer line on the lower section of the Creek to make fish passage easier. Although relocation or removal of the sewer line from its current location (where it acts as a “check-dam”) may allow the stream to function naturally for a certain distance upstream, the improvements in habitat would be minor relative to the costs, environmental disturbance, and engineering effort necessary to relocate the sewer line. Furthermore, fish are able to pass the sewer line in its current configuration. Therefore, the Trustees have rejected this alternative.

Temperature Modifications—The Trustees have determined that water temperature is one of the limiting factors for salmonid productivity in the Creek (AR #15). Higher-than-optimal summer water temperatures are stressful (AR #26) and result in reduced growth and survival (Figure 27). Prevailing water temperatures are partly due to natural causes (the outlet of Lake Whatcom occurs in a warm, shallow bay and surface water temperatures routinely reach 20°C or more during summer months) and partly due to human causes (surface spillway, reduced summer flows due to regional water use, and loss of riparian forests along the lake and creek). Several temperature modification alternatives were evaluated, including searching for cold water from deep sections of Lake Whatcom, managing spilled water to reduce water temperatures, and adding groundwater flows to the Creek (AR #15). All of these alternatives have potential merit but were rejected because of volume of water necessary, technical feasibility, and concerns about sustainability.

Off-site Land Acquisition—The Trustees considered both on-site and off-site land acquisitions to help compensate for the lost ecological and human-use services (AR #15). The goals of the land acquisition are to prevent future development and promote ecological and recreational uses. A specific off-site acquisition project proposed by the Company was rejected by the Trustees because the land was already protected by conservation easements (AR #82, 83). Acquiring

lands in Whatcom Creek watershed was a priority because on-site acquisition would directly compensate for the human uses, while off-site acquisition would potentially benefit a different set of users. Furthermore, the relative scarcity of public lands within the urban boundary, as well as developmental pressures, make lands along the Creek much more valuable. Off-site acquisition was not necessary because on-site parcels of land were available.

Alternative Designs for Cemetery Creek and Salmon Park—At the request of the Trustees, the Company and its contractor, Inter-Fluve, Inc., developed a series of conceptual plans for the creation of fisheries habitats at the Cemetery Creek and Salmon Park sites (AR #118-122). These alternatives varied in the overall size of the projects, the locations of the pools and stream channels, amounts of woody debris, and the preservation of trees on the site. These various alternatives were reviewed for potential benefits and environmental impacts, as well as construction feasibility and regulatory and permitting concerns. These alternatives were reviewed by the Trustees and modified to increase the fisheries benefits and minimize the impacts to existing habitats. This iterative review and modification process resulted in the preferred plan in Section 5.2.2 .

Stocking—Following the Incident, the recreational fishery was closed, and it remains closed to allow recovery of sustainable populations of resident and anadromous fish stocks in the lower basin. The Trustees considered stocking sterile trout to help open a season as quickly as possible. There are, however, concerns regarding competition for food with surviving resident and anadromous fish stocks (AR #115, 135). Therefore, the Trustees have rejected this alternative.

Whatcom Falls Hatchery Upgrades—The Trustees considered improvements to the hatchery in the Park as compensation for the lost fishing opportunities in the Creek. Warm water temperatures currently preclude year-round hatchery operations. As a result, the hatchery is prevented from rearing certain species and cannot raise fish to recreationally harvested sizes. The alternative involved trying to find a source of colder water so that the hatchery could operate through the summer months. These fish would then be available for recreational stocking of lakes in the area. The Trustees rejected this proposal because of the costs and feasibility associated with providing cooler water and the broader concerns over stocking of hatchery-reared fish (AR #115, 127).

Planting Large Trees—The focus of forest revegetation efforts to date has been the planting of seedlings. The Trustees evaluated whether planting older and larger trees would enhance the recovery rate of the forest canopy. The Trustees determined that while the technology exists to move large (up to 50-foot) trees, the costs and maintenance needs are high, survival of the trees can be low, and their growth rates may be retarded for several years. Smaller trees have a high survival rate and have inherently more rapid growth; after overcoming the temporary stress of transplantation, small trees quickly resume their growth. A smaller tree will recover sooner and may actually be taller than a larger transplanted tree ten years later (AR #116). Furthermore, planting large trees would require temporary roads and heavy equipment in areas that are

sensitive to disturbance. Smaller trees can be hand-carried and planted without the use of heavy equipment. As a result, the Trustees rejected the concept of widespread planting of large trees, but may selectively plant 5- to 10-foot trees where access is feasible (e.g., near access roads).

Gabion Removal—Gabion (rock-filled wire basket) removal would provide a flood benefit; however, it is not directly related to the injury and difficult to scale. In addition, gabions are located downstream of the burn and not in the area affected most by the Incident. Although habitat improvements can be made following gabion removal, the Trustees believe that other projects provide greater ecological and recreational benefits.

Automobile Use Reduction—The suggestion to fund a program to pay people who work and commute to downtown Bellingham to ride their bikes, walk, or take the bus instead of driving has the potential of reducing air and water pollution within the Whatcom Creek watershed and Bellingham as a whole. This project was proposed as part of the Lake Whatcom/Whatcom Creek residential pledge project (AR #117). These benefits, although real, are extremely difficult to quantify and very difficult to monitor for success.

5.4 Restoration Summary

A total of thirty-four specific restoration alternatives and/or restoration locations were identified. These restoration alternatives were evaluated for restoration location and site characteristics, restoration description, overall goal of restoration, objectives, implementation issues, economic feasibility issues, and methods of monitoring and judgment of success.

Table 5 summarizes the injuries and preferred restoration alternatives for the Incident.

Table 5: Injuries and preferred restoration alternatives

| Preferred Alternative | Injury Categories | Description and Benefits |
|---|---|---|
| <p>Completion of planting and invasive- species control</p> | <p>Vegetation, Wildlife, Salmonids, Water Quality, Recreation</p> | <p>The vegetation projects implemented during Emergency Restoration Phase will be completed. The burn zone was replanted and areas dominated by invasive vegetation prior to spill were restored using native vegetation. The planting of trees and removal of invasive vegetation will have multiple benefits to the park, terrestrial wildlife, and help to protect water quality in Whatcom Creek.</p> |
| <p>Acceptance of 4-acre parcel along Whatcom Creek near confluence with Cemetery Creek</p> | <p>Vegetation, Wildlife, Salmonids, Water Quality, Recreation</p> | <p>Acceptance of the transfer of this parcel will help protect Whatcom Creek. This parcel was selected for acquisition for protection from development, connectivity of wildlife habitat, parks and greenways, and to leverage future restoration projects. Restoration projects conducted on this site will be specifically designed to benefit fish, wildlife and riparian habitat. Trails along the edge of the parcel will provide recreational benefits.</p> |
| <p>Acceptance of 9.5-acre parcel along Whatcom Creek at Woburn Street</p> | <p>Vegetation, Wildlife, Salmonids, Water Quality, Recreation</p> | <p>Acceptance of the transfer of this parcel will expand Whatcom Falls Park. The additional land will provide increased access to park trails and creek for public use such as hiking, nature watching, fishing. The acquisition of the riparian area will preclude development and protect an important spawning and rearing area for salmonids. The acquisition will also benefit water quality, vegetation, and wildlife.</p> |
| <p>Recreational Improvements to 9.5-acre parcel</p> | <p>Recreation</p> | <p>Construction of a small parking lot and restrooms facility. These improvements will benefit recreational use of the park, but will use an existing access road and be designed to minimize impacts on fish and wildlife habitat.</p> |
| <p>Salmon Park Project</p> | <p>Fish, Aquatic Biota, Recreation, Wildlife, Water Quality</p> | <p>Construction of off-channel salmonid habitat near Racine Street will improve winter refuge habitat for juvenile salmonids and provide benefits to aquatic and terrestrial wildlife. Creation of backwater channel will also benefit public uses such as nature watching and tribal and recreational fisheries.</p> |
| <p>Cemetery Creek Project</p> | <p>Fish, Aquatic Biota, Recreation, Wildlife, Water Quality</p> | <p>Construction of pools, wetlands and salmonid rearing habitat on lower Cemetery Creek will benefit salmon and also provide public uses such as nature watching and tribal and recreational fisheries.</p> |
| <p>Monitoring and Maintenance</p> | <p>All</p> | <p>Funding for long-term monitoring of Whatcom Creek and restoration projects. Funding for maintenance of the restoration projects and parklands injured by the Incident.</p> |

6.0 COORDINATION WITH OTHER PROGRAMS, PLANS, AND REGULATORY AUTHORITIES

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 and the NEPA. The Oil Pollution Act and its regulations provide the basic framework for natural resource damage assessment and restoration. The 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 environment or economic programs or plans that are ongoing or planned in or near the affected environment. For example, as previously noted, the restoration projects may be occurring, in part, in an urban park that is subject to comprehensive planning. A number of documents have been and will be produced as a part of that park and City planning process. Additionally, the Creek has been the focus of community-based restoration efforts. The Trustees will work with the sponsors of the ongoing restoration projects to ensure that 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.

In initiating this final RP/EA, the Trustees have elected to combine the restoration plan required under the Oil Pollution Act with the environmental processes required under the NEPA. This will enable the Trustees to implement restoration more rapidly than if these processes had been undertaken sequentially.

6.2 Key Statutes, Regulations and Policies

There are a number of federal, state, tribal, and local statutes, regulations, treaties 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), 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.

This rule provides a framework for conducting sound natural resource damage assessments that achieve restoration. The process emphasizes both public involvement and participation by the RP(s). The Trustees have followed the regulations in this assessment.

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 Council on Environmental Quality. 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 Environmental Assessment. The Environmental Assessment 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 or a finding of no significance (FONSI) will be issued.

The Trustees have integrated this final RP/EA with the NEPA process to comply, in part, with those requirements. This integrated process allows the Trustees to meet the public involvement requirements of the Oil Pollution Act and NEPA concurrently. This final RP/EA is intended to accomplish partial NEPA compliance by:

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

Project-specific NEPA documents may need to be prepared for those proposed restoration projects not already analyzed in an environment assessment or environmental impact statement. There are similar state requirements (Ch. 43.21C RCW) that will need to be met as part of the regulatory evaluation of some of the restoration projects.

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 waters or wetlands (e.g., hydrologic restoration of marshes) require Section 404 permits. Under Section 401 of the CWA, restoration projects that involve discharge or fill to wetlands or navigable waters must obtain certification of compliance with state water quality standards (Section 401). Generally, restoration 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 Trustees anticipate that the Salmon Park and Cemetery Creek restoration projects will require Section 404 permits.

Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), 16 U.S.C. §§ 1801, *et seq.*, 50 CFR Part 600

In 1996, the Act 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 to fish for spawning, breeding, feeding or growth to maturity" (62 Fed. Reg. 66551, § 600.10 Definitions). The MSFCMA requires consultation for all federal agency actions that may adversely affect essential fish habitat. Under Section 305(b)(4) of the Act, the National Marine 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 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 NMFS prior to implementation of any restoration project occurring in an area covered by the Pacific Fishery Management Council.

Coastal Zone Management Act, 16 U.S.C. §§ 1451, *et seq.*, 15 CFR Part 923

The goal of the Coastal Zone Management Act (CZMA) is to preserve, protect, develop, and, where possible, restore and enhance the nation's coastal resources. The federal government provides grants to states with federally approved coastal management programs. The State of Washington has a federally approved program. Section 1456 of the CZMA requires that any federal action inside or outside of the coastal zone that affects any land or water use or natural

resources of the coastal zone shall be consistent, to the maximum extent practicable, with the enforceable policies of approved state management programs. It states that no federal license or permit may be granted without giving the state the opportunity to concur that the project is consistent with the state's coastal policies. The regulations outline the consistency procedures.

The Trustees do not believe that any of the proposed projects will adversely affect the state's coastal zone, but will consult the CZMA to ensure that any applicable projects are consistent to the maximum extent practicable with the enforceable policies of the state coastal program.

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. §§ 9601, *et seq.*

The Act 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 substances and will undertake no actions which might constitute "arrangement for disposal of hazardous substances." At this time, the Trustees are not aware of any potential hazardous-substance problem associated with the areas where restoration projects will occur.

Model Toxics Control Act (MTCA), Ch. 70.105D RCW (1989) and Ch. 173-340 WAC (1992). MTCA, Washington's toxic cleanup law, mandates that site cleanups protect the state's citizens and the environment. The regulations established cleanup standards which provide a uniform, statewide approach to cleanup that can be applied on a site-by-site basis; and requirements for cleanup actions, which involve evaluating the best methodology to achieve the cleanup standards at a site. MTCA is the state equivalent of the Federal Superfund program and is managed by WDOE. WDOE is a Trustee for this site so MTCA compliance will be inherent in the Trustee decisionmaking process.

Endangered Species Act, 16 U.S.C. §§ 1531, *et seq.*, 50 CFR Parts 17, 222, 224

The Act 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 the ESA, NOAA, through NMFS, 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 several of the preferred ecological alternatives will benefit some endangered species, notably chinook salmon. Certain projects that require significant construction activity may disturb endangered species, although the regulatory permits and consultation 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 permitting process for the in-water projects, such as Salmon Park, Cemetery Creek, and the park improvements.

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, NMFS, 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 the Clean Water Act, the NEPA or other federal permit, license, or review requirements.

In the case of restoration actions for this Incident, the fact that the three consulting agencies for the Fish and Wildlife Coordination Act (i.e., USFWS, NMFS and WDFW) are represented by the Trustees means that FWCA compliance will be inherent in the Trustee decision-making process.

Rivers and Harbors Act, 33 U.S.C. §§ 401, *et seq.*

The Rivers and Harbors Act regulates development and use of the nation's navigable waterways. Section 10 of the Act prohibits unauthorized obstruction or alteration of navigable waters and vests the U.S. Army Corps of Engineers with authority to regulate discharges of fill and other materials into such waters. Restoration actions that require Section 404 Clean Water Act permits are likely also to require permits under Section 10 of the Rivers and Harbors Act; however, a single permit usually serves for both. Therefore, the Trustees can ensure compliance with the Rivers and Harbors Act through the same mechanism.

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 analyses conducted by federal agencies under the NEPA and of developing mitigation measures that avoid disproportionate environmental effects on minority and low-income populations.

The Lummi Nation and Nooksack Tribe constitute distinct, separate communities of Native Americans who rely on Treaty-reserved fish and shellfish resources for subsistence, economic, and spiritual purposes. Other members of low-income communities may rely on fishery resources for subsistence purposes. The Trustees have not identified any disproportionate, adverse impacts on human health or environmental effects on implementation of the Preferred Alternative on Native Americans or other minority or low-income populations and believe that

the projects will be beneficial to these communities. The Tribes are Trustees for this Incident and their representation will be inherent in the Trustee decisionmaking 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 impacts 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. If the only practicable alternative requires siting in a floodplain, the agency must: 1) design or modify the action to minimize potential harm; and 2) prepare and circulate a notice containing an explanation of why the action is proposed to be located in the floodplain. The Trustees will take the appropriate steps to comply with EO 11988 should any of the preferred alternatives be located in the floodplain.

Treaty of Point Elliott, 12 Stat. 927 (1855)

The Treaty of Point Elliott to which the Lummi Nation, the Nooksack Tribe and the United States are parties, reserves to the tribal signatories, among other rights, the right of taking fish at all usual and accustomed places and the rights of hunting and gathering. Among the places where the Lummi Nation and the Nooksack Tribe reserved fishing, hunting and gathering rights are the Creek. Under federal court decisions including United States v. Washington, 312 Fed. Supp. 384 (WD WA, 1974), these Tribes are co-managers of the fisheries resources found in the Creek and of those fisheries resources that utilize the Creek for spawning and rearing.

6.3 Other Potentially Applicable Laws and Regulations

This section lists other laws that potentially affect the restoration activities. The statutes or their implementing regulations may require permits from federal or state permitting authorities. The permitting process also may require an evaluation of statutes other than those listed below.

Archaeological Resources Protection Act, 16 U.S.C. §§ 470, *et seq.*

Clean Air Act, 42 U.S.C. §§ 7401, *et seq.*

Marine Mammal Protection Act, 16 U.S.C. §§ 1361, *et seq.*

Migratory Bird Treaty Act, 16 U.S.C. §§ 703, *et seq.*

National Historic Preservation Act, 16 U.S.C. §§ 470, *et seq.*

Treaty of Point Elliott, 1855. S. Doc. 319, 58-2, vol. 2:43, 12 Stat. 927 (1855)

6.4 Cedar and Salmon Cultural Framework

In addition to the potentially applicable federal, state, and local laws and regulations, the Trustees have also considered Tribal policies, priorities, and guiding principles. For many centuries, the native people of the Pacific Northwest based their economy, culture, and religion on salmon fishing. The Western red cedar tree also was also critical to the tribes for shelter, clothing, transportation, and art. The Trustees have attempted to address this cultural framework through salmon restoration and planting of cedar trees and other native vegetation along the Creek.