

Environmental Consequences

This section describes the impacts that the proposed restoration alternatives are expected to have on the affected resources at the Otter Point site. The two alternatives were evaluated, No Action Alternative (Alternative 1) and active restoration approach (Alternative 2). This chapter is organized by resource and presents the potential impacts by alternative. This organizational structure was chosen primarily to evaluate in a systematic manner the many resource topics. This structure was also chosen to facilitate interagency consultations and the review of the impact analysis by various stakeholders and other interested parties. Implementing this style of analysis helps to assure that impacts are thoroughly and comprehensively evaluated, but it does lend itself to some overlap and repetition between similar injury types and resource topics.

Three categories of effects, or impacts, are considered and analyzed: (1) direct effects, which occur at the same time and in the same place as the action; (2) indirect effects, which occur later or at a location away from the action; and (3) cumulative effects, which are additive and include those that occur in the past, present, and foreseeable future. Direct, indirect, and cumulative effects are addressed for each affected resource under the proposed alternatives. The following resources described in Chapter 3, Affected Environment, were evaluated for potential effects.

1. Geology
2. Water Quality
3. Hydrology
4. Vegetation
5. Soils
6. Fish and Wildlife
7. Threatened and Endangered Species
8. Historic and Cultural Resources
9. Visitor Use and Experience
10. Land Use

Analysis Approach

The potential direct, indirect, and cumulative impacts of the alternatives were analyzed for the restoration methods. The resources expected to be affected by the proposed restoration alternatives are described in Chapter 3. Restoration actions and methods discussed in this environmental assessment are those currently approved and utilized by the Lewis and Clark National Historical Park.

Approach for Evaluating Alternatives

The impact analysis involved the following steps:

- Identifying the resource that could be affected.
- Identifying the cumulative effect, duration of impact (long-term or short-term), and intensity of impact (negligible, minor, moderate, or major).
- Identifying whether effects would be beneficial or adverse.

- Identifying mitigation measures that may be employed to offset or minimize potential adverse impacts.

The impact analyses were based on professional judgment using information provided by project designs, NPS staff, relevant references and technical literature citations, and subject matter experts.

Impacts and Effects

Under CEQ regulations the terms “effects” and “impacts” are used synonymously (40 CFR 1508.8). Impacts or effects of an action can be beneficial or adverse. Impacts, or effects, also consider spatial and temporal components. For this assessment, “place” is defined as the Otter Point site, but the meaning of “time” varies. When evaluating direct impacts from restoration actions and specific methods, “time” is defined as the period of time when the restoration activity is occurring.

Cumulative Impacts: The CEQ regulations to implement NEPA require an assessment of cumulative impacts. Under CEQ regulations a “cumulative impact is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.” For the purposes of this environmental assessment, cumulative impacts include other ongoing or reasonably foreseeable future projects and plans at the Fort Clatsop Unit of the Lewis and Clark National Historical Park and the contribution of the action on cumulative effects to the resource.

Duration of Impacts

Effects can be characterized by the duration of the effect. Short-term effects include actions that temporarily affect, or have the potential to affect, a resource for 12 months or less, such as disturbance during restoration of areas that are later reclaimed. Long-term effects include actions that affect a resource for greater than 12 months, and may or may not be permanent.

Intensity of Impacts

For all adverse impacts, the intensity of the impact on a given impact topic is described as negligible, minor, moderate, or major. For each impact topic, a distinct set of impact thresholds is used to provide definition of what constitutes an impact of a given intensity. The impact thresholds are aligned to relevant standards based on regulations, scientific literature and research, or best professional judgment. The intensity of an impact on a given topic is determined by comparing the effect to the impact threshold definitions for that topic. Impact thresholds are used for adverse impacts only.

Regulations and Policies—The Organic Act of 1916, NPS Management Policies (NPS 2006b), and NPS Reference Manual 77: National Resource Management Guidelines (NPS 1991) direct NPS managers to provide for the protection of Park resources. These regulations and policies require the NPS to protect and preserve geologic resources and processes.

Impairments

According to the 1916 Organic Act, which established the National Park Service, impairment is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values. An impact to any park resource or value may, but does not necessarily, constitute an impairment. An impact would be more likely to constitute impairment to the extent that it

- affected a resource or value whose conservation was necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or
- was key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or
- was identified in the park's general management plan or other relevant NPS planning documents as being of significance.

Implementation of either restoration alternative considered in this environmental assessment would not result in impairment to park resources. An impairment determination is made for each potentially affected resource for the No Action alternative (Alternative 1), the Active Restoration of Tidal Wetlands at Otter Point (Alternative 2), and the restoration actions overall. Impairment evaluation is only applicable to natural and cultural resources within the park boundaries. Therefore, impairment determinations were not made for visitor use and experience and land use resource evaluations.

Geology

Methodology

Recent field surveys conducted by the hired project engineer, and historical data of the geology and landscape morphology of the proposed project area were used in this analysis. Findings of these assessments and professional knowledge of landscape morphology were used to estimate the effects on the geology of the area.

Thresholds for Intensity, Duration, and Type of Effect:

- **Negligible**—Geologic resources would not be affected or effects would be below or at the lower levels of detection. Any effects to the geology or geomorphology of the site would be slight and no long-term effects would occur.
- **Minor**—The effects to geologic resources would be detectable. Changes in grade would be measurable through photographic documentation or channel cross-sections. If mitigation were needed to offset adverse effects, it would be relatively simple to implement and would likely be successful.
- **Moderate**—The effect on landscape morphology would be readily apparent and likely long-term. The resulting change to the geology would cover a relatively wide area (1-5 ac). Mitigation measures would probably be necessary to offset adverse effects and would likely be successful.
- **Major**—The effect on landscape morphology would be readily apparent, long-term, and substantially change the character of the wetland over a large area (> 5 ac). Mitigation measures to offset adverse effects would be needed, extensive, and their success could not be guaranteed.

Duration:

- **Short-Term**—Lasting only during the construction period or no longer than the first growing season thereafter.
- **Long-Term**—A permanent post-construction impact.

Alternative 1- No Action

Impact Analysis: The No Action Alternative does not entail any changes to the current structures and natural functions of the Otter Point wetland. This alternative would not affect the existing geology at the site from ongoing recreation activities. The Otter Point location would remain isolated from tidal action, and therefore there would be no risk of altered landscape morphology. However, the No Action alternative would perpetuate the artificial geology of diked tideland and filled tidal slough that currently exists at the Otter Point site, and therefore would not meet the NPS cultural and natural resources restoration goals.

Cumulative Impacts: The No Action alternative would not create conditions that would alter the current geological conditions or landscape morphology.

Conclusion: The No Action alternative would have negligible negative long-term effects on geology.

Impairment: There would be no impairment of geology under this alternative.

Alternative 2- Active Restoration of Tidal Wetlands at Otter Point

Impact Analysis: This alternative involves removing 25,546 cubic yards of historic dredge material from 4,952 linear feet of historic tidal channels and existing levee in order to reestablish tidal connectivity between the Lewis and Clark River and the Otter Point wetland. Excavation will expose the Otter Point site to riverine and tidal flows, creating the potential dynamic alteration of design grades throughout the restored wetland. In most cases, minor changes in grade are no a cause of concern, and may even be beneficial. The potential for adverse landscape morphology effects would be reduced through methods to stabilize the excavated channels such as strategically placing large woody debris in areas with increased tidal action, and vegetating stream banks to stabilize the soils (See Figure 4-1). Short-term adverse affects during construction would be minor or negligible and would be mitigated by installing erosion control methods, and excavating the tidal channels 1 year prior to breaching the existing levee to allow the channel time to harden before tidal inundation.

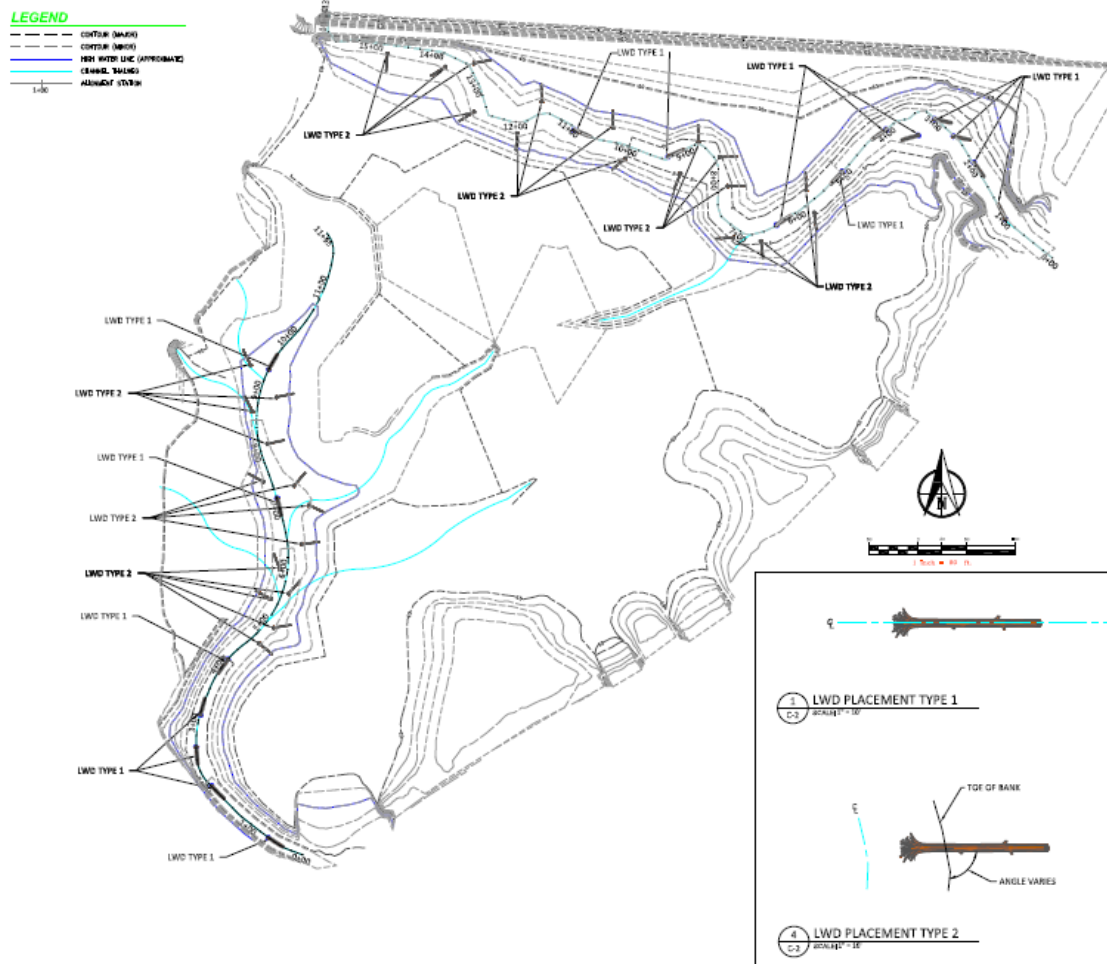


Figure 4-1. Project Design for Excavated Channels and Large Wood Placement at Otter Point Restoration Site

Cumulative Impacts: Alternative 2 would expose the Otter Point site to tidal inundation which will result in long-term beneficial alterations of the site's current landscape morphology by reestablishing historic conditions that were found on site prior to diking and filling activities.

Conclusion: Alternative 2 would have moderate long-term positive effects on geology and landscape morphology. Potential long-term adverse effects would be mitigated by placement of large wood and bank revegetation. Short-term adverse affects during construction would be minor or negligible and would be mitigated through erosion control methods.

Impairment: There would be no impairment of geology under this alternative.

Water Quality

Methodology

On-site visits and surface water quality datasets were utilized to estimate the effects of the proposed alternatives on surface water quality.

Thresholds for Intensity, Duration, and Type of Effect:

- **Negligible**—Very slight changes in surface water quality. Impacts barely detectable.
- **Minor**—Changes in surface water quality would be measurable, although the changes would likely be small and the effects would be localized. No mitigation measures would be necessary.
- **Moderate**—Changes in surface water quality would be measurable and potentially long-term but would be relatively local. Mitigation measures would be necessary and would be effective.
- **Major**—Changes in surface water quality would be measurable, long-term, and broad-scale. Mitigation measures would be necessary and their success would not be guaranteed.

Duration:

- **Short-Term**—Recovery in less than a year.
- **Long-Term**—Permanent post-construction impact.

Alternative 1- No Action Alternative

Impact Analysis: The No Action Alternative suggests no action would be taken to change the existing surface water hydrology or drainage patterns of water discharged from Otter Point. Surface runoff would continue to flow from the adjacent pasture directly into the Lewis and Clark River through the tide gate on the northeastern corner of the property.

Cumulative Impacts: The No Action alternative would not create conditions that will alter the current water quality at Otter Point or the adjacent properties.

Conclusion: This alternative would have negligible long-term negative effects on the water quality of the Otter Point wetland and the adjacent Lewis and Clark River.

Impairment: There would be no impairment of water quality to the Otter Point wetland or the adjacent Lewis and Clark River from this alternative.

Alternative 2- Active Restoration of Tidal Wetlands at Otter Point

Impact Analysis: Alternative 2 project designs recommend creating a bioswale on the northern border of the enhanced levee. This bioswale would have dimensions of 6 feet wide and approximately 4 feet deep (See Figure 4-2). This aspect of the project design would allow for more filtration of surface water runoff through the bioswale, as well as the enhanced wetland system. Additional nutrients and bacteria would have increased chance of being filtered out instead of becoming surface water pollution. Project designs allow for some flexibility of the excavation depth of the proposed bioswale. If it is determined that a

deeper swale is necessary in compensate for higher than expected water volumes, the design of the bioswale can be altered to accommodate that need. Proposed native plantings would add shade and future large wood recruitment into the system, thereby reducing overall in stream water temperature as well.

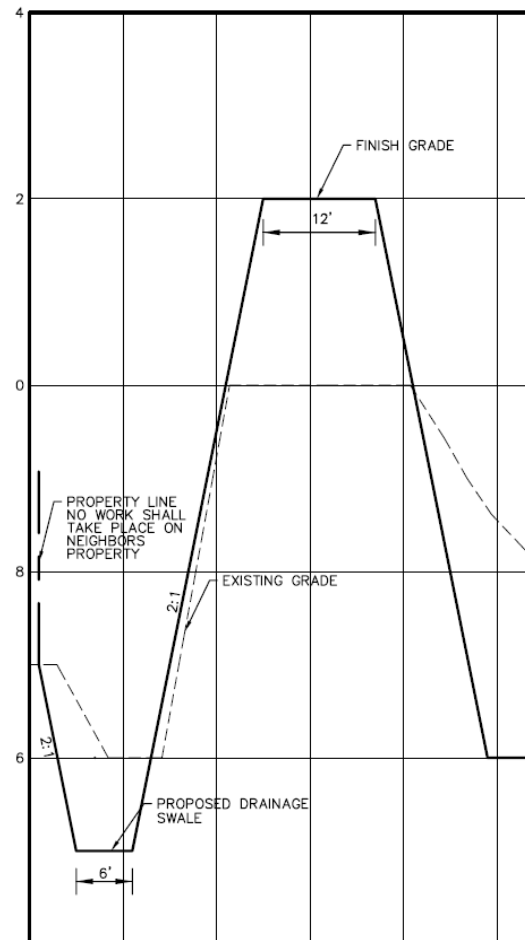


Figure 4-2. Project Design for Constructed Enhanced Levee and Bioswale at Otter Point Restoration Site

Cumulative Impacts: The substantial mitigative measures associated with this alternative would provide minor benefits from increased filtering capabilities within the Lewis and Clark floodplain.

Conclusion: When compared with current conditions, this alternative with the recommended mitigation measures would have minor long-term positive effects to surface water quality.

Impairment: There would be no impairment of water quality to the Otter Point wetland or the adjacent Lewis and Clark River from this alternative.

Hydrology

Methodology

Two-dimensional modeling using was utilized to compute water surface elevations and horizontal velocity components for free-flows both within the Otter Point Project area and the downstream tidal and upstream flow boundary locations.

Thresholds for Intensity, Duration and Type of Effect:

- **Negligible**—Very slight changes in surface hydrology. Impacts barely detectable.
- **Minor**—Changes in surface water hydrology would be measurable, although the changes would likely be small and the effects would be localized. No mitigation measures would be necessary.
- **Moderate**—Changes in surface hydrology would be measurable and potentially long-term but would be relatively local. Mitigation measures would be necessary and would be effective.
- **Major**—Changes in surface hydrology would be measurable, long-term, and broad-scale. Mitigation measures would be necessary and their success would not be guaranteed.

Duration:

- **Short-Term**—Recovery in less than a year.
- **Long-Term**— Permanent post-construction impact.

Alternative 1- No Action Alternative

Impact Analysis: The No Action Alternative suggests that taking no action at the site would not change the existing surface water hydrology or water storage capacity of the Otter Point wetland. The Otter Point wetland would continue to be isolated from the Lewis and Clark River, and would therefore not provide additional water storage capacity or pollutant filtration.

Cumulative Impacts: The No Action alternative would not create conditions that will alter the current hydraulic and hydrologic conditions at Otter Point or the adjacent properties.

Conclusion: This alternative would have negligible long-term negative effects on the hydrology of the Otter Point wetland and the adjacent Lewis and Clark River due to its inability to provide proper wetland functions of filtration and water storage within the floodplain.

Impairment: There would be no impairment of hydrology to the Otter Point wetland or the adjacent Lewis and Clark River from this alternative.

Alternative 2- Active Restoration of Tidal Wetlands at Otter Point

Impact Analysis: The effects of this alternative would not only impact the site itself, but also the Lewis and Clark River system. Alternative 2 would restore hydrologic connectivity between the Otter Point wetland and the Lewis and Clark River. Reestablishing surface connectivity with upstream seeps, springs and intermittent streams would recreate the ecological complexity of the historic tidal wetland. It would also increase the water storage

capacity of the Lewis and Clark River floodplain, and rehabilitate the wetland filtration functions of Otter Point for the larger watershed system

Cumulative Impacts: This alternative, in conjunction with other restoration projects on the Lewis and Clark River, would provide minor long-term positive effects for the River. It would also have a major long-term positive effect on the site itself from hydrologic reconnection and rehabilitation of historic wetland functions.

Conclusion: When compared with current conditions, this alternative would have minor long-term positive effects to surface hydrology of the Lewis and Clark River, and major long-term positive effects on the hydrology of the project site.

Impairment: There would be no impairment of hydrology to the Otter Point wetland or the adjacent Lewis and Clark River from this alternative.

Vegetation

Methodology

Multiple site visits, vegetation community maps and wetland delineation maps, as well as professional knowledge of NPS staff were used to determine potential effects of proposed alternatives at the Otter Point site.

Thresholds for Intensity, Duration and Type of Effect:

- **Negligible** – Direct or indirect impacts would have perceptible but small changes in the size, integrity, or continuity of vegetation at the site.
- **Minor** – Disturbance of vegetation would be measurable or perceptible but limited in size to less than one acre. The overall viability of plant communities would not be affected and would recover. The introduction of exotic plants would be limited to those species already established at the site.
- **Moderate** – Disturbance of 1 to 5 acres of vegetation would occur. Impacts would cause a change in the plant communities (e.g. abundance, distribution, quantity, or quality), but the impacts would remain localized. May result in the introduction of non-aggressive exotic plant species not previously established in the park.
- **Major** – Disturbance of more than 5 acres of vegetation or any disturbance to federally listed plant species would occur. This alternative would also result in the introduction of aggressive exotic plant species not already established in the park.

Duration:

- **Short-term** – The physical impact from the proposed actions would require less than one growing season for the full recovery of plant communities.
- **Long-term** – The physical impact from the proposed actions would require more than one growing season for the full recovery of plant communities

Alternative 1- No Action

Impact Analysis: Immediate removal of invasive species would not be conducted under this alternative. There would be negligible negative impacts to existing vegetation, and no

change in extent or competition at this time. However, active eradication of invasive plant species would be conducted at the site as part of the park's long-term management plan. Efforts could include mechanical removal methods similar to those proposed in the active restoration alternative.

Cumulative Impacts: This alternative would result in negligible short-term negative impacts by allowing invasive vegetation to continue to thrive within the Otter Point wetland at this time.

Conclusion: Alternative 1 would have negligible short-term negative impacts on existing vegetation. Invasive species removal at Otter Point conducted as part of the park's general management plan would have moderate to major long-term positive effects depending on the method used, and the area treated.

Impairment: There would be no impairment of vegetation from Alternative 1.

Alternative 2- Active Restoration of Tidal Wetlands at Otter Point

Impact Analysis: The Alternative 2 project design specifies several methods to actively improve existing vegetation conditions within the Otter Point site. These methods include mowing the reed canary grass then carefully stripping the upper root zone (approximately 1 foot), for an estimated total of 32,574 cubic yards of non-native organic material removed from the site. Enhanced species diversity will be encouraged by hydrological reconnection and planting of native species on approximately 15 acres of wetland, riparian and upland throughout the restored areas of the wetland (See Figure 4-3).

Cumulative Impacts: This alternative would result in major long-term benefits to vegetation within the Otter Point wetland by removing invasive plants, restoring conditions that promote tidal wetland vegetation, and replanting the site with native plant species.

Conclusion: Alternative 2 will have major long-term positive effects on the Otter Point site.

Impairment: There will be no impairment of vegetation from Alternative 2.



Figure 4-3. Project Design for Revegetation of the Otter Point Restoration Site

Soils

Methodology

Recent soil surveys, as well as the engineering feasibility study, USGS soils maps and professional knowledge from NPS staff were used to estimate the effects of the actions on soils.

Thresholds for Intensity, Duration, and Type of Effect:

- **Negligible**—Soil resources would not be affected or effects would be below or at the lower levels of detection. Any effects to soil erosion potential or productivity would be slight and no long-term effects would occur.
- **Minor**—The effects to soil resources would be detectable. Effects to soil erosion potential or productivity would be small, as would be the area affected (< 1 ac). If mitigation were needed to offset adverse effects, it would be relatively simple to implement and would likely be successful.
- **Moderate**—The effect on soil erosion potential or productivity would be readily apparent and likely long-term. The resulting change to soil character would cover a relatively wide area (1-5 ac). Mitigation measures would probably be necessary to offset adverse effects and would likely be successful.
- **Major**—The effect on soil productivity quality would be readily apparent, long-term, and substantially change the character of the soils over a large area (> 5 ac). Mitigation measures to offset adverse effects would be needed, extensive, and their success could not be guaranteed.

Duration:

- **Short-Term**—Lasting only during the construction period or no longer than the first growing season thereafter.
- **Long-Term**—A permanent post-construction impact.

Alternative Action 1- No Action

Impact Analysis: The No Action alternative would not involve any changes to the current levee structures or channel grades on Otter Point. There will be no additional soil erosion or deposition within the site.

Cumulative Impacts: The No Action alternative would not substantially add to soil erosion or reduced productivity within the scope of existing land use at Otter Point.

Conclusion: The No Action alternative would have negligible long-term effects on soil erosion and productivity at Otter Point.

Impairment: There would be no impairment of the soil from this alternative.

Alternative Action 2- Active Restoration of Tidal Wetlands at Otter Point

Impact Analysis: The recommended actions at this site would involve regrading historic channels that transect the wetland to reestablish natural floodplain hydrology and nutrient exchange. These channels experienced sedimentation after dredge material was placed on site, and the wetland was isolated from tidal and riverine flows through diking. Removing 25,546 cubic yards of historic dredge material and re-introducing the site to riverine and tidal flows would renew historic soil dynamics and nutrient exchange processes. Minor short-term adverse effects during construction would be mitigated through erosion control methods and reseeding disturbed areas of the project site following construction activities

Cumulative Impacts: The cumulative impacts of this alternative would result in major long-term positive impacts resulting from increases in soil productivity through enhanced nutrient exchange.

Conclusion: Alternative 2 would result in major long-term positive effects on soil conditions at Otter Point. Mitigation efforts such as erosion control methods and reseeding will off-set potential minor short-term negative effects during construction.

Impairment: There would be no impairment of the soil from Alternative 2.

Fish and Wildlife**Methodology**

On-site visits, on-going research, and knowledge and technical expertise by park staff were used to estimate the effects of the proposed actions in the various alternatives.

Thresholds for Intensity, Duration, and Type of Impact:

- **Negligible**—Wildlife would not be affected or the effects would be at or below the level of detection, would be short-term, and the changes would be so slight that they would not be of any measurable or perceptible consequence to the wildlife species' population.
- **Minor**—Disturbance of native terrestrial and/or aquatic wildlife habitat would be limited to one acre or less for terrestrial communities and to highly localized areas along length of the Lewis and Clark River.
- **Moderate**—Disturbance of regionally typical native terrestrial and/or aquatic wildlife habitat would occur. The area of disturbance would be from over one to five acres of terrestrial habitat and the localized areas along length of the Otter Point wetland from the point of construction disturbance to the Lewis and Clark River.
- **Major**—Disturbance of more than five acres of regionally typical terrestrial wildlife habitat. Disturbance of both the Otter Point wetland and a measurable portion of the Lewis and Clark River itself.

Duration:

- **Short-Term**—Complete disturbance recovery in less than five years.
- **Long-Term**—Disturbance recovery requiring more than five years to return to pre-disturbance levels.

Alternative Action 1- No Action

Impact Analysis: The No Action alternative leaves the existing wetland unchanged. Limited habitat value of the degraded wetland would persist, with the exception of seasonal habitat to Roosevelt elk. There would also be no restoration of biologically valuable tidal wetland habitat.

Cumulative Impacts: This alternative would have minor long-term negative impacts due to perpetuation of low value habitat.

Conclusion: Alternative 1 would have minor long-term negative effects on fish and wildlife.

Impairment: There would be no impairment of the park's wildlife as a result of the No Action alternative.

Alternative Action 2- Active Restoration of Tidal Wetlands at Otter Point

Impact Analysis: Activities associated with Alternative 2 entail actively restoring 21 acres of estuarine wetland habitat and increasing overall habitat diversity throughout the entire 33.5 acre wetland site. 4,952 feet of off-channel estuarine habitat would be recreated, while also conserving Roosevelt elk habitat. Elk would experience minor long-term benefits from more nutrient-rich forage at the site. Increased edge habitat created would also benefit birds and smaller mammals native to the region. Minor short-term effects may occur due to displacement of elk during construction.

Cumulative Impacts: The cumulative effect of this alternative would result in major long-term habitat benefits for a variety of terrestrial and aquatic species at Otter Point. It may also result in minor short-term adverse effects due to elk displacement during construction.

Conclusion: The active restoration alternative would have major long-term positive impacts for wetland dependant wildlife at Otter Point, and minor short-term negative effects on elk during construction.

Impairment: There would be no impairment of the park's wildlife as a result of Alternative 2.

Threatened and Endangered Species

Methodology

On-site fish presence data from the mainstem of the Lewis and Clark River, as well as fish presence monitoring data from proximate tidal wetlands and available research on the Columbia River Estuary was used to estimate the effects of the proposed actions on threatened and endangered species. Fish presence surveys from the South Clatsop Slough Restoration site, located just upstream of the Otter Point wetland, indicated a dramatic increase in the number of juvenile salmonids utilizing the habitat after the completion of the 44 acre wetland restoration. Not only did the monitoring data reveal a 10-fold increase in the number of individual salmonids surveyed, salmonid species diversity also increased from 2 species to 5. Similar results would be expected following completion of Phase II of the Active Restoration method. However, no impact to threatened or endangered species is anticipated from Phase I implementation activities.

Thresholds for Intensity, Duration, and Type of Impact:

- **Negligible**—Threatened and Endangered species would not be affected or the effects would be at or below the level of detection, would be short-term, and the changes would be so slight that they would not be of any measurable or perceptible consequence to the wildlife species' population.
- **Minor**—Disturbance of native terrestrial and/or aquatic habitat for threatened and endangered species would be limited to one acre or less for terrestrial communities and to highly localized areas along length of the Lewis and Clark River.
- **Moderate**—Disturbance of regionally typical native terrestrial and/or aquatic habitat for threatened and endangered species would occur. The area of disturbance would be from over one to five acres of terrestrial habitat and the localized areas along the length of the Otter Point wetland from the point of construction disturbance to the Lewis and Clark River.
- **Major**—Disturbance of more than five acres of regionally typical terrestrial habitat for threatened and endangered species. Disturbance of both the Otter Point wetland and a measurable portion of the Lewis and Clark River itself.

Duration:

- **Short-Term**—Complete disturbance recovery in less than five years.
- **Long-Term**—Disturbance recovery requiring more than five years to return to pre-disturbance levels.

Alternative 1- No Action

Impact Analysis: Under the No Action alternative, conditions of the existing wetland would remain unchanged. No increase of off-channel salmonid refugia would be reestablished, and therefore the requirements of the 2008 Biological Opinion for the Federal Columbia River Power System would not be met.

Cumulative Impacts: This alternative would result in minor long-term negative impacts to threatened and endangered species due to continued lack of adequate salmonid habitat.

Conclusion: The No Action alternative would result in minor long-term negative effects to threatened and endangered species that would continue to contribute to the decline of salmon populations in the Lower Columbia River basin.

Impairment: There would be no impairment to threatened and endangered species from the No Action alternative.

Alternative 2- Active Restoration of Tidal Wetlands at Otter Point

Impact Analysis: Activities associated with Alternative 2 would involve restoring approximately 8 acres of off-channel juvenile salmonids habitat in the Lower Columbia River Estuary. Off-channel habitat would be enhanced by installation of large woody debris to provide in stream complexity and cover from predation. Riparian plantings would provide shade cover and potential for inputs of macrodetritus. Minor short-term adverse impacts during construction would be mitigated using soil plugs, erosion control methods and revegetating disturbed areas of the site. Phase I construction activities will have no effect on threatened and endangered species. NPS will conduct a biological assessment of the site prior to Phase II implementation as part of the Endangered Species Act Section 7 Consultation.

Cumulative Impacts: Alternative 2 would result in major long-term beneficial impacts to threatened and endangered species as a result of increased off-channel habitat for salmonids. Potential minor short-term adverse effects would be mitigated.

Conclusion: Alternative 2 would result in major long-term positive effects for threatened and endangered species. Minor short-term negative effects would be mitigated to minimize stress to threatened and endangered species.

Impairment: There would be no impairment to threatened and endangered species from the restoration alternative.

Historic and Cultural Resources

Methodology

During the design phase of this project, an archeological technician conducted phase I of the cultural resources survey, which was included in the phase I design documents. Later, in the summer of 2010, a full archeological study was conducted at Otter Point as part of the Section 106 documentation. These studies were utilized in evaluating the effects of the

alternatives on the historic and cultural resources of the Fort Clatsop Unit of the Lewis and Clark National Historical Park.

Thresholds for Intensity, Duration, and Type of Impact:

- **Negligible** - Impact is at the lowest levels of detection, barely perceptible, and not measurable.
- **Minor - Adverse:** Disturbance of archeological site(s) and/or alteration of a pattern(s) or feature(s) of the landscape results in little, if any, loss of integrity. The determination of effect for Section 106 would be *no adverse effect*. **Beneficial:** Maintenance and preservation of an archeological site(s). For Cultural Landscapes, landscape patterns and preservation of an archeological site(s). For Cultural Landscapes, landscape patterns and features preserved in accordance with the Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes. The determination of effect for Section 106 would be *no adverse effect*.
- **Moderate - Adverse:** Disturbance of archeological sites(s) and/or alteration of a pattern(s) or feature(s) of the landscape would result in an overall loss of integrity. The determination for Section 106 would be adverse effect. A memorandum of agreement is executed among NPS and applicable state or tribal historic preservation officer and, if necessary, the Advisory Council on Historic Preservation in accordance with 36CFR 800.6(b). Measures identified in the MOA to minimize or mitigate adverse impacts reduce the intensity of impact under NEPA from major to moderate. **Beneficial:** Stabilization of a site and/or rehabilitation of a landscape or its patterns and features in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes*. The determination of effect for Section 106 would be *no adverse effect*.
- **Major - Adverse:** Disturbance of archeological site(s) and/or alteration of a pattern(s) or feature(s) of the landscape would result in an overall loss of integrity. The determination of effect for Section 106 would be *adverse effect*. Measures to minimize or mitigate adverse impacts cannot be agreed upon and NPS and applicable state or tribal historic preservation officer and/or Advisory council are unable to negotiate and execute a memorandum of agreement in accordance with 36CFR800.6(b). **Beneficial:** Active intervention to preserve a site and/or restore a landscape or its patterns and features in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes*. The determination of effect for Section 106 would be *no adverse effect*.

Duration:

- **Short-Term** - Disturbance only during construction activities.
- **Long-Term** - Disturbance lasting longer than construction activities.

Alternative 1- No Action

Impact Analysis: Under this alternative, activities that are currently taking place at the Otter Point site would continue into the future. Although these actions would not adversely affect the historic and cultural resources at Otter Point, they would not satisfy the goals set in the park's General Management Plan to recreate the historic riverine setting of Fort Clatsop.

Cumulative Impacts: The No Action alternative would not adversely impact the historic and cultural resources at Otter Point. There would be no adverse disturbance of

archeological sites or alterations to landscape features. However, there would also be no rehabilitation of the landscape features.

Conclusions: This alternative would have negligible long-term negative impacts on historic and cultural resources due to its failure to recreate the historic riverine setting of Fort Clatsop.

Impairment: There would be no impairment to cultural resources as a result of Alternative 1.

Alternative 2- - Active Restoration of Tidal Wetlands at Otter Point

Impact Analysis: Pedestrian surveys of the project site did not yield pre-Contact or historic sites within the current project areas. No historical properties, cultural features, artifacts, or modern refuse were identified during either pedestrian or subsurface survey investigations. Archival research does not locate any historical structures within the Otter Point project area. Therefore, data obtained during archaeological reconnaissance survey indicates that the project as proposed will have **no adverse effect** on historic properties, and may proceed as planned (Horton 2010: 49). However, an archeological monitor would be on site during all ground disturbing activities that exceed depths of 35 inches. Furthermore, NPS follows the standard operating procedure that mandates a cessation of all work, and immediate contact of the State Historic Preservation Office, if anthropogenic materials are encountered.

Cumulative Impacts: The cumulative effect of this alternative would create moderate long-term beneficial impacts at the proposed site due to rehabilitation of natural features. Measures are in place to avoid impairments that might occur due to discovery of anthropogenic materials.

Conclusions: This alternative would have moderate long-term positive impacts on the historic and cultural resources at Otter Point.

Impairment: Alternative 2 would not result in impairment to cultural resources

Visitor Use and Experience

Methodology

Personal observation of what is available to visitors under current management combined with information obtained from NPS personnel on visitation patterns, and applicable research were used to estimate the effects of the actions in the various alternatives.

Thresholds for Intensity, Duration, and Type of Effect:

- **Negligible**—Visitors would not likely be aware of the effects associated with changes proposed for visitor use and enjoyment of park resources.
- **Minor**—Visitors would likely be aware of the effects associated with changes proposed for visitor use and enjoyment of park resources; however the changes in visitor use and experience would be slight and likely short term. Other areas in the park would remain available for similar visitor experience.

- **Moderate**— Visitors would be aware of the effects associated with changes proposed for visitor use and enjoyment of park resources. Changes in visitor use and experience would be readily apparent and likely long term. Some visitors who desire to continue their chosen activity would be required to pursue their choice in other available local or regional areas.
- **Major**— Visitors would be highly aware of the effects associated with changes proposed for visitor use and enjoyment of park resources. Changes in visitor use and experience would be readily apparent and long term. The change in visitor use and experience proposed in the alternative would preclude future generations of some visitors from enjoying park resources and values. Some visitors who desire to continue their chosen activity would be required to pursue other available local or regional areas.

Duration:

- **Short-Term** — During construction
- **Long-Term** — Past construction and 10 years into future.

Alternative 1- No Action

Analysis: No changes to the existing site would occur. The current experience for kayakers, hikers and other park visitors would remain the same.

Cumulative Impacts: There would be no cumulative impacts to visitor use and experience as a result of this alternative.

Conclusion: Alternative 1 would result in negligible long-term negative effects on visitor use and experience due to the perpetuation of disturbed wetland conditions.

Alternative 2- Active Restoration of Tidal Wetlands at Otter Point

Impact Analysis: Construction of this project would not temporarily exclude park visitors from previously accessible park amenities. Construction efforts may temporarily impact the viewshed of the area, thereby creating negligible short- term adverse effects. However, this alternative would create opportunities to use the project as an educational tool and provide future capacity for trail expansion with the Warrenton Trail system.

Cumulative Impacts: Cumulatively, this alternative would be moderate long-term beneficial impacts.

Conclusion: The active restoration alternative would create negligible short-term adverse impact, while in contrast creating moderate long-term beneficial impacts on visitor use and experience.

Land Use

Methodology

On-site observation combined with detailed engineering and meticulous hydrological modeling was used to evaluate if the proposed alternatives would be compatible with the land uses of adjacent properties.

Thresholds for Intensity, Duration, and Type of Effect:

- **Negligible**—Changes to site conditions would be barely detectable and create no noticeable difference in for adjoining land uses.
- **Minor**—On-site functions would change to some extent but not unduly impact neighboring land uses. Changes would be unlikely to adversely affect the land use functions.
- **Moderate**— There would be noticeable changes in terms of land use. Measures to correct the altered functions may need to be implemented in response to such changes.
- **Major**— Changes would be substantial in all areas of land use function.

Duration:

- **Short-Term**—one-time finite definitive changes occur due to construction and/or modification. Once tasks are completed--- land use functions return pre-existing conditions.
- **Long-Term**—changes which are instituted that alter neighboring land use functions are expected to remain in effect 5 or more years.

Alternative 1- No Action

Impact Analysis: Existing conditions of the property directly adjacent to Otter Point were evaluated and compared with the conditions predicted in the hydraulic and hydrologic modeling conducted to estimate the impacts of the proposed alternatives. Alternative 1 would not change the existing conditions of either the Otter Point site, or the adjacent property.

Cumulative Impacts: There cumulative impacts to land use as a result of this alternative would be negligible.

Conclusion: Alternative 1 would result in negligible long-term negative impacts on land use due to the continuation of ponding conditions on the neighboring pasture.

Alternative 2- Active Restoration of Tidal Wetlands at Otter Point

Impact Analysis: Actions proposed as part of Alternative 2 include adding an additional culvert and tide gate to drain the neighboring pastureland. Currently, there is only one drainage outlet. A crown in the middle of the field isolates water on the western portion of the field from this drainage outlet. As a result, there is ponding in the western corner of the pasture. Installation of an additional culvert and tide gate in the western corner of the property would eliminate ponding in the field in most conditions. However, construction activities may create minor short-term adverse effects from excavation activities along the border of the neighboring property that would require temporary removal of the existing culvert.

Cumulative Impacts: The cumulative impact of Alternative 2 would be minor long- term beneficial impacts.

Conclusion: Alternative 2 would result in minor long- term positive effects to land use. However, there is also a potential for minor short- term negative effects on drainage and

land use during construction when the realigned dike being constructed and the culverts and tide gates are being installed.