Hult Reservoir and Dam Safety

Final Environmental Impact Statement

DOI-BLM-ORWA-N030-2018-0010-EIS

Northwest Oregon District
Bureau of Land Management
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Acronyms and Abbreviations

APE	Area of potential effects
BLM	Bureau of Land Management
CCD	Census county divisions
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cfs	Cubic feet per second
CO_2e	Carbon dioxide equivalent
CTCLUSI	Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians
EAP	Emergency action plan
eDNA	Environmental deoxyribonucleic acid
EIS	Environmental impact statement
ERMA	Extensive Recreation Management Area
FEMA	Federal Emergency Management Agency
FM	Field manager
FRCC	Fire regime condition class
GeoBOB	Geographic Biotic Observations database
GIS	Geographic information system
GPS	Global Positioning System
NAGPRA	*Native American Graves Protection and Repatriation Act*
NEPA	*National Environmental Policy Act*
NISMS	National Invasive Species Information Management System
NMFS	National Marine Fisheries Service
NRHP	National Register of Historic Places
NTU	Nephelometric turbidity units
NWOD	Northwest Oregon District
OAR	Oregon Administrative Rules
ODA	Oregon Department of Agriculture
ODEQ	Oregon Department of Environmental Quality
ODFW	Oregon Department of Fish and Wildlife
ORBIC	Oregon Biodiversity Information Center
OWRD	Oregon Water Resources Department
ppm	Parts per million
RCC	Western Pond Turtle Range-wide Conservation Coalition
RMA	Recreation Management Area
SHPO	Oregon State Historic Preservation Office
sp., spp.	Species (singular, plural)
SRMA	Special Recreation Management Area
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USDI	U.S. Department of the Interior
USDOT	U.S. Department of Transportation
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
VMAP	Vegetation Management Action Portal
VRM	Visual resources management

2016 RMP	*Northwestern and Coastal Oregon Resource Management Plan* (USDI 2016a)
ARBO II	National Marine Fisheries Service and U.S. Fish and Wildlife Service programmatic 2013 *Aquatic Restoration Biological Opinion* (NMFS 2013)

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Changes Between Draft and Final EIS

The following changes were made to the EIS between the draft and final analysis. Minor corrections, explanations, and edits are not included in this list.

Chapter 1 (Purpose and Need):

Changes were made to:

- *Background and History* section: Describe that adult steelhead (not cutthroat) trout occasionally use the fish ladder.
- *Conformance with Laws, Land Use Plan, and Other Decisions* section: Add additional permits that may be needed and best management practices that would be followed.

Chapter 2 (The Alternatives):

Changes were made to the action alternatives to describe the time frames in which implementation would occur and to clarify that the developed camp host site with partial hook-ups that would be added to the project area would include phone service.

In the *Alternatives Considered but Not Presented in Detailed Analysis* section:

- Changes were made to fix a calculation error that described how quickly the reservoir would re-fill if reservoir levels were seasonally lowered.
- Sections were added to describe why the BLM was not considering using volunteers to rebuild the dam, removing all dams from Lake Creek, and building a dam at Little Log Pond in addition to keeping the dam at Hult Reservoir.

In the *Comparison of the Alternatives* section, updates were made to reflect edits in Chapter 3, including in the rows for cost (Issue 3), environmental justice (Issue 7), historic mill site (Issue 8), special status plants (Issue 11), and western pond turtle (Issue 13), as well as to provide additional details about recreation (Issue 4).

In the *Proposed Mitigation* section, mitigation was added to:

- Reduce adverse impacts to environmental justice populations under Alternative 4.
- Reduce adverse impacts to special status aquatic plants under Alternative 2.
- Reduce adverse impacts to western pond turtles under Alternatives 3 and 4.

Chapter 3 (Affected Environment and Environmental Consequences):

Changes were made to:

- Update Issue 3 (Cost) to reflect costs of additional mitigations proposed in Issue 7 (Environmental Justice) and Issue 13 (Western Pond Turtle) and to further clarify recreation costs, as well as to correct costs associated with building a camp host site under the action alternatives and costs associated with decommissioning the existing Hult Pond Dam.
- Update Issue 4 (Recreation) to clarify that:
    - The BLM has limited quantitative baseline data associated with the specific activities that recreationalists engage in in the project area;
    - Facilities that are built or altered would be subject to the 1968 *Architectural Barriers Act;*
    - Under Alternative 4, Oregon Department of Fish and Wildlife (ODFW) fishing regulations would prohibit fishing on Lake Creek November through mid-May.

  In addition, additional details were added to Issue 4 to describe water-based recreation and dispersed camping.

- Update Issue 7 (Environmental Justice) to add a potential mitigation measure for Alternative 4.
- Update Issue 8 (Historic Mill Site) to reflect a recent 2023 archeological survey of the project area, which found additional site features.
- Update Issue 9 (Wetlands) to more accurately reflect wetlands acres.
- Update Issue 11 (Special Status Aquatic Plants) to describe that in 2023, rare plant surveys in the project area found no additional federally threatened or endangered plants or other Bureau sensitive plants, lichens, or bryophytes; and to propose mitigation under Alternative 2 that would reduce impacts to special status aquatic plants.
- Update Issue 12 (Invasive Plants) to remove outdated information about areas not surveyed and to update acres of invasive plants in addition to adding further information about the potential for cumulative effects.
- Update Issue 13 (Western Pond Turtles) to describe that the western pond turtle has been proposed for listing as threatened under *the Endangered Species Act*, and a decision is expected by late 2024. Additional information was added to the *Analytical Process* section and additional mitigation measures have been proposed to reduce adverse impacts to turtle habitat under Alternatives 3 and 4.
- Update Issue 14 (Native Fish) to describe how the BLM would carry out implementation work (see *Analytical Process* section) and native fish salvage.
- Update Issue 15 (Game Fish) to provide additional information about largemouth bass spawning habitat and to clarify that fish would be salvaged as the reservoir is lowered under the action alternatives.

Chapter 4 (*Consultation and Coordination*):

Changes were made to:

- Describe public involvement in general as well as to add an overview of the October 2023 public comment period to the *Public Involvement* section.
- Update the *Consultation* section to describe government-to-government consultation with local Tribes, consultation with the Oregon State and Tribal Historic Preservation Offices on the historic mill site, and National Marine Fisheries and U.S. Fish and Wildlife Services of federally listed species.
- Update the list of EIS preparers and reviewers.

Additional terms were added to the glossary including carbon dioxide equivalent (CO2e), electrofishing, environmental DNA, and greenhouse gas.

Additional references that were used in the updated analysis were added to the references section, including links in cases where a document is available online.

Appendices

In Appendix A (*Issues Considered but Not Presented in Detailed Analysis*), changes were made to:

- Issue A-1 (Aerial Fire Suppression) to describe that Lake Creek may be available as a helicopter dip site.
- Issue A-18 (Water Quality) to describe that the BLM would follow Oregon DEQ's policies around impaired. waterbodies and to clarify information about impaired waterbodies.
- Issue A-19 (Sediment) to describe sediment testing, including timelines.
- Issue A-21 (Climate Change) to more specifically describe types of greenhouse gases.
- Issue A-23 (Air Quality) to more specifically describe the amount of dust that would be generated in project implementation.

An appendix that described Clean Water Act compensatory mitigation was deleted. Wetlands mitigation can be found at the end of Chapter 2. Additional compensatory mitigation may be required with project implementation; this mitigation would be identified during project design.

The following appendices were added:

- Appendix B: Oregon Department of Fish and Wildlife's Native Turtles Best Management Practices
- Appendix C: Monitoring
- Appendix G: Response to Public Comments on the October 2023 Draft EIS

In addition, the appendices were reordered to group related subjects, such as mitigation, monitoring, and engineering.

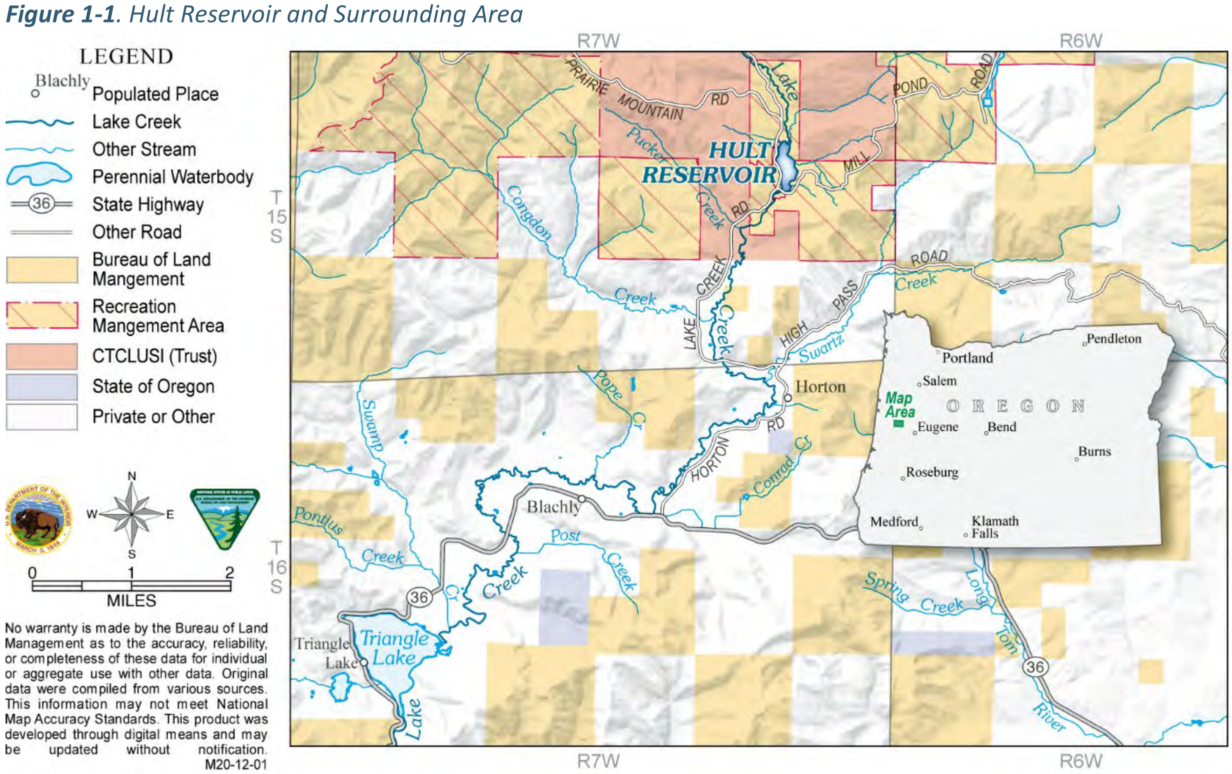
Chapter 1 – Purpose and Need

This environmental impact statement (EIS) [1] was prepared by the Bureau of Land Management (BLM), [2] Siuslaw Field Office, to analyze proposals to address the safety of the dam at Hult Reservoir. This is a final EIS. Information about public involvement can be found in Chapter 4 (*Consultation and Coordination*).

Background and History

Hult Reservoir is a 54-acre reservoir, approximately three-fourths of a mile long and less than a quarter mile wide, with an average depth of 8 feet. The reservoir is located on BLM-administered public lands in Lane County within the Lake Creek watershed (and Siuslaw River drainage), near the community of Horton and within the Siuslaw Field Office of the Northwest Oregon District of the Bureau of Land Management (Figure 1-1).

Figure 1-1*. Hult Reservoir and Surrounding Area*



The reservoir sits on Lake Creek, 14 miles upstream from Triangle Lake. The BLM's 2016 *Northwestern and Coastal Oregon Resource Management Plan* (USDI 2016a:254) designated the reservoir and surrounding area as part of the 13,000-acre Upper Lake Creek Extensive Recreation Management Area [3] (ERMA) and the 21 acres west and south of the reservoir as the Hult Reservoir Recreation Area Special Recreation Management Area (SRMA).

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[1] The National Environmental Policy Act (NEPA) requires Federal agencies to consider the environmental consequences of their proposed actions and to document that consideration (40 CFR 1500.1(a)). When those actions are expected to result in significant effects (not described in other related analyses), that document is an environmental impact statement (40 CFR 1501.3(a)(3)).

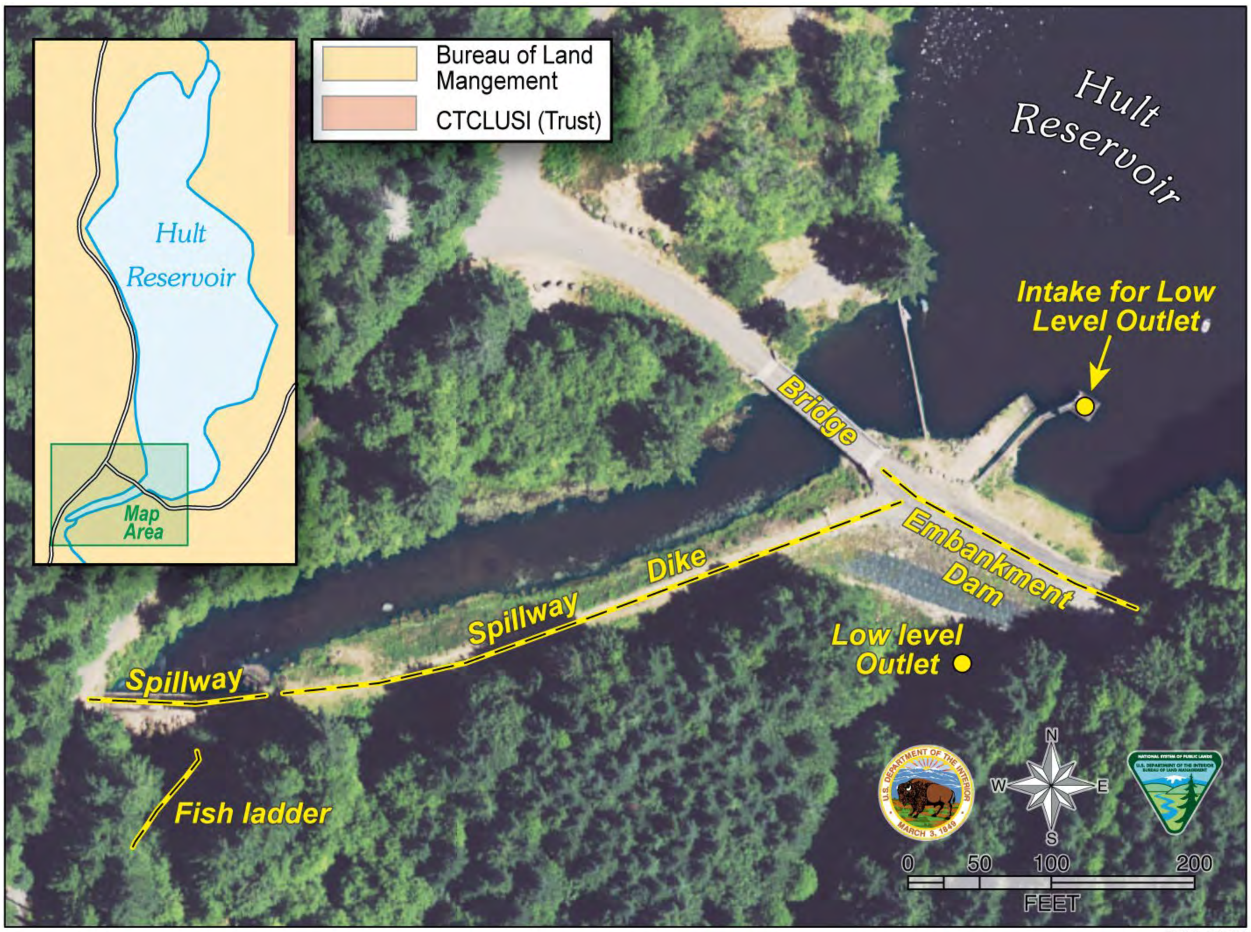
[2] The BLM is an agency within the United States Department of the Interior.

[3] Recreation Management Areas (RMAs) are land units where the BLM recognizes recreation and visitor services as a primary resource management consideration, and specific management is required to protect the recreation opportunities.

Hult Reservoir is a remnant log storage pond. The earthen embankment dam and adjacent spillway dike (Figure 1-2) were constructed in the 1930s or 1940s for sawmill operations for the former Hult Lumber Company. In 1994, then-owner Willamette Industries conveyed the reservoir and surrounding lands to the BLM.[4]

The primary use of the reservoir and surrounding area is now recreation.[5] It is popular for activities such as fishing, swimming, boating, camping, hiking, horseback riding, and scenic driving. A rudimentary boat ramp on the shore of the reservoir offers access for canoeing, kayaking, and other non-motorized and electric-outboard-powered (trolling motor) watercraft. The reservoir has been used for fire suppression efforts by the Oregon Department of Forestry and local fire agencies, both as a draft site for fire engines and a dip site for aircraft. The reservoir and surrounding wetlands support a rich diversity of wildlife, fish, and plant species.

Figure 1-2. *Hult Pond Dam and Associated Structures*



Little is known about the original design and construction of the Hult Pond Dam[6] and associated structures. However, both the embankment dam and spillway dike are homogeneous earth fill mixed with logs and woody

[4] Prior to 1994, the northern portion of the pond was on lands administered by the BLM and was designated the Hult Marsh Area of Critical Environmental Concern. The *Western Oregon Tribal Fairness Act* (P.L. 115-103, 131 Stat. 2253 (Jan. 8, 2018)) conveyed some of the lands surrounding Hult Reservoir to the Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians (CTCLUSI). See Figure 1-1.
[5] The BLM manages the reservoir at full capacity for recreation purposes. The reservoir and dam provide little to no flood control ability.
[6] Also commonly called Hult Dam.

debris, atop a foundation of ancient landslide material (e.g., sandstone, siltstone, and mudstone) (USDA 2015). The dam and associated structures have undergone several modifications and improvements since they were built. These include modifications of the dam, spillway, spillway dike, bridge, fish ladder, and outlet, but there is scant documentation of repairs or maintenance done before 1990. Since the BLM took ownership of the dam in 1994, the agency has carried out many renovations to address structural and safety concerns, including slip lining and grouting the corroded low-level corrugated metal pipe conduit, performing compaction grouting of foundation materials beneath the crest of the dam, soil nailing the dam embankment for seismic stability, placing riprap protection on the dam's downstream slope, and installing monitoring devices. The BLM's larger remedial preventative measures took place in 2003, 2007, 2016, 2020, and 2021 (see Appendix E, *Hult Pond Dam Events, Repairs, Upgrades, Engineering Issues, and Reports*).

The dam requires constant monitoring and adjustment of the outflow valve by BLM staff to reduce the risk of water overtopping (i.e., overflowing) the dam. In addition, the dam's functionally impassable [7] fish ladder impedes fish passage to the reservoir and up to 18 miles of potential fish habitat and 4.5 miles of designated critical habitat for coho salmon upstream (Lake Creek north of the reservoir).

In 1989, during a study to modify the fish ladder at the dam, [8] the Oregon Water Resources Department found erosion and seepage through the dam (Stahlberg 1989). Bohemia Lumber Company (the owner of the dam at the time) drained the reservoir because it felt that the company could not "go into another winter bearing the liability of that dam" (Eugene Register-Guard 1990a). Bohemia repaired a faulty headgate during the drainage, and a 1990 Bureau of Reclamation inspection found that the dam was "in poor condition, but in no immediate danger of failing" (USACE 1994, cited in USDI 2012:2).

Because of public interest in saving the reservoir as a recreation area, the BLM began negotiations with Bohemia Lumber Company to take over management of the dam and reservoir pending resolution of cost and liability issues. In the interim, Bohemia's holdings were purchased by Willamette Industries (Bishop 1990), which made repairs to the dam between 1992 and 1994 (see Appendix E, *Hult Pond Dam Events, Repairs, Upgrades, Engineering Issues, and Reports*). When the area was conveyed from Willamette Industries to the BLM in 1994, a U.S. Army Corps of Engineers (USACE) inspection reported that the dam was "in satisfactory condition for continued operation" [9] (USACE 1994, cited in USDI 2012:2).

In July 2012, the Bureau of Reclamation completed a Comprehensive Dam Evaluation of the dam and spillway. [10] The report characterized the dam as having an "unacceptably high" [11] risk of failure due to issues caused by seepage through the foundation of the dam and spillway dike. The report also noted the potential for overtopping of the dam and spillway dike during a flood event (USDI 2012). These issues warranted expedited action, leading the BLM to reinforce the dam with soil nailing and increase water level monitoring at the site. As recommended by the evaluation, the BLM also began conducting monthly safety inspections on the dam and associated structures, as well as continually monitoring the reservoir water level so BLM staff could actively manage the level to reduce the risk of water overtopping the dam.

In 2017, the U.S. Army Corps of Engineers conducted a periodic inspection and assessment of the dam, which identified several potential failure modes that could cause an uncontrolled release of impounded water [12]

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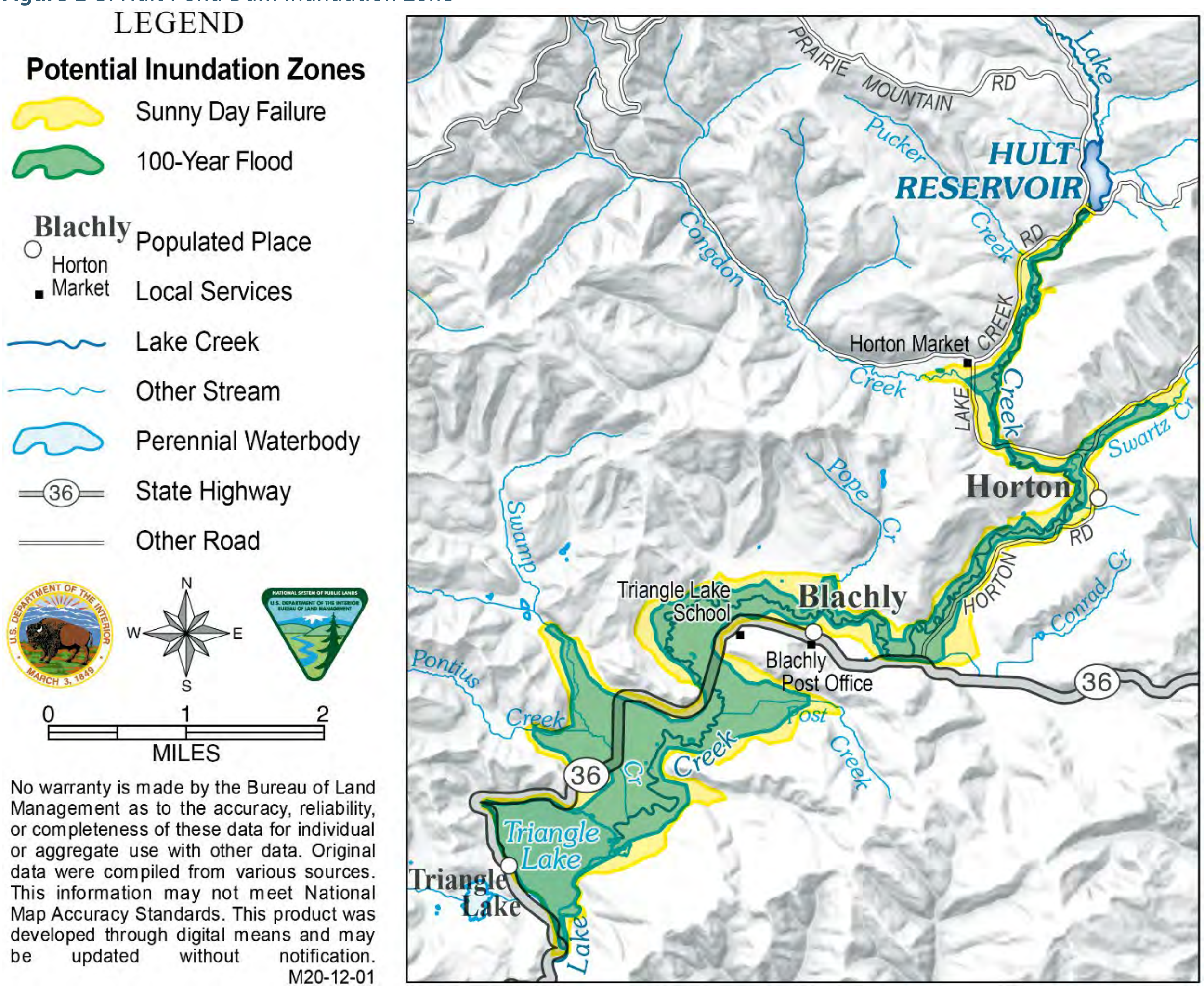
[7] With adequate flow, some adult steelhead trout occasionally use the fish ladder, but fish surveys indicate the ladder does not pass other fish (e.g., coho and lamprey). See Issue 14 in Chapter 3 for more information.
[8] The fish ladder was eventually modified in 1996. See Appendix E, *Hult Pond Dam Events, Repairs, Upgrades, Engineering Issues, and Reports*.
[9] This assessment was based on the dam being classified at the time as "low hazard"; it was later rated as high hazard (AGRA and Otak 1999).
[10] Hult Pond Dam's emergency action plan requires regular, thorough inspections that occur every 5 to 6 years. More details can be found in the description of the No Action Alternative in Chapter 2.
[11] The U.S. Bureau of Reclamation report found that multiple issues each had an "unacceptably high" risk of causing failure. "Unacceptably high" means that the risk of failure is greater than 10 percent over the life of the dam.
[12] The reservoir has a volume of 364 acre-feet (USACE 2019) or approximately 16 million cubic feet.

downstream and possibly lead to loss of life (USACE 2018a). The 2018 report from this 2017 inspection and assessment described that the population at risk from resulting flooding (i.e., the number of people occupying the dam failure floodplain) would be 70 to 130 people, primarily in the community of Horton (see Figure 1-3). Approximately 40 structures would be at risk, as well as $27 million in land and property, including Oregon Highway 36.

Figure 1-3*. Hult Pond Dam Inundation Zone*[1]



1. The 100-year-flood scenario does not assume dam failure.

The primary potential failure mode identified during this inspection was overtopping and breach during a flood event (USACE 2019:1-3). A secondary potential failure mode was instability of the spillway dike near the spillway. This area is only marginally stable and, as described earlier, is built on a foundation of ancient landslide material. Prolonged rainfall and elevated flows may also cause an increase in seepage and saturation, leading to the failure of the dam and spillway dike (USACE 2019:1-4). Figure 1-3 contrasts a) the potential sunny day failure[13] (as envisioned by a BLM hydrologist who looked at failure magnitude and topography between Hult Reservoir and Triangle Lake) with b) a 100-year flood event using spatial data from the Federal Emergency Management Agency (FEMA) and Lane County (Lane County 2023).

[13] Failure could occur in either a “rainy day” or “sunny day” scenario. In the rainy-day scenario, the dam is overtopped by high water from prolonged rainfall and/or rapid snowmelt in the valley upstream. In the sunny day scenario, damage occurs to the dam because of earthquakes, wind-toppled trees, burrowing animals, internal erosion, terrorism, or other non-precipitation-related causes.

More recently, the dam required emergency repairs after high winds toppled a tree at the base of the embankment in September 2020. This necessitated dropping the reservoir level by nine feet to replace a toe drain to reduce the risk of erosion and dam failure during winter rains. In the fall of 2021, the dam's upstream face was re-graded and riprapped to compensate for mass lost due to the rotting of woody material partially buried on the surface of the dam face and the loss of material via wave action over time. In December 2021 through early January 2022, strong winter storms in the region necessitated constant in-person and remote monitoring to reduce the potential for the dam to overtop, which would be expected to lead to dam failure (as described above). The BLM expects severe winter (and summer) weather in future years, as climate change has led to an increase in extreme weather events (Cohen et al. 2019).

The BLM developed a new emergency action plan (EAP) for the dam in 2017 to identify incidents that would lead to potential emergency conditions. The plan specifies preplanned actions that agencies would follow to minimize property damage, potential loss of infrastructure and water resources, and potential loss of life in the event of dam failure. Although the public would receive warning from local emergency management services and be evacuated in the event of dam failure as part of the EAP, in a quickly developing failure, warnings may not be sent in time to allow for evacuation. Because the BLM found low concern about dam failure and hazard downstream of the dam (USACE 2018a, Langdon Group 2017), the agency has taken steps to inform the public of the safety risk (see *Additional Public Outreach* in Chapter 4).

The Need for Action

FEMA describes hazard classification for all dams based on the potential for loss of life and property damage downstream if the dam were to fail (Table 1-1).[14] Based on FEMA's *Federal Guidelines for Dam Safety: Hazard Potential Classification System for Dams* (FEMA 2004), the BLM classifies Hult Pond Dam as a high hazard dam. It is one of only 20 high or significant hazard dams on BLM-administered lands in the United States.

Table 1-1. *Embankment Dam Hazard Potential Classification*[1]

Hazard potential classification	***Loss of human life***	***Economic, environmental, and lifeline (critical services) losses***
Low	None expected	Low and generally limited to property owner
Significant	None expected	Yes
High	Probable (one or more expected)	Yes (but secondary to loss of life for this classification)

1. From *Federal Guidelines for Dam Safety: Hazard Potential Classification System for Dams* (FEMA 2004). These guidelines inform policy for Federal agencies, including the Department of the Interior policy (USDI 2004), which provides the BLM hazard classification policy outlined in MS-9177, *Maintenance and Safety of Dams*.

Because there is a potential for loss of life if Hult Pond Dam were to fail, the BLM needs to minimize the potential for dam failure. While the life expectancy of a well-designed, well-constructed, and well-maintained earthen dam can reach 100 years (Wieland 2010), the *average* life expectancy of embankment dams (such as Hult Pond Dam) is 50 years (Maclin and Sicchio 1999). Given the construction materials used in Hult Pond Dam, uncertainty surrounding its design and construction, and ongoing repairs and improvements since the dam was built seven or eight decades ago, the BLM has determined that the structure has already exceeded its functional lifespan. Due to the instability of the dam and spillway dike's construction, repairing or modifying the dam would do little to extend its lifespan. The BLM expects that the need for emergency and other repairs and maintenance to reduce the risk of imminent dam failure would continue and would, in fact, increase if the dam were to remain in place. Therefore, the BLM needs to plan for the decommissioning[15] of this aging dam.

[14] This hazard classification system is unrelated to the potential for (or risk of) dam failure but is rather the potential for loss of life and resources *if* the dam were to fail.
[15] As described in McCulloch (2008), "'[d]ecommissioning' is an ambiguous term used to indicate a significant change in the human use when a dam is taken out of the operation for which it was first designed but is sometimes used as if synonymous with removal." Decommissioning is where a dam is partially or fully removed or otherwise is taken out of service.

In addition, the BLM needs to manage costs associated with the dam. Ongoing dam maintenance and repair are costly, and the BLM has borne these costs at Hult Reservoir since 1994. The price of these repairs continues to escalate: Additional repairs to reduce the potential for dam failure proposed by the U.S. Army Corps of Engineers in 2019 would account for approximately a quarter of the combined budgets for recreation and maintenance of capital investments for all lands that the BLM administers in Oregon and Washington (USACE 2019:3-14, USDI 2019a:7). [16] These proposed repairs would reduce (but not eliminate) the level of risk down to a level deemed societally tolerable. [17] At the same time, these substantial and expensive repairs would not extend the overall life expectancy of this dam or meet Federal Guidelines for Dam Safety (FEMA 2005). The BLM must also consider the potential cost and humanitarian implications of dam failure, including fatalities and injuries, property damage, emergency operations and cleanup costs, environmental impact, and economic impact on nearby communities (Salisbury 1998, USDI 2009b, Baecher et al. 1980).

The BLM has a responsibility to protect lives and the property of downstream landowners and to be fiscally responsible to the public. Therefore, the BLM has a *need* to decommission the existing seven- to eight-decade-old Hult Pond Dam structure.

The Purpose

The purpose of this project is to decommission the current Hult Pond Dam structure to reduce the potential for failure of the aging structure and associated loss of life and property, [18] and to be fiscally responsible to the public in managing the costs associated with the dam.

Issues

Issues Analyzed in Detail

The BLM used issues it identified during internal and external scoping and the May 2022 draft Chapters 1 and 2 public comment period to guide the effects analysis in Chapter 3. Issues are analyzed in detail when:

- The issue is related to how the alternatives respond to the purpose and need; and/or
- Analysis is necessary to determine the significance of the environmental impacts of the action alternatives (USDI 2008a:41). [19]

The following issues are analyzed in detail in Chapter 3 to address how the alternatives respond to the purpose and need:

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[16] As further described in Chapter 2 (*The Alternatives*), the BLM requested that the U.S. Army Corps of Engineers evaluate options to reduce the potential of dam failure following its 2017 inspection. The USACE 2019 report addresses repairs that could be undertaken to reduce the potential of two of the identified failure points: overtopping and dam breach. Cost estimates in 2019 for these repairs ranged from $8.6 to $13.2 million (USACE 2019:3-14). For context, the BLM spends $19 million on recreation annually and $25 million on maintenance of capital investments as part of its entire Oregon/Washington program. (The BLM administers lands on approximately 25 percent of the State of Oregon and 1 percent of Washington (USDI 2019a:7).)

[17] Societal risk is the probability of death or serious injury among the total population exposed to a hazard; individual risk considers the risk level to specific individuals from a hazard, along with any other risks they live with on a daily basis. Tolerable risk is the known level of risk from a hazard that individuals and society are willing to accept to achieve some benefit (USACE 2014:5-1, 5-9).

[18] The BLM's primary responsibility and liability for Hult Pond Dam is to meet the Federal Dam Safety Guidelines for High Hazard Dams.

[19] Significance varies with the setting of the proposed action. For instance, in the case of a site-specific action, significance would usually depend only upon the effects in the local area. In considering the degree of the effects, agencies should consider the following, as appropriate to the specific action: (i) Both short- and long-term effects; (ii) Both beneficial and adverse effects; (iii) Effects on public health and safety; (iv) Effects that would violate Federal, State, Tribal, or local law protecting the environment.

Public Safety

1. How would implementation of the alternatives affect the potential for dam failure and downstream flooding?
2. How would implementation of the alternatives affect the potential for loss of life and property?

Cost

3. How much would it cost to implement the alternatives (including maintenance, operations, implementation, and failure)?

The following issues are analyzed in detail in Chapter 3 because analysis is necessary to determine the significance of the environmental effects of the action alternatives:

Recreation

4. How would implementation of the alternatives affect visitor access and the type and quality of recreation opportunities in the BLM-administered Recreation Management Areas (RMAs) that overlap the project area?

Socioeconomic

5. How would implementation of the alternatives affect the local economy?
6. How would implementation of the alternatives affect quality of life for local residents?
7. Would implementation of the alternatives have any disproportionate adverse effects on environmental justice [20] populations?

Cultural

8. How would the implementation of the alternatives affect archaeological or historic resources and values (including downstream of the dam)?

Natural Resources

9. How would implementation of the alternatives affect riparian areas, wetlands, and lentic systems?
10. How would implementation of the alternatives affect the wetland vegetation types at the reservoir?
11. How would implementation of the alternatives affect humped bladderwort and northern bog clubmoss at the reservoir?
12. How would implementation of the alternatives affect the introduction and spread of invasive plants?
13. How would implementation of the alternatives affect persistence of the western pond turtle?
14. How would implementation of the alternatives affect fish passage and habitat for native fish?
15. How would implementation of the alternatives affect non-native game fish like largemouth bass, bluegill, and bullhead in Hult Reservoir?

Issues Analyzed but Not Presented in Detailed Analysis

Several issues identified during scoping and the May 2022 draft Chapters 1 and 2 public comment period were considered by the BLM but are not presented in detailed analysis in this EIS. Issues are not presented in detailed analysis when:

- Analysis of the issue is not necessary to make a reasoned choice between alternatives (i.e., it does not relate to how the alternatives respond to the purpose and need);
- There is no potential for significant effects related to the issue; or
- The issue has already been sufficiently analyzed in documents to which this EIS tiers (USDI 2008a:40–42).

[20] Environmental justice populations are defined as racial or ethnic minorities and low-income or Tribal populations (USDI 2022).

Further information about the following issues is included in Appendix A, *Issues Considered but Not Presented in Detailed Analysis*.

Public Safety and Access

- Issue A-1. How would implementation of the alternatives affect the availability of water for use for aerial wildland fire suppression?
- Issue A-2. How would implementation of the alternatives affect the availability of water for ground-based water delivery for local fire departments as well as wildland fire suppression?
- Issue A-3. How would implementation of the alternatives impact right-of-way access in the area?

Socioeconomic

- Issue A-4. How would the implementation of the alternatives impact undesirable behavior by the public on or near the project area?
- Issue A-5. How would the implementation of the alternatives affect neighboring lands?

Cultural

- Issue A-6. How would the implementation of the alternatives affect culturally significant species important to local Tribes?
- Issue A-7. How would implementation of the alternatives impact the physical integrity, accessibility, or use of Tribal sacred sites?

Recreation

- Issue A-8. How would implementation of the alternatives affect the scenic value of the area?

Natural Resources

- Issue A-9. How would implementation of the alternatives affect ecosystems at and around Hult Reservoir?
- Issue A-10. How would implementation of the alternatives affect special status[21] species?
- Issue A-11. How would implementation of the alternatives affect wildlife?
- Issue A-12. How would implementation of the alternatives affect special status wildlife species?
- Issue A-13. How would alternatives affect the Oregon spotted frog?
- Issue A-14. How would logging activity upstream affect the project area?
- Issue A-15. How would implementation of the alternatives impact the hydrology of the basin?
- Issue A-16. How would implementation of the alternatives affect downstream water quantity, including water available for consumptive use?
- Issue A-17. How would implementation of the alternatives affect groundwater and groundwater infiltration rates?
- Issue A-18. How would implementation of the alternatives impact water quality and storm water discharges, especially during removal of the existing dam (and construction of a new dam)?
- Issue A-19. Would implementation of the alternatives disturb potentially contaminated soil in the project area?
- Issue A-20. How would implementation of the alternatives impact sediment transport?
- Issue A-21. How would implementation of the alternatives contribute to climate change?
- Issue A-22. How would implementation of the alternatives impact carbon sequestration?
- Issue A-23. How would implementation of the alternatives impact air quality?

[21] Federally listed threatened, endangered, proposed, or candidate species, and species managed as Bureau sensitive by the BLM.

Decision to Be Made

The decision to be made by the Northwest Oregon District Manager is to determine which alternative to select and whether any additional mitigation is to be applied. The decision-maker may also modify the selected alternative by adding features from other alternatives if the environmental effects of such changes are reasonably discernable in the EIS.

As described in Chapter 4 (*Consultation and Coordination*), following the issuance of a final EIS, the BLM will prepare a Record of Decision, which the decision-maker will sign to document the selected alternative and accompanying mitigation. The BLM cannot take any action concerning a proposal until the Record of Decision has been issued; the decision-maker would not sign the Record of Decision until at least 30 days after the final EIS is issued.

Conformance with Laws, Land Use Plan, and Other Decisions

The BLM will meet the requirements of the *National Historic Preservation Act* (NHPA) (CFR 800.5, 800.6), as it expects implementation of the action alternatives to result in the removal of a site eligible for listing in the National Register of Historic Places. Information about this and conformance with the *Endangered Species Act* can be found in Chapter 4, *Consultation and Coordination*.

To implement the action alternatives, the BLM will require permits from various State and Federal regulatory agencies. The BLM will need *Clean Water Act* Section 404 [22] permit issuance or verification from the U.S. Army Corps of Engineers Regulatory Branch and a *Clean Water Act* Section 401 water quality certification or waiver. If a proposed action requires *Clean Water Act* Section 404 authorization, review by Oregon Department of Environmental Quality (DEQ) would be required under Section 401. In addition, the BLM would need removal/fill permits from the Oregon Department of State Lands. A 1200-C permit from the Oregon DEQ dictating construction project water discharges may be required. Implementation of Alternative 3 (Remove Hult Reservoir; Add Little Log Pond) or Alternative 4 (Remove Hult Reservoir) would be expected to change the BLM's water right holdings, which are administered by the Oregon Water Resources Department. Details can be found in Issue 9 in Chapter 3 (*Affected Environmental and Environmental Consequences*) and Issue A-16 in Appendix A (*Issues Considered but Not Presented in Detailed Analysis*). All applicable permits, certifications, and reviews will be obtained in the implementation phase of the project.

Because the project area includes waterbodies impaired for temperature and those suspected of dissolved oxygen impairment, the BLM will incorporate antidegradation policies specific to both as detailed in Oregon DEQ's *Water Quality Standards: Beneficial Uses, Policies, and Criteria for Oregon* (OAR-340-041-0004(3)) into its management and monitoring plans for any activity potentially affecting water quality. The BLM would employ best management practices to ensure compliance with the Clean Water Act. [23]

The *Federal Land Policy and Management Act* (1976) requires that all management decisions be consistent with the land use plan for an area, in accordance with 43 Code of Federal Regulations (CFR) 1610.5-3(a). Management activities for the Hult Reservoir and Dam are currently covered by the *Northwestern and Coastal Oregon Resource*

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[22] Clean Water Act Section 404 jurisdiction extends includes all waters of the United States (33 CFR Part 328). Approved jurisdictional determinations, which are issued by the U.S. Army Corps of Engineers, determine whether waters will be regulated under *Clean Water Act* Section 404.
[23] Many of the best management practices likely to be selected for these projects are listed in Table C-11 of the 2016 *Northwestern and Coastal Oregon Resource Management Plan* (USDI 2016a:178–179), to which this EIS tiers.

Management Plan and Record of Decision (USDI 2016a), which provides management direction and objectives for the management of all resources on BLM-administered lands in the Northwest Oregon District, Coos Bay District, and the Swiftwater Field Office of the Roseburg District.

Hult Reservoir is located on lands allocated to District-Designated Reserve in the *Northwestern and Coastal Oregon Resource Management Plan* (2016 RMP). BLM-administered lands immediately surrounding the reservoir are generally Riparian Reserve;[24] however, the 2016 RMP allocates the dam (as well as the lands bordering the Riparian Reserves) to Late-Successional Reserve.[25] District-Designated Reserves are managed to maintain the values and resources for which the BLM has reserved these areas from sustained-yield timber production (USDI 2016a:56). Management objectives and direction for Riparian Reserve primarily relate to habitat for special status species associated with water, riparian function, and water quality (USDI 2016a:68–74). Management objectives and direction for Late-Successional Reserve primarily relate to protection and enhancement of habitat for the northern spotted owl and marbled murrelet (USDI 2016a:64–67). (See the 2016 RMP for the complete list of management direction for Riparian Reserves and Late-Successional Reserves (USDI 2016a:64–74).)

The 2016 RMP designates the reservoir and surrounding area as part of the 12,486-acre Upper Lake Creek ERMA (USDI 2016a:255). ERMAs are administrative land units that require specific management consideration to address recreation use, demand, or recreation and visitor services program investments. The BLM manages these areas to support and sustain the principal recreation activities and the associated qualities and conditions of the ERMA. Management focuses on actions that address visitor health and safety, user conflicts, resource protection issues, and maintaining access or appropriate activity participation. Table 1-2 shows the important recreation values and visitor activities specified for the recreation area's framework (USDI 2016c).

In addition, the 2016 RMP designates the 21 acres west and south of the reservoir as the Hult Reservoir Recreation Area SRMA (USDI 2016a:254).[26] SRMAs are administrative units where the recreation opportunities and recreation setting characteristics are recognized for their unique value, importance, and/or distinctiveness, especially as compared to other areas used for recreation: Recreation and visitor services management are recognized as the predominant land use plan focus, where specific recreation opportunities and recreation setting characteristics are managed and protected on a long-term basis (USDI 2014b:I-36). The BLM manages SRMAs to protect and enhance a targeted set of activities, experiences, benefits, and desired recreation setting characteristics as outlined in a recreation planning framework (USDI 2016a). Table 1-2 shows the important recreation values and visitor activities specified for the recreation area's framework (USDI 2016b:441–471, c:42, 116). Issue 4 addresses how the alternatives affect the use of the Upper Lake Creek ERMA and Hult Reservoir SRMA.

Table 1-2. *Hult Reservoir Recreation Management Areas Frameworks (USDI 2016c)*

Recreation Management Area	***Upper Lake Creek ERMA***	***Hult Reservoir Recreation Area SRMA***
Important Recreation Values	The Upper Lake Creek ERMA has opportunities for hiking, swimming, equestrian, pleasure driving, and more.	The Hult Reservoir Recreation Area SRMA offers unique opportunities for camping, day use, swimming, fishing, and scenic driving.
Visitor Activities	Hiking, equestrian, camping, picnicking, day use, driving for pleasure, swimming, boating/rafting, fishing, and wildlife viewing	Hiking, equestrian, camping, picnicking, day use, driving for pleasure, swimming, and boating/rafting

In addition, as shown in Figure 1-1, *Hult Reservoir and Surrounding Area*, and Figure 2-1, *Project Area,* the lands surrounding the reservoir are held in trust by the Bureau of Indian Affairs for the Confederated Tribes of Coos,

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[24] Riparian refers to zones along the edges of rivers, streams, lakes, and other waterbodies; Riparian Reserves are protected areas that preserve and enhance natural riparian conditions and habitat.

[25] Late-Successional Reserves are areas protected to maintain and enhance old-growth forest ecosystems.

[26] Within the former Eugene District, SRMA boundaries were selected based on the general staging area for the recreation activities and values associated with the SRMA and the larger encompassing ERMA. At the Hult Reservoir Recreation Area SRMA, this included the main parking areas at Hult Reservoir, but not the reservoir itself. (The Salem District and Eugene Districts were combined in 2016 to create the Northwest Oregon District.)

Lower Umpqua, and Siuslaw Indians (CTCLUSI). Through its compact with the Bureau of Indian Affairs, CTCLUSI has assumed responsibility for the forest management and real estate programs on these lands. The road to the reservoir crosses these lands. The *Western Oregon Tribal Fairness Act* (P.L. 115-103, Jan. 8, 2018) specifies that if the BLM "discontinues maintenance of the public recreation site known as Hult Reservoir, the terms of any agreement in effect on that date that provides for public vehicular transit to and from the Hult Log Storage Reservoir shall be void." A 2018 memorandum of agreement with the Tribe states, "The BLM agrees that if it discontinues maintenance of the Hult Log Storage Reservoir and provides written notice to the Confederated Tribes of its intent to discontinue said maintenance, the Confederated Tribes would no longer be required to allow public vehicular transit across the Oregon Coastal land for this purpose." If the BLM selects an alternative that discontinues maintenance of Hult Reservoir, the BLM will work with the CTCLUSI to reach a new public access agreement if necessary. Under all alternatives in this EIS, some form of public recreation and maintenance managed by the BLM would continue at the Hult Reservoir site.

Chapter 2 – The Alternatives

This chapter describes four alternatives in detail: the No Action Alternative and three action alternatives. The alternatives address dam safety and the removal of the existing dam. A comparision of the key features of the alternatives (Table 2-2) can be found in this chapter's *Comparision of the Alternatives* section. The effects of these alternatives are addressed in Chapter 3, *Affected Environment and Environmental Consequences*. That section also includes Table 2-3, which briefly summarizes and compares the effects described in Chapter 3.

This chapter also describes the other alternatives the BLM considered but did not present for detailed analysis in this EIS. This includes alternatives that look at repairs to the existing dam structure. The U.S. Army Corps of Engineers (Portland District USACE, Engineering Division) completed feasibility studies on those alternatives, as requested by the BLM; these studies are available on the BLM's ePlanning website. [27]

Lastly, this chapter contains potential mitigation measures the BLM identified to respond to adverse effects identified in Chapter 3 of this EIS.

All implementation work for the action alternatives would take place within the project area shown in Figure 2-1.

Alternative 1: No Action Alternative (Continue Current Management)

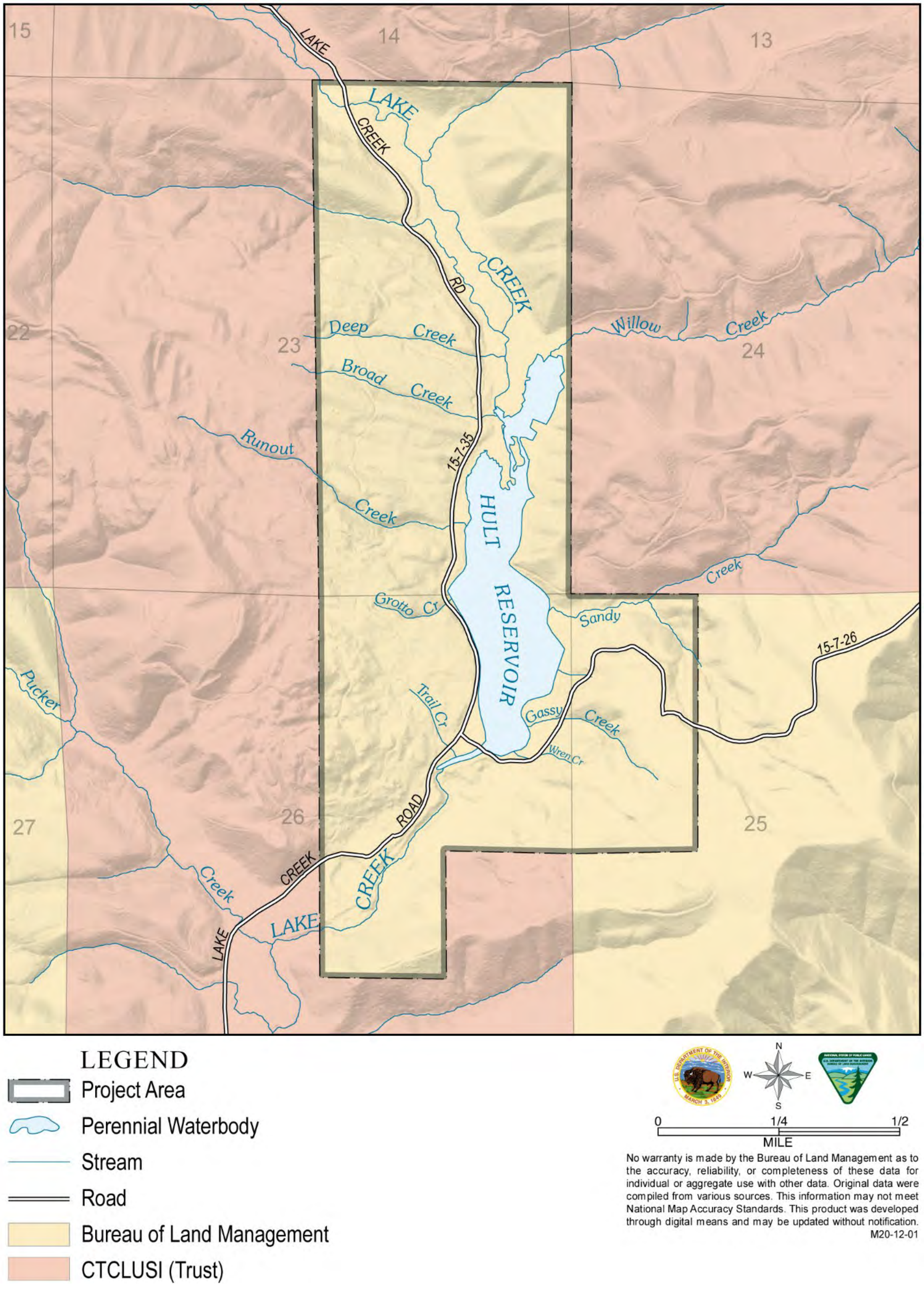
National Environmental Policy Act regulations require that an EIS analyze a no action alternative (40 CFR 1502.14(c)). The Council on Environmental Quality (CEQ) guidance explains that there are two interpretations of this, depending on the nature of the proposal being evaluated: *No Action* can indicate that a proposal (i.e., an action alternative) does not take place, or *No Action* can indicate that there is no change from current management direction or level of management intensity (CEQ 1981). In this EIS, "no management" is not an appropriate interpretation of the no action alternative: The analysis would overstate the potential for dam failure and would not reflect the BLM's future actions if the agency did not select another alternative.

Under the No Action Alternative, the BLM would continue to monitor, inspect, maintain, and repair [28] the existing dam, associated structures, and fish ladder. There would be no structural changes to the dam beyond the regular maintenance and ongoing and emergency repairs the BLM currently performs.

The main dam components at Hult Reservoir include the 225-foot-long and 37- to 39-foot-high embankment dam, the 470-foot-long and 16-foot-high spillway dike, the intake structure (the gate and gate structure), a low-level outlet pipe (i.e., the conduit), and the spillway (see Figure 1-2 in Chapter 1). The crest elevation of the embankment dam is 820 feet (above sea level) at the main dam, tapering along the spillway dike to a minimum of 814.5 feet near the spillway; the spillway crest is 811 feet, which regulates the (normal pool) reservoir elevation at 811 feet (or less), except during storm flooding. The dam structure has a hydraulic height [29] of 28 feet. The existing bridge span across the spillway is 88 feet long. The BLM would manage the reservoir at full capacity for recreation purposes and fish ladder operation, and the dam would continue to afford little to no flood control ability.

[27] See the *References* section for additional information about ePlanning and how to access it.
[28] See Appendix F, *Hult Pond Dam Operations* for details.
[29] The vertical distance between the maximum design water level and the lowest point in the original streambed measured at the downstream toe of the dam.

***Figure 2-1**. Project Area*



The low-level outlet gate is usually opened 8 inches during the winter season. However, BLM staff my open it as much as 24 to 32 inches during storm or flood events (based on telemetry data; see below) or when storm or high-water events are expected. The outlet pipe can pass a maximum of 250 cubic feet per second.

The BLM would continue to follow its EAP (USDI 2017) for the dam:

- Telemetry equipment (installed in 2017) would continue to provide real-time remote monitoring of the reservoir levels, stream levels, rainfall, and static changes in the dam. BLM staff would monitor on-site when water levels exceeded a reservoir elevation of 812 feet (daily monitoring) or 813.5 feet (continuous monitoring via an on-call monitoring system with alarm).
- Monthly and annual inspections by BLM staff would appraise the dam's condition, including erosion, vegetation growth, rodent activity, seepage rates, and low-level conduit/gate conditions. The BLM would complete repairs and maintenance as necessary to address structural issues.
- The BLM would stage emergency exercise drills [30] every 3 years, involving management, key BLM staff, and personnel from outside organizations as appropriate.
- A comprehensive dam evaluation overseen by the BLM Dam Safety Officer would occur every 5 to 6 years, including a field examination and a state-of-the-art review of a structure's design assumptions, construction practices, and integrity under various loading conditions.

The EAP is reviewed (by operating and maintenance personnel as well as management personnel), updated, and approved annually.

BLM staff would remove debris on the functionally impassable fish ladder annually. Dispersed camping in the area would continue. Local fire departments would continue to use the reservoir to draft fire engines, and helicopters would use the reservoir as a dip site for wildfires. As described in the 2002 BLM water rights certificates, [31] the beneficial uses of the reservoir would be "multiple purposes, including, but not limited to pond maintenance for aquatic life and recreation" (Oregon 2002a, b).

Under the No Action Alternative, the BLM anticipates that in the future the dam will fail or the agency will need to drain the reservoir to prevent imminent dam failure. These two scenarios are addressed throughout the analysis (i.e., Chapter 3 and Appendix A) as follows:

- Effects under Alternative 1.1 address the assumption that the dam would fail.
- Effects under Alternative 1.2 address the assumption that the BLM would breach the dam to drain the reservoir to prevent imminent dam failure.

More detail can be found at the beginning of Chapter 3 (*Affected Environmental and Environmental Consequences*) and Issue 1 (Chapter 3), which addresses dam failure scenarios and their potential to occur.

Alternative 2: Remove the Existing Dam and Build a New Dam to Maintain Hult Reservoir

Under this alternative, the BLM would remove (i.e., decommission) the existing dam (including the outlet conduit gate and pipe), spillway, and fish ladder and construct a new embankment dam. The estimated 39,000 cubic yards [32] of material (homogeneous fine-grained earth fill mixed with logs and woody debris) from the old dam and embankment foundation would be moved to a to-be-determined location. [33] Construction crews would bring in

[30] Referred to as "tabletop," "functional," or "full scale" exercise drills by the Federal Emergency Management Agency.
[31] The BLM has two water rights for the Hult Reservoir: one for a 481-acre-foot reservoir (Oregon 2002a) and a second for 1.00 cubic feet per second of Lake Creek diversion (Oregon 2002b).
[32] Measurements and quantities described in this alternative are estimates that provide analytical assumptions for the analysis in this EIS. The BLM will review final actions through a determination of NEPA adequacy, a review process that confirms that an action is adequately analyzed in an existing NEPA document (i.e., this EIS or another NEPA document).
[33] The BLM will complete an environmental assessment, categorical exclusion review, or determination of NEPA adequacy, as appropriate for this location before the action takes place.

new material (e.g., clay, heavy granular material, and soils with a low degree of compressibility, swelling, shrinking, organic content, and soil amendments) to build the new zoned [34] earthen dam. The BLM would design the dam to its current standards and build it in approximately the same location.

The reservoir would be a similar size (54 acres) and the BLM would manage it at full capacity for recreation purposes. A drop intake structure (e.g., a morning glory spillway; see Figure 2-2) would be added, with a low-level valve to help the reservoir self-regulate during high flows. In addition, a roughened channel would be designed to pass—at a minimum and depending on dam and reservoir design—a 500-year flood [35] water level in place of the existing spillway. Mill Pond Road would cross the top of the dam, but a new longer bridge (estimated at 250 feet) would be needed to span the wide, roughened channel.

Fish passage would be designed to National Marine Fisheries Service (NMFS) and Oregon Department of Fish and Wildlife (ODFW) standards to pass native migratory fish, including Pacific lamprey and federally listed coho salmon. For example, the roughened channel would be designed to facilitate fish passage by using boulders placed such that they would slow water flow and create rest and refuge spots for fish migrating upstream and for resident and juvenile anadromous fish passing downstream.

Figure 2-2*. A Morning Glory Spillway at Fishhawk Lake*

The dam would still provide little to no flood control ability. Because of its location (upstream from the community of Horton), the dam would continue to be classified as high hazard and for that reason would have an EAP to minimize loss of life and property (FEMA 2013). The BLM would write the EAP to address general, hydraulic, structural, and seismic hazards that could occur at the dam. The BLM would reinstall telemetry devices and continue to remotely monitor reservoir levels, stream levels, rainfall, and static and seismic changes in the dam. The BLM would continue monthly, annual, and periodic inspections on the dam and related structures. The agency would review and update the EAP annually, holding emergency exercise drills every 3 years and performing a comprehensive dam evaluation every 5 to 6 years.

Removing the existing dam and other structures and constructing a new dam, roughened channel, and associated structures would take approximately 3 years. The BLM would partially or fully drain the reservoir during this time, [36] with work happening in summer months, when the water level is at its lowest. Crews would perform in-water work during the period specified in the *Oregon Guidelines for Timing of In-Water Work to Protect Fish and Wildlife Resources* (ODFW 2022). [37] Temporary or permanent pipes, cofferdams, or other structures would be used to divert Lake Creek and high flows through the construction site. Pumps and siphons may also be used to remove water from the construction area. Construction would be done with bulldozers and heavy equipment. Crews would use controlled blasting if necessary to remove bedrock during the construction of the roughened channel. [38]

[34] Dams can be "zoned," with fine soils (silts or clays) at the center of the dam to impound the water, and sand, gravel, or rockfill in the upstream and downstream parts of the dam to provide the strength needed for stability of the embankment or collect and drain water from within the dam.
[35] A 500-year flood is a flood event that has a 1-in-500 chance (0.2 percent probability) of being equaled or exceeded in any given year.
[36] Depending on phases of construction, the reservoir may be refilled partially during wetter months before the dam is completed.
[37] July 1 through September 15 in the Siuslaw River drainage.
[38] The BLM would only conduct blasting in dewatered channels where fish have been removed prior through salvage.

As under Alternative 1, in the long term, local fire departments would continue to use the reservoir to draft water for fire suppression equipment (fire engines, helicopters, etc.). The water rights for the reservoir would remain as "multiple purposes, including, but not limited to pond maintenance for aquatic life and recreation" (Oregon 2002a, b).

Design Features of This Alternative

To reduce or eliminate some of the adverse effects of this alternative, the BLM would adopt the following project design features as part of this alternative. (These design features are also applicable to Alternatives 3 and 4.)

Cultural:

- Complete data recovery via detailed site documentation in an *Oregon Inventory of Historic Properties Section 106 Documentation Form for Individual Properties*.
- Create pamphlets that describe the history of Nils Hult and the Hult Lumber Company and the original inhabitants and their traditional uses of the area.
- Install signs at parking lots and high-traffic areas describing the history of the dam and reservoir on BLM lands.
- Monitor certain actions during their implementation in the vicinity of some known cultural resources when archaeological resources are not identified but their presence is possible. See Appendix D (*Cultural Resources Monitoring and Inadvertent Discovery Plan*) for details.

Recreation:

- Build a developed camp host site with partial hookups including phone service.

Additional mitigation measures that further reduce or eliminate adverse effects under the action alternatives are listed in the *Potential Mitigation* section at the end of this chapter. The effects of adopting or not adopting these mitigation measures are analyzed in Chapter 3 (*Affected Environment and Environmental Consequences*). The Record of Decision will document which alternative is selected and whether any additional mitigation or monitoring is to be applied. Mitigation measures would be applied in addition to the above project design features.

Alternative 3: Remove Hult Reservoir; Add Little Log Pond

Under this alternative (and Alternative 4), the BLM would decommission Hult Pond Dam[39] and excavate the embankment (estimated volume of 39,000 cubic yards [40]), draining the reservoir and returning it to a naturelike stream channel (estimated at a 783-foot elevation). The material removed from the dam would be used to fill in the spillway, and a new, approximately 140-foot bridge over Lake Creek would replace the road across the dam.

Dam removal would include the removal of the fish ladder as well as the low-level outlet structure and pipe. A new streambed would be created by placing riprap, gravel, cobbles, and boulders over the 30-foot-wide bottom of the dam opening to match the nearby bed conditions of Lake Creek, along with some finer materials to ensure the flow remains aboveground and does not go subsurface. The excavated side slopes (under the new bridge) would be

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[39] This could be partial or full removal of the dam as long as the Lake Creek stream channel could safely pass a 500-year flood through the former dam site.

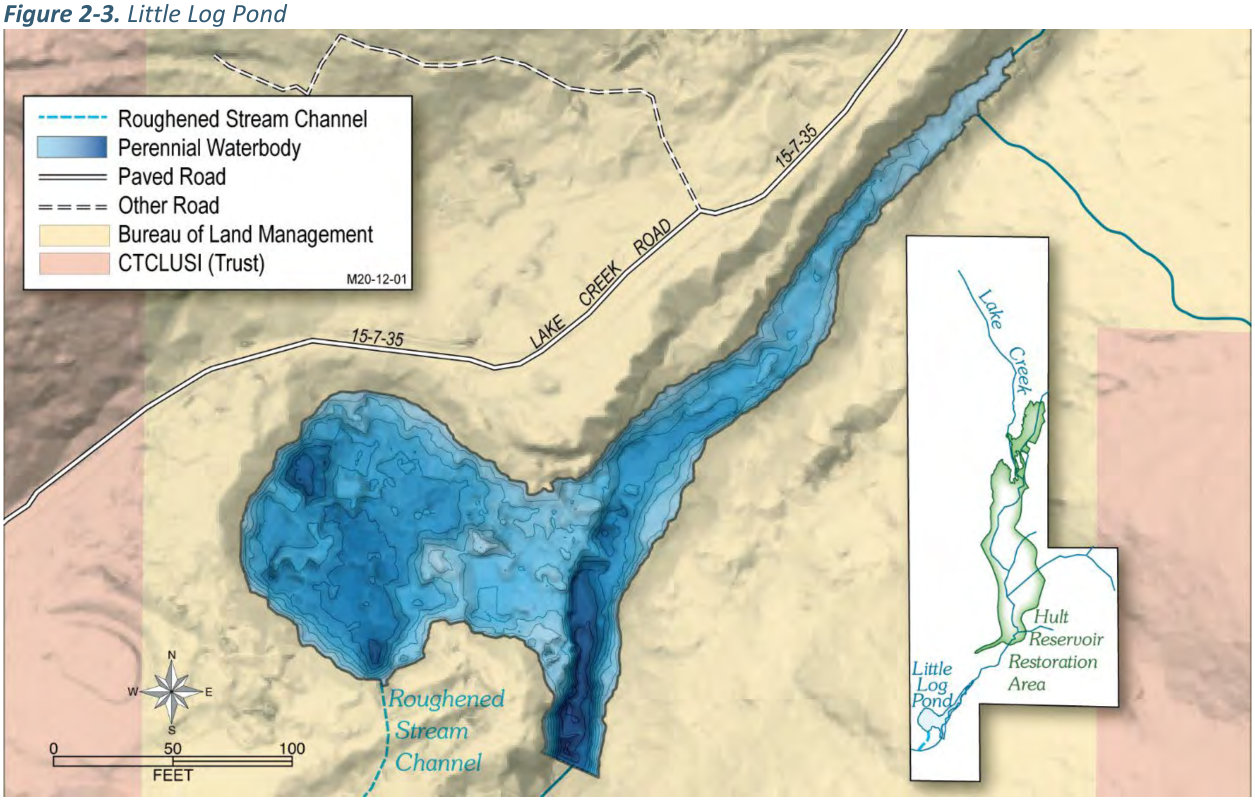
[40] Measurements and quantities described in this alternative are estimates that provide analytical assumptions for the analysis in this EIS. The BLM will review final actions through a determination of NEPA adequacy, a review process that confirms that an action is adequately analyzed in an existing NEPA document (i.e., this EIS or other NEPA document, as appropriate).

armored with riprap up to an elevation of roughly 792 feet (3 feet above the elevation of the 100-year flood). Above this elevation, the excavated side slopes would be covered with topsoil and seeded with native plants.

Downstream from the existing dam, the BLM would construct a smaller dam on Lake Creek to create "Little Log Pond" (see Figure 2-3). This 5-acre pond would occupy the area formerly used for the mill's lower log pond [41] and would be designed for water-based recreation. A roughened channel would be constructed to connect the pond's south end to the main Lake Creek channel, providing fish passage for resident and both adult and juvenile anadromous fish passing downstream through the pond to the main stream channel above it.

The new embankment dam for Little Log Pond would be up to 120 feet long and 20 feet tall. The dam would be designed with adequate freeboard so the water level would be kept 3 to 6 feet below the top of the dam. The dam would be installed at least 1 year after removal of the Hult Pond Dam. Paved or improved surface water-entry ramps would allow entry at various water depths, [42] facilitating recreation access and use of the pond. These ramps would be pedestrian-access only to facilitate easy entry and exit for swimmers, for boaters to hand-launch non-motorized watercraft, and to provide a safe area for children to play. Sandy beaches that offer additional areas for swimming, bathing, non-motorized boating, and day use would be connected to the water-entry ramps. Developed day-use areas would be located nearby.

Figure 2-3. *Little Log Pond*



If the dam at Little Log Pond is classified as low hazard, no EAP would be necessary. However, because it is located upstream from the community of Horton, the dam at Little Log Pond may be classified as significant hazard. [43] This

[41] This log pond was used from the mid-1940s or '50s to the mid-'70s.

[42] The access would also be used for reservoir and dam maintenance as well as access for firefighting equipment.

[43] As described in Chapter 1, a significant hazard dam has the potential for economic, environmental, and lifeline (critical services) losses if it fails. A significant hazard rating is lower than a high hazard rating: High hazard dams (like the existing dam and the dam described in Alternative 2) are so designated because of the potential for loss of life and severe property damage in the event of failure. Low hazard ratings indicate that there would be no probable loss of life and limited property damage in the event of failure. Hazard ratings are not related to the *potential for failure* but rather describe what would happen if a failure was to occur.

classification would require the BLM to have an EAP for the dam to minimize infrastructure loss (FEMA 2013). The dam and the pond's roughened channel would be designed to pass a 500-year flood water level. As necessary for wildfire suppression, the pond would be used as a water source for fire engines and water tenders and as a helicopter dip site.

The removal of Hult Pond Dam and the creation of Little Log Pond would happen in summer months, when the water level is at its lowest. Crews would perform in-water work during the period specified in the *Oregon Guidelines for Timing of In-Water Work to Protect Fish and Wildlife Resources* (ODFW 2022). Removing the existing Hult Pond Dam and other structures and constructing a new dam, roughened channel, and associated structures at Little Log Pond would take approximately 4 years. Construction would be done with bulldozers and heavy equipment. No blasting would be used.

Design Features of This Alternative

To reduce or eliminate some of the adverse effects of this alternative, the BLM would adopt the following project design features as part of this alternative.

Hult Reservoir Restoration Area [44] (also applicable to Alternative 4):

- After the dam is removed, add approximately 100 pieces of instream structure (e.g., logs, trees with root wads) over 10 to 20 sites to assist the natural process of sediment retention and routing (e.g., upstream and downstream of dam location and in Lake Creek tributaries). Two to 5 years later, add approximately 200 to 300 additional pieces over 30 to 40 sites.
- Use an adaptive management process (i.e., an annual invasive plant treatment and restoration plan [45] that encompasses the project area) to maintain a functioning ecosystem in the Hult Reservoir Restoration Area, with ongoing planting and non-native invasive plant control, depending on how the terrain evolves and what will grow well in the area.
    - Create, enhance, and maintain diverse terrain with structural diversity (e.g., trees with root wads) to support species richness.
    - In wetlands (see Figure 2-5), including any marshes or ponds: Plant willows (*Salix* spp.), cottonwood (*Populus trichocarpa*), and red alder (*Alnus rubra*), including planting for beaver habitat.
    - Upland from the wetland areas, plant red cedar (*Thuja plicata*), beaked hazel (*Corylus cornuta*), yew (*Taxus brevifolia*), and other species as needed and practicable.
    - Plant alder, cottonwood, and willows for shade and bank stability along Lake Creek and the tributary streams that will join Lake Creek in the Hult Reservoir Restoration Area.
    - Monitor planted areas for invasive plant spread and treat invasive plant infestations to protect botany resources and prevent further invasive plant spread.
    - Plant native tree and shrub species to shade out infestations of reed canarygrass (*Phalaris arundinacea*) and other invasive plants.
- Vehicular access to the reservoir footprint (including the floodplain, tributaries, and Lake Creek) will be blocked by restoration structures, plantings, boulders, cables, barricades, etc.

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[44] The Hult Reservoir Restoration Area (i.e., the footprint of the former Hult Reservoir) would be intended for riparian restoration (such as returning the area to a more natural state), not recreational activities.

[45] Under Alternatives 3 and 4, invasive plant treatments in the project area will be included in this annual invasive plant treatment and restoration plan. This plan would conform with the Northwest Oregon District *Invasive Plant Management and Habitat Restoration EA*'s Treatment Key, treatment prioritization, and implementation and effectiveness monitoring (USDI 2023a). The Hult annual invasive plant treatment and restoration plan will also address specific invasive plant prevention activities (such as native plant restoration). This process of planning and prioritization, treatments and restoration, and monitoring will help determine if management actions are meeting outcomes and, if not, facilitate management changes that will best ensure desired outcomes are met or reevaluated.

Cultural (also applicable to Alternatives 2 and 4):

- Complete data recovery via detailed documentation of the site in an *Oregon Inventory of Historic Properties Section 106 Documentation Form for Individual Properties*.
- Create pamphlets that describe the history of Nils Hult and the Hult Lumber Company and the original inhabitants and their traditional uses of the area.
- Install signs at parking lots and high-traffic areas describing the history of the dam and reservoir on BLM lands.
- Monitor certain actions during their implementation in the vicinity of some known cultural resources when archaeological resources are not identified but their presence is possible. See Appendix D (*Cultural Resources Monitoring and Inadvertent Discovery Plan*) for details.

Recreation:

- Build a multi-use non-motorized trail (with benches) adjacent to both Little Log Pond and the Hult Reservoir Restoration Area.
- Build a developed camp host site with partial hookups including phone service (also applicable to Alternatives 2 and 4).
- Add a group campsite (also applicable to Alternative 4).
- Add a day-use area and picnic tables (also applicable to Alternative 4).

Fire (see also *Recreation* project design features, above):

- Provide a draft site for fire engines off Little Log Pond. An improved roadway would allow engines with limited maneuverability quick access in and out of the site.

Additional mitigation measures that further reduce or eliminate adverse effects under the action alternatives are listed in the *Potential Mitigation* section at the end of this chapter. The effects of adopting or not adopting these mitigation measures is analyzed in Chapter 3 (*Affected Environment and Environmental Consequences*), and the Record of Decision will document which alternative is selected and whether any additional mitigation or monitoring is to be applied. Mitigation measures are in addition to the above project design features.

Alternative 4: Preferred Alternative (Remove Hult Reservoir)

As with Alternative 3, under Alternative 4 the BLM would decommission the dam[46] and excavate the embankment (estimated volume of 39,000 cubic yards[47]), draining the reservoir and returning it to a naturelike stream channel (estimated at a 783-foot elevation). The material removed from the dam would be used to fill in the spillway, and a new, approximately 140-foot bridge over Lake Creek would replace the current bridge and road across the dam.

Dam removal would include the removal of the fish ladder as well as the low-level outlet structure and pipe. A new streambed would be created by placing riprap, gravel, cobbles, and boulders over the 30-foot-wide bottom of the dam opening to match the nearby bed conditions of Lake Creek, along with some finer materials to ensure the flow remains aboveground and does not go subsurface. The excavated side slopes (under the new bridge) would be armored with riprap up to an elevation of roughly 792 feet (3 feet above the elevation of the 100-year flood). Above this elevation, the excavated side slopes would be covered with topsoil and seeded with native plants.

[46] This could be partial or full removal of the dam as long as the Lake Creek stream channel could safely pass a 500-year flood through the former dam site.

[47] Measurements and quantities described in this alternative are estimates that provide analytical assumptions for the analysis in this EIS. The BLM will review final actions through a determination of NEPA adequacy, a review process that confirms that an action is adequately analyzed in an existing NEPA document (i.e., this EIS or other NEPA document, as appropriate).

This work would happen in summer months, when the water level is at its lowest. In-water work would occur during the period specified in the *Oregon Guidelines for Timing of In-Water Work to Protect Fish and Wildlife Resources* (ODFW 2022). Construction would be done with bulldozers and heavy equipment. No blasting would be used.

Once established, the naturelike stream channel would allow full passage for resident fish and both adult and juvenile anadromous fish. Coho salmon would have access to 4.5 miles of designated critical habitat and a total of 8.8 miles of suitable spawning and rearing habitat upstream from the decommissioned dam.

Design Features of This Alternative

To reduce or eliminate some of the adverse effects of this alternative, the BLM would adopt the following project design features as part of this alternative:

Hult Reservoir Restoration Area [48] (are also applicable to Alternative 3):

- After the dam is removed, add approximately 100 pieces of instream structure (e.g., logs, trees with root wads) over 10 to 20 sites to assist the natural process of sediment retention and routing (e.g., upstream and downstream of dam location and in Lake Creek tributaries). Two to 5 years later, add approximately 200 to 300 additional pieces over 30 to 40 sites. [49]

Figure 2-4. *Instream Structure at McLeod Creek (Tributary to the North Fork of the Siuslaw River)*

- Use an adaptive management process (i.e., an annual treatment and restoration plan [50]) to maintain a functioning ecosystem in the Hult Reservoir Restoration Area, with ongoing planting and non-native invasive plant control, depending on how the terrain evolves and what will grow well in the area.
    - Create, enhance, and maintain diverse terrain with structural diversity (e.g., trees with root wads) to support species richness.
    - In wetlands (see Figure 2-5), including any marshes or ponds: Plant willows, cottonwood, and red alder, including planting for beaver habitat.
    - Upland from the wetland areas, plant red cedar, beaked hazel, and yew and other species as needed and practicable.

[48] The Hult Reservoir Restoration Area would be intended for riparian restoration (e.g., returning the area to a more natural state), not recreational activities.

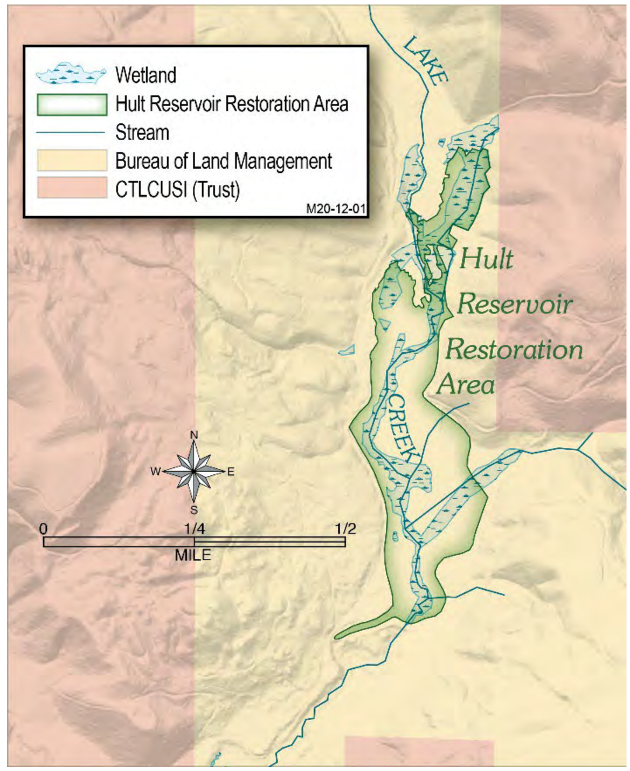
[49] See Figure 2-4 for an example of a similar restoration strategy applied to a nearby stream where bank angles were contoured to an angle of repose and woody debris was integrated into the bed, banks, and floodplains. The overall effect on the stream is reduced velocity and erosive forces with added habitat and floodplain connectivity. Absent an aggressive invasive plant treatment plan in Hult Reservoir Restoration Area, reed canarygrass will colonize the site as it has in Figure 2-4.

[50] Under Alternatives 3 and 4, invasive plant treatments in the project area will be included in this annual invasive plant treatment and restoration plan. This plan would conform with the Northwest Oregon District *Invasive Plant Management and Habitat Restoration EA*'s Treatment Key, treatment prioritization, and implementation and effectiveness monitoring (USDI 2023a). The Hult annual invasive plant treatment and restoration plan will also address specific invasive plant prevention activities (such as native plant restoration). This process of planning and prioritization, treatments and restoration, and monitoring will help determine if management actions are meeting outcomes and, if not, facilitate management changes that will best ensure desired outcomes are met or reevaluated.

- Plant alder, cottonwood, and willows for shade and bank stability along Lake Creek and the tributary streams that will join Lake Creek in the Hult Reservoir Restoration Area.
- Monitor planted areas for invasive plant spread and treat invasive plant infestations to protect botany resources and prevent further invasive plant spread.
- Plant native tree and shrub species to shade out infestations of reed canarygrass and other invasive plants.

- Vehicular access to the reservoir footprint (including the floodplain, tributaries, and Lake Creek) will be blocked by restoration structures, plantings, boulders, cables, barricades, etc.

Figure 2-5. *Alternatives 3 and 4 Wetlands in the Hult Reservoir Restoration Area*



Cultural (also applicable to Alternatives 2 and 3):

- Complete data recovery via detailed documentation of the site in an *Oregon Inventory of Historic Properties Section 106 Documentation Form for Individual Properties*.
- Create pamphlets that describe the history of Nils Hult and the Hult Lumber Company and the original inhabitants and their traditional uses of the area.
- Install signs at parking lots and high-traffic areas describing the history of the dam and reservoir on BLM lands.
- Monitor certain actions during their implementation in the vicinity of some known cultural resources when archaeological resources are not identified but their presence is possible. See Appendix D (*Cultural Resources Monitoring and Inadvertent Discovery Plan*) for details.

Recreation:

- Build a developed camp host site with partial hookups including phone service.
- Add a group camping site.
- Add a day-use area and picnic tables.

Fire:

- Provide a draft site for fire engines off Lake Creek. An improved roadway would allow engines with limited maneuverability quick access in and out of the site.

Removing the existing Hult Pond Dam and other structures and beginning the restoration work in the Hult Reservoir Restoration Area would take approximately 3 years. Additional mitigation measures that further reduce or eliminate adverse effects under the action alternatives are listed in the *Potential Mitigation* section at the end of this chapter. The effects of adopting or not adopting these mitigation measures is analyzed in Chapter 3 (*Affected Environment and Environmental Consequences*), and the Record of Decision will document which alternative is selected and whether any additional mitigation or monitoring is to be applied. Mitigation measures are in addition to the above project design features.

The BLM has identified Alternative 4 as the agency’s preferred alternative. The identification of a preferred alternative does not constitute a commitment or decision in principle, and the BLM is not required to select this preferred alternative in the Record of Decision.

Alternatives Considered but Not Presented in Detailed Analysis

The BLM may eliminate from detailed analysis alternatives that:

- Are ineffective (i.e., do not meet the purpose and need);
- Are technically or economically infeasible;
- Are inconsistent with the basic policy objectives for the management of the area;
- Would have implementation that is remote or speculative;
- Are substantially similar in design to an alternative that is analyzed; or
- Would have substantially similar effects to an alternative that is analyzed (USDI 2008a:52).

The interdisciplinary team considered several other alternatives for analysis. These alternatives were submitted in the form of public comments during scoping. The reasons these alternatives were eliminated from detailed analysis follow.

Repair the Existing Dam

The BLM considered various alternatives to repair the existing dam to reduce the risk of potential failure. However, these alternatives are not presented in detailed analysis as they do not meet the project purpose and need (to minimize the potential for dam failure by planning for the decommissioning of an aging dam and to be fiscally responsible) and because they are substantially similar in design to an alternative that is analyzed (the No Action Alternative).

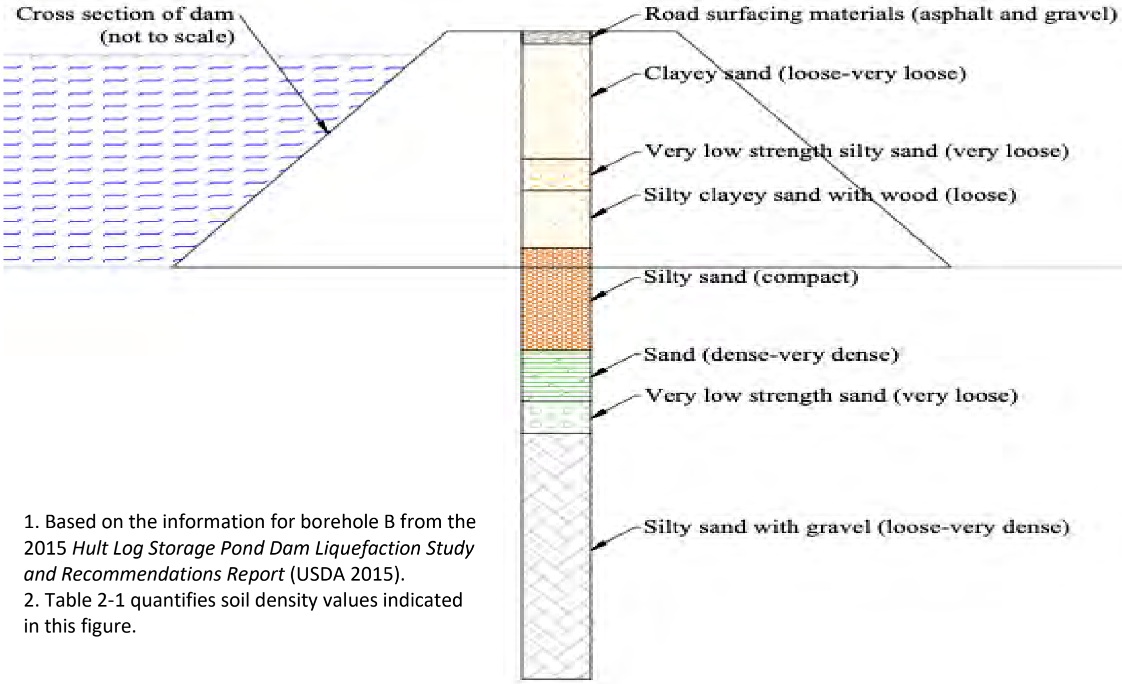
As described above in *Alternative 1: No Action Alternative*, the dam is regularly inspected and repaired. Repairs (including emergency repairs) and regularly scheduled inspections and maintenance on the dam have and will continue as long as a dam is there. Appendix E (*Hult Pond Dam Events, Repairs, Upgrades, Engineering Issues, and Reports*) has additional details about the history of the dam and its repairs.

In July 2012, the Bureau of Reclamation conducted a periodic inspection and completed a Comprehensive Dam Evaluation of the dam and spillway. The report characterized the dam as having an "unacceptably high" [51] risk of failure due to issues caused by seepage through the foundation of the dam and spillway dike. The report also noted the potential for overtopping of the dam and spillway dike during a flood event (USDI 2012). In response, the U.S. Forest Service undertook additional studies about the seismic stability of the dam (see Figure 2-6), and the BLM increased safety inspections and water level monitoring at the site (see Appendix E, *Hult Pond Dam Events, Repairs, Upgrades, Engineering Issues, and Reports*, for details.)

In 2017, the U.S. Army Corps of Engineers conducted a periodic inspection and assessment of the dam, which identified several potential failure modes (USACE 2018a). In response to this inspection and assessment, the BLM requested that the Corps evaluate options to reduce the potential of these failures occurring. These options were evaluated as part of a 2019 U.S. Army Corps of Engineers report, which addressed the feasibility of 1) raising the height of the dam so that a large flood event would not overtop it and breach the dam and 2) excavating the spillway channel and dike and using that material to make the dam wider, reducing the risk that the dam would be breached (USACE 2019). While there would still be potential for failure, these repairs would reduce the level of risk to a level deemed societally tolerable by the U.S. Army Corps of Engineers, the U.S. Bureau of Reclamation, and the Federal Energy Regulatory Commission (USACE 2014:5-1, 5-9).

[51] The U.S. Bureau of Reclamation report found that multiple issues each had a "unacceptably high" risk of causing failure. "Unacceptably high" means that the risk of failure is greater than 10 percent over the life of the dam.

Figure 2-6*. Bore Dam Profile Showing Structure of Hult Pond Dam*[1, 2]



1. Based on the information for borehole B from the 2015 *Hult Log Storage Pond Dam Liquefaction Study and Recommendations Report* (USDA 2015).
2. Table 2-1 quantifies soil density values indicated in this figure.

Table 2-1. *Soil Density Values in Hult Pond Dam*

Soil penetration test[1] *(blows per 12 inches)*	***Soil packing***	***Relative density***
< 4	Very Loose	< 20%
4–10	Loose	20–40%
10–30	Compact	40–60%
30–50	Dense	60–80%
> 50	Very Dense	> 80%

1. An in-situ (on-site) dynamic penetration test designed to provide information on the geotechnical engineering properties of soil. The main purpose of the test is to provide an indication of the relative density of granular deposits, such as sands and gravels from which it is virtually impossible to obtain undisturbed samples. The soil strength parameters which can be inferred are approximate but may give a useful guide in ground conditions where it may not be possible to obtain borehole samples of adequate quality, like gravels, sands, silts, clay containing sand or gravel, and weak rock.

However, in addition to this report, the BLM considered the age of the dam, its history of problems and repairs, the materials that the dam was originally constructed with, and the underlying foundation of ancient landslide material (see Figure 2-6),[52] as well as other inspections done on the dam by the U.S. Army Corps of Engineers, U.S. Bureau of Reclamation, and other agencies over the past 30 years (see Appendix E, *Hult Pond Dam Events, Repairs, Upgrades, Engineering Issues, and Reports*).

The life expectancy of a well-designed, well-constructed, and well-maintained earthen dam can reach 100 years (Wieland 2010), but the average life expectancy is 50 years (Maclin and Sicchio 1999). While the above-described repairs proposed by the U.S. Army Corps of Engineers would, in the short term, reduce the overall potential for failure of the dam (built in the 1930s or 1940s), these substantial and expensive repairs ($8 million to $14 million in 2018; USACE 2019:3-14) would not extend the overall life expectancy of this dam. That is, if repairs were made, the BLM expects that subsequent inspections would continue to bring to light additional or returning deficiencies of the dam's condition as it continues to age. Therefore, these suggested alternatives did not meet the BLM's purpose and need for this project.

[52] As shown in Figure 2-6, the dam and associated structures comprise loose or very loose materials, including soils mixed with decomposing woody debris, and are built atop loose to very dense sand.

Save the Reservoir Using Funds from Donations, Grants, Recreation Fees, Raised Taxes, Lobbying Congress, the 2022 Bipartisan Infrastructure Law, or the Sale of Hydropower

Public scoping comments suggested various funding measures to address costs associated with preserving the reservoir. However, using funds from donations, grants, recreation fees, raised taxes, requesting money from Congress or the 2022 Bipartisan Infrastructure Law, or selling hydropower to save the reservoir are not presented in detailed analysis because they would have substantially similar environmental effects to Alternative 2 (see Issue 3 in Chapter 3 for information about costs, including potential sources of funding to implement the alternatives). In addition, many of these options are remote and speculative or economically infeasible.

As described above, the BLM performs regular repairs and maintenance on the dam. These costs are part of the BLM's annual maintenance budget, which is part of the overall BLM budget proposed by the President and approved by Congress. Although the BLM submits its priorities as part of the budget planning process, the agency is prohibited from lobbying Congress for specific funds. Also, as described above, neither these repairs nor larger-scale and more expensive repairs would extend the dam's life. Therefore, the BLM considered these comments as suggestions for funding to build a new dam, the environmental effects of which would be substantially similar to the effects under Alternative 2.

As described in Chapter 3's Issue 3, the cost of removing the existing dam and building a new dam to meet Federal Guidelines for Dam Safety (FEMA 2005) would be approximately $25 million. Several of the suggested funding measures are remote and speculative or economically infeasible. For example:

- Camping fees: Recreation.gov indicates that developed campsites on public lands generally cost $10 to $30 per night. Not accounting for any overhead, if campsites cost $30 per night and there were 40 campsites continuously in use year-round at the reservoir (there are currently 6 officially recognized campsites at the reservoir), it would take 57 years to raise the money to replace the dam. (Recreation fees on BLM-administrated lands account for around $2 million annually in all of Oregon (USDI 2019a).)
- Donations: The average online donation to an environmental cause is $257 (Blackbaud 2022). To raise the necessary funds through donations, the BLM would need to receive approximately 97,000 donations of $257. Siuslaw Field Office, where Hult Reservoir is located, has approximately 658,000 recreation visits annually (USDI 2019a), which could represent potential donors. However, these recreation visits are generally to other popular recreation sites in the Field Office: Upper Lake Creek, Lake Creek Falls Recreation Site, Siuslaw River campgrounds, West Eugene Wetlands, Tyrell Orchard-Forest Successional Trail, and Carpenter Bypass mountain biking trails attract the majority of these visitors. If 97,000 people visited Hult Pond Dam once annually and all of them donated an average of $257, that would amount to more than 267 visitors to the reservoir per day, year-round. (Guidance about how the BLM accepts, solicits, and uses donations can be found in the BLM's *Donations, Solicitations, and Fundraising Manual* (USDI 2019b)).
- Sale of hydropower: Hydropower dams need both high head [53] and high flow in order to generate power. Given the relatively low height of the dam and the relatively small size of Hult Reservoir and Lake Creek, [54] a hydropower project at Hult Pond Dam is unlikely to be feasible. [55] If it were feasible, it would cost more to build, maintain, and operate [56] than any funds received from hydropower generation. In addition, this would require a land use plan amendment, a license from the Federal Energy Regulatory Commission, and changes to the reservoir's water rights.

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[53] Head is the height difference between where the water enters into the hydro system and where it leaves it. Hult Pond Dam has a hydraulic height of 28 feet, and the maximum head would be expected to be approximately 20 feet.
[54] In addition, some amount of water flow would be necessary for fish passage (i.e., not part of the hydropower system).
[55] The dam would be expected to generate 0 to 5 kW, which is similar to a single-family residential solar panel installation in Oregon in the summer.
[56] Including transmitting electricity generated by the dam into the electrical grid.

- Congressional funds or tax dollars: As described above, funding for the BLM is part of the President's Federal budget and approved by Congress, and the BLM is prohibited from lobbying Congress for specific funds. Using local taxpayer funds to pay for a Federal project is unlikely: The State and the County are unlikely to propose raising local taxes to support a Federal agency.

Leave the Dam Alone

This alternative was suggested by public scoping commenters who proposed that the BLM should leave the dam and reservoir alone. However, this would not meet the project's purpose and need because not only would it not decrease the current potential for the dam to fail; rather, it would increase the potential for failure as the structure continues to age: Several examples of recent potential dam failure events averted by BLM repairs or monitoring can be found in the *Background and History* section in Chapter 1. For example, in September 2020, a storm toppled a tree, severely damaging a dam toe drain. Emergency repairs reduced the risk of erosion and dam failure during winter rains. More recently, in 2022, strong winter storms in the region necessitated increased in-person and remote monitoring to ensure that the dam did not overtop, which would be expected to lead to dam failure. To prevent overtopping, the BLM opened the low-level outlet gate of the dam to 36 inches, even though BLM staff was unsure if they would be able to close the gate after opening it that far. (The BLM successfully closed it to 8 inches following the storm.)

As described earlier in this chapter, NEPA regulations require that an EIS address a No Action Alternative. In this EIS, "no management" is not the appropriate interpretation of the No Action Alternative. In the absence of a proposal, the BLM would continue to perform monitoring, inspection, maintenance, and repairs on the dam as it does now so that there is not an increased potential for dam failure (i.e., repairing the dam as necessary is required to meet Federal Dam Safety Guidelines for high hazard dams). Appendix F, *Hult Pond Dam Operations*, describes annual and monthly operations and inspections that are performed at the dam.

Transfer the Dam to Another Agency (With or Without Repairs)

January 2022 scoping comments suggested that the BLM should transfer the dam to another agency. In addition to not meeting the purpose and need, this alternative is also remote and speculative. The BLM has in the past attempted to transfer the dam and reservoir to other Federal, State, and local agencies and governments; however, other agencies have not wanted the liability of the dam, nor the costs associated with the ongoing maintenance and repairs. The BLM would not do expensive repairs in advance of an imminent transfer: Additional repairs to the dam are not expected to decrease the liability of the dam, and the BLM does not receive budget or funding to allocate to resources that are outside of its control.

Give or Lease the Reservoir to the Public

Public comments received on draft Chapters 1 and 2 during the May 2022 public comment period suggested that the BLM should give or lease the reservoir and dam to the public to manage. As it is located on public land, the dam is already owned by the public and managed by the BLM. In addition to not meeting the purpose and need, this alternative is also remote and speculative. According to FEMA, the responsibility of maintaining a safe dam rests with the owner of the dam. As described in Issue 3 (Costs) in Chapter 3 and other alternatives considered but not presented in detail, the BLM expects the costs of replacing and then maintaining and operating a dam would be substantial and difficult to raise.

Seasonally Lower Water Levels to Prevent Potential for Dam Failure

The BLM received a comment suggesting that the agency seasonally lower the water level at the reservoir to prevent potential dam failure during the rainy winter months. However, this alternative does not meet the BLM's purpose and need to decommission the existing dam to minimize the potential for dam failure by planning for the decommissioning of an aging dam. Seasonally lowering the water level could reduce the likelihood of some potential failures (such as overtopping) that could occur during normal operations, and it would decrease pressure on the dam, which would reduce the potential for seepage. However, the inflow from a storm would quickly raise the reservoir level, which would contribute to the potential for dam failure.

As described under Alternative 1, Lake Creek typically flows at approximately 45 cubic feet per second (cfs) in the winter. However, Lake Creek flowing at 250 cfs has a recurrence interval of 1.4 years (in other words, a 250 cfs flow is a 1.4-year event). The existing outlet pipe passes approximately 250 cubic feet of water per second, which means that any higher flow will start to fill the reservoir. Hence, this alternative would still pose a risk of overtopping (and potential failure) because the spillway and/or the dam's underdrain are not adequate to pass a major flood event (i.e., exceeding an approximately 11-year event). Assuming that the reservoir was allowed to refill seasonally, there would still be risk from the unseasonal storms or the unstable foundation during the drier months when the reservoir was full. This alternative would also be fraught with potential for human error and greater liability if the BLM didn't anticipate a storm or a larger-than-forecasted storm came in.

Implementing this alternative would also render the fish ladder impassable for the few steelhead currently able to use it. In addition, low water levels would encourage types of recreation such as mud-bogging [57] that would be detrimental to the function of the aquatic ecosystem in the area.

Repair the Existing Fish Ladder

The BLM received public comments suggesting that the BLM repair the existing fish ladder so that coho and Pacific lamprey could pass it, which would allow access to more than 8 additional miles of coho stream habitat. While this would be a beneficial effect for native fish, this alternative does not meet the purpose and need, which is to address the potential for failure of the aging dam and associated loss of life and property. All action alternatives improve fish passage through the project area; information about the impacts to native fish under the alternatives can be found in Issue 14.

Use the Existing Dam as a Cofferdam to Keep Hult Reservoir Levels High While Building a New Dam

The BLM considered an alternative that would use the existing Hult Pond Dam as a cofferdam [58] during the construction of a new dam built slightly downstream. Keeping the water level high throughout the entire process would minimize adverse impacts to recreation, special status aquatic species, and western pond turtles. However, this alternative is not presented in detailed as it is technically infeasible to remove the cofferdam (i.e., the existing Hult Pond Dam) after the construction of the new dam without draining the reservoir for a period of time. Hence, this alternative is substantially similar in design to Alternative 2, an alternative that is analyzed in detail. As described in Alternative 2, cofferdams may be used during construction, which could include the use of the existing Hult Pond Dam.

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[57] An off-road motorsport in which competitors attempt to drive a vehicle as far as possible through a pit of mud.
[58] A structure that retains water and allows a work area to be dewatered so that crews can pour concrete, excavate, repair, weld, etc.

Consider Different Project Design Features or Mitigation Measures with the Action Alternatives

Mitigation includes specific means, measures, or practices that would reduce or eliminate effects of the action alternatives (USDI 2008a:61) and design features that reduce or eliminate adverse effects after the initial formulation of the alternatives (USDI 2008a:44).

The BLM received public comments suggesting that the BLM consider other project design features or mitigation measures with the action alternatives. For example, comments suggested that the BLM could charge for camping; add recreation amenities; or create a new recreation pond (like Alternative 3's Little Log Pond) in a different location (for example, in the footprint of Hult Reservoir).

Some of these suggestions were eliminated because they were infeasible or remote and speculative. For example, the BLM looked at other sites in the project area besides the location of Little Log Pond (Alternative 3) in which to put replacement recreation ponds but found that these locations would be too small, too difficult to maintain, or too prone to water pollution.

Some of these suggestions are not presented in detailed study because effects would be substantially similar to the effects of a project design feature or mitigation measure already being considered. For example, many of the proposed recreation mitigation features would have effects similar to recreation mitigation features that are proposed under Alternative 4. Specifically, the BLM did not include a mitigation measure or project design feature that would charge for camping. This was suggested both to raise funds for dam replacement or maintenance and as a preventative measure to reduce undesirable behavior at Hult Reservoir. As explained previously, money raised by camping fees would be a very small amount of the money needed to address dam replacement. In addition, all action alternatives include a proposed project design feature adding a camp host site. This would be expected to reduce undesirable behavior in the area while also maintaining an affordable camping location in the Coast Range.

Build Little Log Pond Dam in Addition to Keeping the Hult Pond Dam

The BLM received a public comment suggesting that the BLM consider an alternative that would build Little Log Pond Dam in addition to keeping Hult Pond Dam. This alternative was not presented in detailed analysis: If the existing Hult Pond Dam is kept with the new Little Log Pond Dam, this alternative would not meet the purpose and need. As described in the purpose and need for this project, the existing Hult Pond Dam represents an unacceptably high risk to the downstream population and therefore needs to be removed. Were it to build a new dam at Little Log Pond location without removing the existing Hult Pond Dam, the BLM does not expect the presence of Little Log Pond and its dam to decrease the impacts of a Hult Pond Dam failure. In fact, the BLM believes that if two dams were to exist in the project area, the failure of the upper one would severely damage the lower one. An additional recreation area below Hult Pond Dam may also increase the population at risk that could be impacted by dam failure.

If the BLM built a new Hult Pond Dam in addition to the Little Log Pond Dam, this alternative would be substantially similar in design and effects to Alternatives 2 (for Hult Pond Dam and Reservoir) and 3 (for Little Log Pond and its dam).

Remove All Dams from Lake Creek

The BLM received a public comment suggesting that the BLM consider an alternative that would remove all dams from Lake Creek. The BLM did not present this in detailed analysis: An alternative proposing this would be similar in design and effects to Alternative 4 (Remove Hult Reservoir), as the BLM does not manage any other dams on Lake Creek and is not aware of any other reservoirs or dams on Lake Creek on lands not administered by the BLM.

Use Volunteers to Build a New Dam

The BLM received a public comment suggesting that the BLM consider using volunteers to build a new dam to save money. This alternative was not presented in detailed analysis as it would be inconsistent with the basic policy objectives for the management of the area. Federal contracting laws (e.g., Davis-Bacon and Related Acts and the McNamara-Ohara Service Contract Act) require that the contractors pay, at minimum, locally prevailing wages for work under construction contracts over $2,000 and service contracts over $2,500.

The removal of the existing dam and potential construction of a new dam and/or bridge would need to be contracted by the Government. Under Federal contracts, the contractor would be required to provide licenses, bonding, and insurance to protect the Government. These protections do not exist with volunteer agreements. Further, the contracts themselves provide the Government with the means to ensure that work is accomplished to the Government's satisfaction and standards. These labor costs are passed along to the Government as part of the contract cost. Portions of the restoration activities may be suitable for volunteer work; however, these activities do not drive cost for the project as a whole and would not change the general cost estimates included in the EIS.

Comparison of the Alternatives

Table 2-2 summarizes the key features of the alternatives, and Table 2-3 summarizes the effects that are presented in Chapter 3.

Table 2-2. *Key Features of the Alternatives*

Feature	Alt. 1: No Action	Alt. 2: Build a New Dam	Alt. 3: Remove Hult Reservoir; Add Little Log Pond	Alt. 4: Preferred Alternative (Remove Hult Reservoir)
Reservoir	No change: The 54-acre Hult Reservoir maintained with a volume of 364 acre-feet	Hult Reservoir maintained in the long term with an approximate size of 54 acres and volume of 364 acre-feet, although the reservoir would be fully or partially drained while rebuilding the dam	• Hult Reservoir removed; Lake Creek restored to a naturelike stream channel through the Hult Reservoir Restoration Area • Little Log Pond (a 5-acre reservoir) created downstream with an approximate volume of 35 acre-feet	Hult Reservoir removed; Lake Creek restored to a naturelike stream channel through the Hult Reservoir Restoration Area
Dam	• No change: Dam maintained as is (dam elevation: 820 feet) • Dam length: 225 ft • Dam is high hazard	• New dam built and existing dam removed • New dam material brought in from off-site; old dam material moved off-site • Dam length: 250 ft[1] • New dam remains high hazard[2]	• Hult Pond Dam removed • New dam built at Little Log Pond • Dam length: 120 ft[1] • New Little Log Pond dam would be low or significant hazard	• Dam removed • Naturelike stream channel rehabilitated in its place • Dam length: 0 ft • No dam hazard
Low-level outlet and spillway	No change: Structures maintained as is	• Existing outlet gate and pipe removed • Roughened channel built at Hult Reservoir through old spillway to accommodate high flows (at least a 500-year flood) and debris • Drop intake structure with a low-level valve added	• Hult Pond Dam's outlet gate and pipe removed • Spillway filled in with removed dam material • Little Log Pond would have a low-level outlet • Roughened channel at Little Log Pond would accommodate high flows and debris	• Outlet gate and pipe removed • Spillway filled in with removed dam material
Fish ladder	No change: Poorly functioning fish ladder would remain	Removed: Roughened channel through spillway accommodates fish passage	• Removed: Channel rehabilitation through Hult Reservoir Restoration Area allows fish passage • Roughened channel at Little Log Pond accommodates fish passage	Removed: Channel rehabilitation allows fish passage
Bridge	No change: Existing 88-foot bridge remains in place	• New, longer bridge built to accommodate roughened channel, replacing the existing bridge and road across the dam • Bridge length: 250 ft[1]	• New bridge built across Lake Creek, replacing the existing bridge and road across the dam • Bridge length: 140 ft[1]	• New bridge built across Lake Creek, replacing the existing bridge and road across the dam • Bridge length: 140 ft[1]

Feature	***Alt. 1: No Action***	***Alt. 2: Build a New Dam***	***Alt. 3: Remove Hult Reservoir; Add Little Log Pond***	***Alt. 4: Preferred Alternative (Remove Hult Reservoir)***
Monitoring, maintenance, and repairs (dam, adjacent structures, and bridges)	No change: Ongoing as necessary	Ongoing as necessary	Ongoing as necessary	· No dam, therefore, no dam monitoring, maintenance, or repairs · Bridge: Ongoing as necessary
Emergency action plan (EAP)	No change: BLM would continue to follow its EAP	BLM would create a new EAP	BLM would create a new EAP if Little Log Pond Dam was a significant hazard dam	No EAP needed

1. Dam and bridge lengths are estimated.
2. Because there is a potential for loss of life if the dam were to fail, a new dam would continue to be a high hazard dam (see Table 1-1). All high hazard and significant hazard dams must have emergency action plans.

***Table 2-3**. Comparison of the Effects of the Alternatives*[1]

Issue	***Affected Environment and Alt. 1: No Action (in the short term[2])***	***Alternatives 1.1 and 1.2 (within 8 years[2])***	***Alternative 2: Build a New Dam***	***Alternative 3: Remove Hult Reservoir; Add Little Log Pond***	***Alternative 4: Preferred Alternative (Remove Hult Reservoir)***
Dam failure (see Issue 1)	Not applicable	· Potential for high hazard dam failure from overtopping or breach during high water as well as instability of the structures (**Alt. 1.1**) · If possible, dam would be breached to prevent imminent failure (**Alt. 1.2**)	Potential for high hazard dam failure from seismic activity (but lower potential than under Alt. 1.1)	Potential for low or significant hazard dam failure	No dam, so no potential for dam failure
Public safety (see Issue 2)	Not applicable	**Alt. 1.1**: The potential for loss of life would range from 0 to 11 deaths and flooding would be expected to harm 1 to 10 structures **Alt. 1.2**: No loss of life or property damage	Low potential threat to public safety from dam failure, but if it were to occur, effects would be similar to Alt. 1.1	Low potential threat to public safety from dam failure, but if it were to occur, flooding would be expected to harm zero to one structures	No threat to public safety
Cost (see Issue 3)	Annual costs (operations and maintenance): $50,000	**Alt. 1.1**: · Estimated property damage would range from $270,000 to $6,480,000 · No attempt is made to quantify the cost of emergency services, environmental damages, disruption of government services, cleanup, or the disruption of people's lives	· Implementation costs: $19–$27 million · Annual costs (operations and maintenance): $57,000	· Implementation costs: $17.6–$25.6 million · With proposed mitigation: $22.2–$30.2 million · Annual costs (operations and maintenance): $67,000 ($92,000 with mitigation)	· Implementation costs: $5.6–$8.1 million · With proposed mitigation: $10.6–$13.1 million · Annual costs (operations and maintenance): $24,000 ($49,000 with mitigation)

Issue	***Affected Environment and Alt. 1: No Action (in the short term²)***	***Alternatives 1.1 and 1.2 (within 8 years²)***	***Alternative 2: Build a New Dam***	***Alternative 3: Remove Hult Reservoir; Add Little Log Pond***	***Alternative 4: Preferred Alternative (Remove Hult Reservoir)***
Hult Reservoir recreation³ (see Issue 4)	· Water-dependent activities: H · Water-influenced activities: M · Non-water-influenced activities: L	· Water-dependent activities: L · Water-influenced activities: M · Non-water-influenced activities: L	· Water-dependent activities: H · Water-influenced activities: M · Non-water-influenced activities: L	· Water-dependent activities: L · Water-influenced activities: H · Non-water-influenced activities: M	· Water-dependent activities: L · Water-influenced activities: M · Non-water-influenced activities: L (Water influenced and non-water influenced activities' quality increases with proposed mitigation)
Local economy (see Issue 5)	Presence of Hult Reservoir helps support local businesses and residents	Adverse effect on local businesses	· Short term: Potential boost to economy (construction) in short term · Long term: Similar to current conditions	· Short term: Potential boost to economy (construction) in short term · Long term: Similar to current conditions	· Short term: Potential boost to economy (construction) in short term, but less than under Alts. 3 and 4 · Long term: Similar to Alt. 1.1 and 1.2
Quality of life (see Issue 6)	Presence of Hult Reservoir provides valued recreation opportunities but poses risk to life and property	Decreased compared to current condition, with higher risk to life and property under Alt. 1.1	Similar to current condition but with lower risk to life and property	Decreased compared to current condition but with lower risk to life and property	Decreased compared to current condition but with lower risk to life and property
Environmental justice (see Issue 7)	Benefit to environmental justice populations	Adverse, disproportionate impact to environmental justice populations	Similar to current conditions	Adverse, disproportionate effects on environmental justice populations but less than under Alt. 4	Adverse, disproportionate impact to environmental justice populations but less than under Alt. 1.1 and 1.2 Mitigation proposed to seek public input on proposed recreation
Historic mill site (see Issue 8)	Number of historic features that would be completely lost, or have a moderate to high potential for damage or loss by actions in project area: NA	**Alt. 1.1:** 24 **Alt. 1.2**: 1	8	21	21 or less
Wetlands (see Issue 9)	37.1 acres	29.9 acres	36.7 acres	· 31.0 acres · 41.9 acres with proposed mitigation	· 28.5 acres · 39.4 acres with proposed mitigation
Wetlands vegetation types (see Issue 10)					
Unconsolidated bottom	15.1 acres	0 acres	14.5 acres	2.8 acres	0 acres
Aquatic bed	8.5 acres	0 acres	8.5 acres	0 acres	0 acres

Issue	***Affected Environment and Alt. 1: No Action (in the short term[2])***	***Alternatives 1.1 and 1.2 (within 8 years[2])***	***Alternative 2: Build a New Dam***	***Alternative 3: Remove Hult Reservoir; Add Little Log Pond***	***Alternative 4: Preferred Alternative (Remove Hult Reservoir)***
Emergent wetland, mostly native species	5.4 acres	0 acres	5.4 acres	0 acres	0 acres
Scrub-shrub wetland	1.9 acres	1.3 acres	1.9 acres	1.3 acres	1.3 acres
Forested wetland	9.4 acres	4.3 acres	9.4 acres	4.3 acres	4.3 acres
Emergent wetland, reed canarygrass dominant	0 acres	18.4 acres	0 acres	17.2 acres	17.2 acres
				(Acres would change with mitigation)	(Acres would change with mitigation)
Special status aquatic plants (see Issue 11)	Populations survive; at risk if reservoir is temporarily lowered	Populations no longer present	• Populations no longer present • Populations possibly survive in part with proposed Hult Marsh mitigation	• Populations no longer present • Populations possibly survive in part with proposed Hult Marsh mitigation	• Populations no longer present • Populations possibly survive in part with proposed Hult Marsh mitigation
Invasive plants (see Issue 12)	• Moderate risk of terrestrial invasive plant spread (risk value of 25/100) • Aquatic invasive plants in Hult Reservoir	• High risk of terrestrial invasive plant spread (risk value of 81–100/100) • Aquatic invasive plants may spread downstream	• Moderate risk of terrestrial invasive plant spread (risk value 25/100) • Aquatic invasive plants likely in Hult Reservoir	• High risk of terrestrial invasive plant spread (risk value 63–81/100) • Aquatic invasive plants likely in Little Log Pond and proposed mitigation ponds	• High risk of terrestrial invasive plant spread (risk value 56–72/100) • Aquatic invasive plants likely in proposed mitigation ponds

Issue	*Affected Environment and Alt. 1: No Action (in the short term[2])*	*Alternatives 1.1 and 1.2 (within 8 years[2])*	*Alternative 2: Build a New Dam*	*Alternative 3: Remove Hult Reservoir; Add Little Log Pond*	*Alternative 4: Preferred Alternative (Remove Hult Reservoir)*
Western pond turtle (see Issue 13)	Large breeding population of turtles	Turtle population no longer present	Large breeding population of turtles	· Without mitigation, turtle population is expected to no longer be present, but proposed mitigation would maintain a healthy breeding population (see Issue 13 for details) · Additional genetic diversity mitigation proposed	· Without mitigation, turtle population is expected to no longer be present, but proposed mitigation would maintain a healthy breeding population (see Issue 13 for details) · Additional genetic diversity mitigation proposed
Native fish (coho used as indicator) (see Issue 14)	Coho habitat upstream of Hult Pond Dam inaccessible due to poorly functioning fish ladder	**Alt. 1.1**: Redds and fish eggs would be covered in sediment (high mortality) **Alt. 1.2**: No habitat upstream of breached Hult Pond Dam	8.1 additional miles of coho habitat (poor quality habitat in Hult Reservoir)	8.7 additional miles of coho habitat (poor quality habitat in Little Log Pond)	8.8 additional miles of coho habitat
Non-native game fish (see Issue 15)	Non-native game fish would have 54 acres of habitat	Non-native game fish eliminated	Non-native game fish eliminated due to reservoir dewatering spanning multiple seasons	Non-native game fish eliminated (No habitat suitable for non-native game fish in the new 5-acre Little Log Pond)	Non-native game fish eliminated

1. Water-dependent activities includes boating, swimming, and fishing; water-influenced activities includes camping, day use/picnicking, and wildlife watching; and non-water-influenced activities include equestrian use, driving for pleasure, and hiking. H indicates that these activities are high quality; M indicates medium quality, and L indicates low quality. These qualifiers are quantified and described in more detail in the analysis of the issue to which they are applied. Effects shown are the long-term impacts to the resource. Many of these activities would not be available at all in the short term. Long term and short term vary by issue, and details can be found in Chapter 3.)
2. Assuming future dam failure (Alternative 1.1) or dam breach to prevent imminent dam failure (Alternative 1.2) within 8 years. See assumptions at the beginning of Chapter 3.
3. Low (L): Recreation activities are nearly nonexistent to existent but with poor quality and low demand; Moderate (M): Recreation activities are in demand, supported with some infrastructure, and of comparable quality to similar areas in the region where they are pursued; High (H): Recreation activities are in demand, supported with robust infrastructure, and of high quality compared to similar areas in the region where they are pursued.

Potential Mitigation[59]

The BLM identified the following mitigation measures to respond to adverse effects identified in the analysis of this EIS. If a resource addressed in this analysis is not shown below, that means that the BLM deemed potential for adverse effects to that resource negligible or did not identify any practical mitigation measures that would mitigate adverse effects to that resource.

The decision-maker's decision to reject, modify, or apply each of the following mitigation measures to the selected alternative will be described in the Record of Decision. The decision-maker may decline to select an identified mitigation measure because the adverse impact that it is supposed to address is acceptable in light of the potential for increased cost or decreased effectiveness of the selected alternative and/or because the decision-maker believes that other measures adequately address the concern.

Mitigation can include (40 CFR 1508.1(s)):

- Avoiding the impact altogether by not taking a certain action or parts of an action.
- Minimizing impact by limiting the degree of magnitude of the action and its implementation.
- Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.
- Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.
- Compensating for the impact by replacing or providing substitute resources or environments.

To reduce adverse impacts to recreation under Alternative 4:

- Extend and improve the existing multi-use trail system and build a connector trail to a viewpoint and day-use area.
- Build a one-way, downhill-emphasis mountain bike trail with bike-specific trail features accessible from both the Hult Reservoir recreation complex and the proposed day-use area viewpoint.

To reduce adverse impacts to environmental justice populations under Alternative 4:

- Explore the development of non-water-based recreational opportunities in or near the project area by working with the BLM Office of Collaborative Action and Dispute Resolution to conduct a follow-up to the 2017 *Upper Lake Creek Management Plan Update EIS Stakeholder Assessment* (Langdon Group 2017) to engage with the local public.

To reduce adverse impacts to native fish and aquatic resource function in wetlands under Alternatives 3 and 4:

- Remove, replace, and install three new culverts on Runout Creek (alluvial fan) and up to two new culverts on Broad Creek (currently none) where they cross Lake Creek Road (15-7-35.0).

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[59] These measures are in addition to the project design features that are included as part of the action alternatives. BLM's NEPA Handbook describes the differences between mitigation measures and project design features thusly: "Design features are those specific means, measures or practices that make up the [action] alternatives." and "If any means, measures, or practices are not incorporated into the [action] alternatives, they are considered mitigation measures" (USDI 2008a:44). In Chapter 3 (*Affected Environment and Environmental Consequences*), the analysis considers the effects of adopting and not adopting mitigation measures. Project design features are part of the alternatives, and the analysis does not address the impacts of not including them (beyond the impacts of not adopting a specific alternative). In the Record of Decision, the BLM must describe the mitigation measures that are being adopted (USDI 2008a:61) and must identify any mitigation measures that were not selected with a brief explanation of why those measures were not adopted (USDI 2008:104).

The *Clean Water Act* describes that compensatory mitigation is required to replace the loss of wetlands and aquatic resource functions in a watershed, and the *National Historic Preservation Act* asks agencies to avoid, minimize, or mitigate adverse effects to historic resources. Many of the protection measures that respond to *Clean Water Act* and *National Historic Preservation Act* requirements are included as project design features of the alternatives (listed under each alternative earlier in this chapter) and are not listed above as mitigation measures. Measures that mitigate adverse impacts to historic resources can be found under the *Cultural* header in the *Design Features of the Alternative* section of each alternative.

- Regrade the valley in the Hult Reservoir Restoration Area such that valley and stream grade (longitudinal profile) and valley width (lateral profile) are at the lowest possible angles.
- Cut a pilot channel through Hult Reservoir Restoration Area for Lake Creek to mimic the natural/historic sinuosity index of 1.12[60] and locate Lake Creek in its historic footprint using bathymetry (measurement of water depth and underwater contours and features) and site photographs.
- Within the Hult Reservoir Restoration Area, cut pilot channels for tributaries connecting to Lake Creek and install large debris jams of wood and logs at tributary junctions. Design for maximum stream sinuosity and minimum stream grade as appropriate with the valley form.
- Ensure floodplain connectivity by designing and constructing low bank angles and shallow incisions throughout Hult Reservoir Restoration Area.
- Enhance natural topographic depressions in the Hult Reservoir Restoration Area (northwest and southeast corners of the existing reservoir) to sustain the presence of wetlands.
- Cut pilot channels on the Hult Reservoir Restoration Area floodplain for energy dissipation and habitat provisions during winter floods.
- Add up to 1,500 additional pieces of structure (e.g., logs and trees with root wads) in the Hult Reservoir Restoration Area (stream, bank, floodplain, flood channels, and wetlands) to stabilize exposed soils; prevent headcutting,[61] bank slumping, and other runoff and erosion; and provide habitat. These pieces would be arranged in a combination of strategically placed structures and scattered opportunistically across the landscape to provide appropriate habitat and turtle basking structures and to maintain flood flow capacity. Place more pieces than necessary to compensate for firewood theft.
- Construct up to five beaver dam analogs[62] and/or post-assisted log structure complexes (multiple structures per complex) (see Figure 2-7) in the Hult Reservoir Restoration Area to reduce stream energy in Lake Creek, tributaries, flood channels, and wetlands. When constructing beaver dam analogs in a sequence such that the structures work in concert with each other, space approximately 100 to 300 feet apart.

***Figure 2-7**. Beaver Dam Analogs at Bridge Creek, Crabtree Lake, and Fox Creek*

To reduce adverse impacts to aquatic special status plants under Alternative 2:

- Maintain warm-water habitat in the large open wetland at the north end of the reservoir (Hult Marsh; see Figure 3-15 in Chapter 3). This construction can be a temporary cofferdam while Hult Pond Dam is rebuilt.

[60] Sinuosity is the degree to which a stream meanders side to side along its length. Sinuosity index describes this as a ratio of a stream's length to the stream's valley.
[61] Headcutting is progressive stream channel erosion and expansion resulting from the formation of a sharp vertical drop (headcut) in a streambank.
[62] Beaver dam analogs are channel-spanning structures that mimic or reinforce natural beaver dams. They are constructed with material that is similar to what beaver use to build their dams. This may include sediment ranging in size from cobbles, gravel, sand, silt and clay; vegetation, such as the stalks of emergent vegetation; the branches and stems of deciduous trees and shrubs (usually willow or cottonwood); and wood posts made from the trunks of conifers.

To reduce adverse impacts to aquatic special status plants and western pond turtles under Alternatives 3 and 4:

- Maintain warm-water habitat in the large open wetland at the north end of the reservoir (Hult Marsh; see Figure 3-15 in Chapter 3).
    - Utilize deconstructed fill material from the dam to control and contain water for special status plant species and wildlife management (e.g., large beaver dam analog, low embankment). Maintain approximately 3 to 6 feet of permanent water.
- Design and construct up to five artificial ponds that maintain permanent water with deep (greater than 6 feet) and shallow (less than 3 feet) aquatic habitat. Construct the ponds near other aquatic features for connectivity between habitats and long-term population benefits.
    - Provide approximately 4 acres of ponds within the Hult Reservoir Restoration Area.

To reduce adverse impacts to the Hult Reservoir population of western pond turtles under Alternatives 3 and 4:

- Create warm-water habitat in the reconnected alluvial features, including design of channel and pool morphology (see mitigation measures proposed for wetlands).
    - To promote beaver activity, cut the pilot channel tributaries' stream width within a range of 1 to 8 meters, with a stream gradient of 0.5 to 5 percent (preferred gradient of 3 percent), and a valley width greater than two times the active channel width (USDI 2018b).
- Maintain and promote soft, muddy areas in ponds, wetlands, and other waterbodies known to support turtles (ODFW 2015:30) by planting shrubs and deciduous trees along aquatic habitat that will provide ample leaf litter and cool, moist spots for turtles during prolonged periods of heat. Maintain approximately 30 meters of vegetated buffer[63] (e.g., aquatic vegetation, shrubs, grasses, reeds, deciduous trees) around and adjacent to ponds, wetlands, and other waterbodies (USDI 2018b).
    - Promote beaver habitat in restoration activities by planting at least 225 shrubs and deciduous trees per acre within 30 meters of the aquatic habitat. Preferred species include willow, cottonwood, maple, alder, red osier dogwood, sedges, grasses, and aquatic vegetation (USDI 2018b).
- Maintain and protect turtle nesting habitat and movement corridors from actions that would otherwise make the habitat unsuitable or subject nesting females, developing eggs, or emerging young to increased levels of predation, human-caused mortality, and illegal collection (ODFW 2015:22). Do not disrupt or destroy western pond turtle nesting habitat. Avoid disruption during the nesting season[64] when working within movement corridors and when working within 100 meters of nesting habitat. Exceptions include actions that are linked to habitat restoration efforts that would benefit or improve turtle habitat and actions that are directly related to meeting the purpose and need (e.g., reservoir construction, deconstruction, maintenance, or enhancement).
    - Maintain open areas (i.e., areas without overstory) within 100 to 200 meters of ponds and pool areas for nesting in the Hult Reservoir Restoration Area.
    - Buffer western pond turtle nesting habitat by 100 meters from all recreational development to reduce disruption.
    - Utilize deconstructed fill material to create and maintain up to five nesting mounds for western pond turtles measuring at least 20 feet by 20 feet (6 meters by 6 meters) and ranging from 12 inches to 36 inches deep that receive full solar exposure, preferably south facing (ODFW 2015:25).
    - Maintain clear visual and travel paths between waterbodies and occupied or potential nesting sites and remove obstructions to movement in aquatic corridors including the removal of vegetation that can obstruct turtle movement.
- Strategically place instream structures (see mitigation measures proposed for aquatics) of various-sized downed wood to provide needed habitat features for turtles, other wildlife, and fish. Instream wood structures would provide habitat and basking structure and maintain flood flow capacity (ODFW 2015:31).

[63] A buffer is a protective zone or area adjacent to or surrounding an important habitat feature such as a stream, wetland, or known wildlife breeding/nest site (ODFW 2015:19)
[64] Early May to mid-September.

- To minimize sight and sound disruption around new and existing recreational trails, create and maintain buffers of at least 500 feet (150 meters) between turtle habitats and trails by planting native vegetation around key turtle[65] areas (ODFW 2015:55).
- When dewatering a waterbody known or suspected to harbor turtles, leave the drained waterbody undisturbed and free of any wildlife exclusion fencing for at least 5 days (120 hours) before continuing project activities to allow any turtles present to leave on their own when human presence/activity is low. During these 5 days, a wildlife biologist would be on-site as needed during regular work hours to locate and move any turtles away from the construction zone.
- Post signs for anglers with instructions on what to do if they hook a turtle or instructions to immediately transport the turtle to the closest ODFW-licensed wildlife rehabilitation facility that can accept turtles (ODFW 2015:65).
- To avoid and minimize negative impacts to turtles during the construction, operation, and maintenance phases of the project, refer to the best management practices in Appendix B (*Oregon Department of Fish and Wildlife's Native Turtle Best Management Practices*)

To maintain genetic diversity of Hult Reservoir western pond turtles:

- Alternative 2: Capture pond turtles before and during the reservoir dewatering and temporarily move them to another off-site location with suitable habitat
- Alternatives 3 and 4: Capture pond turtles before and during the reservoir dewatering and move them to another site with suitable habitat (such as Hult Marsh).

To reduce adverse impacts to western brook lamprey juveniles under Alternatives 2, 3, and 4:

- Lower the reservoir level at a rate that allows western brook lamprey juveniles to move into saturated sediment as the water level drops; utilize sprinkler systems where possible to retain wet substrate; and conduct an intensive salvage operation to capture and move as many juveniles as possible.

To reduce adverse impacts to native fish under Alternative 3:

- Place logs and trees with whole root wads around portions of the perimeter of Little Log Pond to provide shelter and rearing habitat for juvenile salmonids.

[65] Key turtle areas include nesting habitat, basking sites, and wildlife managed ponds, pools, and wetlands.

Chapter 3 – Affected Environment and Environmental Consequences

This chapter focuses on resource issues analyzed in detail that the BLM identified during scoping. It presents the consequences (effects) of the action alternatives compared to continuing current management (the No Action Alternative). Issues address the direct, indirect, and cumulative effects of the alternatives. Direct effects are those effects "which are caused by the action and occur at the same time and place" (40 CFR 1508.1(g)(1)). Indirect effects are those effects "which are caused by the action and are later in time or farther removed in distance but are still reasonably foreseeable" (40 CFR 1508.1(g)(2)). Cumulative effects are "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 action" (40 CFR 1508.1(g)(3)) (USDI 2008a:57). Several issues do not address cumulative effects because, other than the actions proposed under the alternatives, there are no reasonably foreseeable actions slated to occur within the geographic and temporal scales defined for the issues (i.e., based on available information, there are no known cumulative effects).

Issues are analyzed in detail when:

a) The issue is related to how the alternatives respond to the purpose and need; or
b) Analysis is necessary to determine the significance of impacts (USDI 2008a:41).

There are 15 issues analyzed in detail in this chapter, including:

1. How would implementation of the alternatives affect the potential for dam failure and downstream flooding?
2. How would the implementation of the alternatives affect the potential for loss of life and property?
3. How much would it cost to implement the alternatives (including maintenance, operations, implementation, and failure)?
4. How would implementation of the alternatives affect visitor access and the type and quality of recreation opportunities in the BLM-administered Recreation Management Areas (RMAs) that overlap the project area?
5. How would the implementation of the alternatives affect the local economy?
6. How would the implementation of the alternatives affect quality of life for local residents?
7. Would the implementation of the alternatives have any disproportionate adverse effects on environmental justice populations?
8. How would the implementation of the alternatives affect archaeological or historic resources and values (including downstream of the dam)?
9. How would implementation of the alternatives affect riparian areas, wetlands, and lentic systems?
10. How would implementation of the alternatives affect the wetland vegetation types at the reservoir?
11. How would implementation of the alternatives affect humped bladderwort and northern bog clubmoss at the reservoir?
12. How would implementation of the alternatives affect the introduction and spread of invasive plants?
13. How would implementation of the alternatives affect persistence of the western pond turtle?
14. How would implementation of the alternatives affect fish passage and habitat for native fish?
15. How would implementation of the alternatives affect non-native game fish like largemouth bass, bluegill, and bullhead in Hult Reservoir?

Appendix A contains additional Issues A-1 through A-23, which the BLM did not analyze in detail, and explains why they were not analyzed in detail.

For the purpose of analyzing the issues in this chapter and Appendix A, the BLM makes the assumption (based on the life span and condition of Hult Pond Dam) that, if no action were taken apart from continuing current management (Alternative 1), at some point within approximately 8 years the dam either 1) will fail or 2) the reservoir will need to be drained to prevent imminent dam failure. Within these two assumptions, a range of scenarios are possible:

1. Dam failure – This could be either partial or complete failure of the dam, resulting in an uncontrolled release downstream of some or all of the water in Hult Reservoir.
2. Preemptive breach – In some situations, there is the potential that in advance of a foreseeable dam failure, the BLM may breach the dam to drain the reservoir. This could happen in a controlled manner that limits downstream flows and allows adequate of time to issue warnings. On the other hand, the dam may be breached with less lead time and in a less controlled manner to prevent a potentially worse full or partial failure.

Other scenarios are possible, such as a controlled breach of the dam by the BLM following a partial failure. Likewise, a controlled breach could potentially lead to dam failure.

To address the potential range of effects from the above scenarios, the analysis considers two sub-alternatives of Alternative 1 that represent the least controlled and most controlled of the scenarios, respectively:

- Effects under Alternative 1.1 address the assumption that the dam would completely fail. [66]
- Effects under Alternative 1.2 address the assumption that the reservoir would be drained in a controlled manner to prevent imminent dam failure.

Issue 1: How would implementation of the alternatives affect the potential for dam failure and downstream flooding?

This issue is related to how the alternatives respond to the purpose and need, and analysis of this issue is necessary to determine the significance of the impacts.

The BLM received comments during the January 2022 scoping period and the May 2022 draft Chapters 1 and 2 public comment period that questioned:

- How would implementation of the alternatives affect the potential for dam failure?
- How would dam failure affect downstream flooding?
- How would implementation of the alternatives impact the flood regimes[67] in Lake Creek?
- How much flood control does Hult Pond Dam offer to downstream reaches of Lake Creek?
- How would the effects of dam failure be different than annual or other flooding that occurs on Lake Creek?
- How would implementation of the alternatives affect the Lake Creek seasonal flood regime and floodplain connectivity?
- How would the alternatives impact the residents who live downstream from the dam site?

This issue statement and associated analysis address all of the above. Additional information about the area's hydrology can be found in Appendix A (*Issues Not Presented in Detailed Analysis*), Issue A-15, *How would implementation of the alternatives impact the hydrology of the basin?* Additional information about how the alternatives would impact local residents can be found in Issue 2, *How would the implementation of the alternatives affect the potential for loss of life and property?*

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[66] It should be noted that in order to meet Federal Dam Safety Guidelines that in the event that failure of a high hazard dam seems imminent, the BLM would be required to decommission the dam (with or without building a replacement) and drain the reservoir so the dam does not fail.

[67] The term regime refers to the historical pattern of frequency and intensity of events such as wildfires, rainfall, or floods, which may be influenced by other factors.

Analytical Process

Assumptions

- The BLM does not and will not manage the dam for flood control as stated in current management direction and existing water rights. The dam was constructed to create a log holding pond and was not designed with management equipment or structure to serve for flood control purposes. The current reservoir has a capacity of 364 acre-feet on a 53.9-acre footprint, and beyond ±6 inches, the existing dam cannot retain an additional influx of water in the reservoir.
- In advance of and during a forecasted storm event, the BLM would respond accordingly by adjusting Hult Reservoir levels so the reservoir and associated infrastructure would not be overwhelmed. The existing spillway, fish ladder, and low-level outlet cannot pass enough water to keep up with larger storm events that would trigger an EAP. These actions are not akin to flood control; rather, they represent the BLM's best attempt to preserve the infrastructure at the project site to prevent dam failure or breaching. In the winter, effectively all of Lake Creek entering Hult Reservoir is passed to downstream reaches.
- Under the No Action Alternative, the BLM will continue to maintain, repair, and regularly inspect the dam. However, the dam has passed the end of its effective lifespan, and one of two things will happen in the future under the No Action Alternative, either of which could occur at any time of the year:
    1. The dam will fail unexpectedly due to a systemic breakdown of structural integrity or natural disaster, or
    2. Inspection will indicate that dam failure is imminent, and the BLM will perform an emergency drainage of the reservoir to prevent dam failure and flooding.
       (As described at the start of this chapter, these two scenarios are referred to as Alternative 1.1 and Alternative 1.2, respectively, throughout the rest of the EIS.)
- Dam and/or spillway dike failure could occur in either a "rainy day" or "sunny day" scenario. In a rainy day scenario, the dam is overtopped by high water from prolonged rainfall and/or rapid snowmelt in the valley upstream of Hult Pond Dam (12.3-square-mile catchment area, see Figure 3-1), resulting in a partial or complete failure of dam infrastructure. In a sunny day scenario, damage occurs to the dam because of earthquakes, wind-toppled trees, burrowing animals, internal erosion, terrorism, or other non-precipitation-related causes, resulting in an unexpected partial or complete loss of dam infrastructure.
- Weather events (e.g., the rainy day scenario) are generally more forecastable than sunny day events. However, they can be more difficult to accommodate since their magnitude and duration are difficult to proactively manage for. On the other hand, structural failures, either partial or complete, can be impossible to forecast but may be mitigated if detected early enough.
- There is internal erosion and seepage within the dam. This may be due to rotting logs and other organic material that the dam is built on or vegetation rooted in the dam and spillway dike. Other sources of internal erosion could be poor compaction next to the low-level outlet, soil nails, or other appurtenances.
- There are holes in the top of the dam and spillway dike from burrowing animals that damage the structural integrity of both. These areas are also the narrowest part of the dam. If the water is high, pressure will be increased most in these areas.
- If the spillway dike is overtopped, the structural breakdown will start there and work its way back toward the embankment dam.
- While the BLM has not tracked Lake Creek peak streamflow data, stream gaging data (stream height, flow volume, and velocity) from the Siuslaw River can be used as a surrogate since Lake Creek flows into the Siuslaw River and precipitation events affect both systems similarly. Gaged (monitored) systems in East Fork Lobster Creek (west of Hult Reservoir) and the Luckiamute River (north of Hult Reservoir) may also be used for the same reasons.
- For low-flow stream data in Lake Creek and its tributaries, U.S. Geological Survey (USGS) StreamStats (https://streamstats.usgs.gov/ss/) will be used to quantify probable discharges.

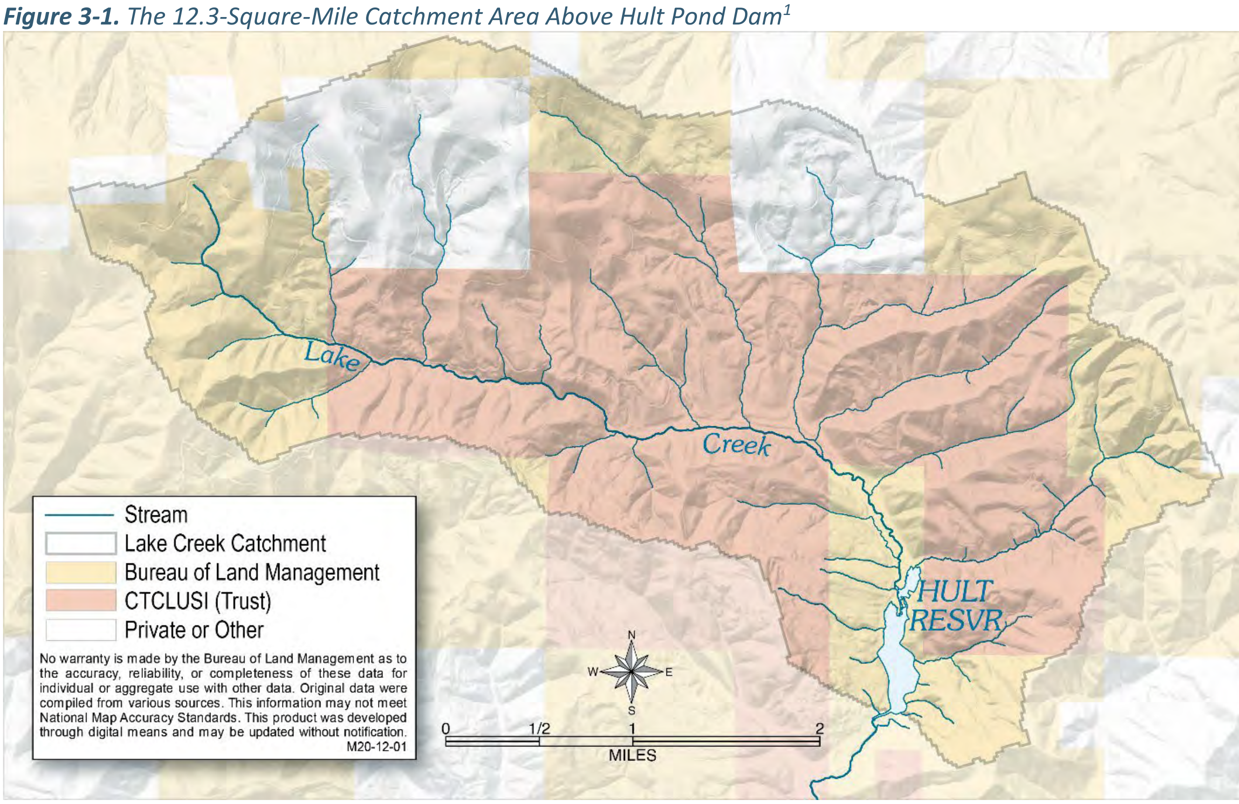
- The average summer baseflow of Lake Creek is 1.5 cubic feet per second (cfs), spring and fall flows are 15 cfs, and typical winter flows are 45 cfs.
- Triangle Lake, downstream from Hult Reservoir, would effectively absorb the volume of water resulting from a Hult Pond Dam failure event, but its level would nonetheless rise up to 1.7 feet. Downstream of Triangle Lake, Lake Creek discharge or flood elevations resulting from a dam failure would not be discernably different from background levels under any flow conditions.

Summary of Analytical Methods

Geographic scale:

Because precipitation (rain and snow) can accumulate, melt, and flow into Hult Reservoir, the geographic scope of this issue includes the entire 12.3-square-mile catchment area above the reservoir (see Figure 3-1). Lake Creek immediately below Hult Reservoir would "control" the loss of water resulting from a dam failure event as water flows through a geologic bottleneck in the form of a narrow, confined canyon. That volume of water would quickly spread out onto floodplains once it exits the canyon ending at Pucker Creek, progressively widening as it flows downstream. These floodplains contain roads, homes, pastures, and other infrastructure and property. Triangle Lake (with a 290-acre footprint) is 13.4 river miles downstream from Hult Reservoir. Triangle Lake has a surface area five times greater and a depth six times greater than Hult Reservoir (Johnson 1985), which could effectively hold the entire volume of Hult Reservoir while rising less than 1.7 feet before continuing down Lake Creek.

Figure 3-1. *The 12.3-Square-Mile Catchment Area Above Hult Pond Dam*[1]



1. All precipitation falling in this area and/or melting and running off drains to Hult Reservoir.

The signature of a dam failure would be easier to observe and potentially measure following a sunny day failure. Even then, the flood alleviation afforded by floodplains and Triangle Lake would mute a streamflow response below Triangle Lake. Although Lake Creek drains to the Siuslaw River and eventually the ocean, no measurable response from flooding in the event of a dam failure is expected below Triangle Lake, where again, a substantial volume of water is "controlled" through a geologic bottleneck in the form of old and large landslide materials (see Figure 1-3 in Chapter 1).

Temporal scale:
Short-term: This analysis will focus on the effects of a flood resulting from a dam failure or other event at Hult Reservoir. The short-term temporal effects will look at the rapid rise and eventual peak in stream discharge, flooding on Lake Creek, and the peak of lake elevation at Triangle Lake. Flood inundation would occur moments after dam failure at locations immediately downstream from Hult Reservoir and up to approximately 4 hours later when the flood crest would reach Triangle Lake. Depending on the location on Lake Creek relative to Hult Reservoir, short-term effects from flooding would last from mere moments to up to 4 hours.

Long-term: Following a rapid spike in stream discharge, stream levels would begin to drop in Lake Creek within a maximum of 7 hours under the longest scenario. Following a dam failure and resultant flood, effects would be relatively short-lived (hours to weeks) as floodwaters drain from the landscape. However, flooding effects from a rainy day failure may continue to be observed on Lake Creek as the storm event persists (prolonged rainfall and snowmelt). Storms in the Coast Range tend to last between 2 days to 2 weeks, with effects ranging from no flooding to widespread flooding. Following a dam failure and resultant flood, effects would be relatively short-lived (hours to weeks) as floodwaters drain from the landscape.

Affected Environment

Hult Reservoir and Lake Creek are situated in the Coast Range of western Oregon. Lake Creek is a tributary to the Siuslaw River. Hult Reservoir is located approximately at a transition zone between high-energy sediment transport reaches typically found in headwater regions and low-energy, sediment deposition reaches typically found at lower elevations and as streams reach their terminus. Table 3-1 breaks down the general geomorphology (land forms and types) of Lake Creek that combine to affect flooding from either storm or dam failure events. Table 3-1 describes each stream reach with a number of characteristics that are explained in more detail below:

Sediment action – Sediment transport is the movement of organic and inorganic particles by water. Transport reaches are usually higher in a catchment area, have "high energy," and move sediment downstream. Depositional reaches are usually lower in a catchment, are often described as "lazy" and "meandering," and have low stream energy, allowing sediment to be deposited (settle to the streambed).

Stream substrate – Substrate size is proportional to stream energy and action. While transport reaches wash away fine sediment and leave behind coarser ones, in depositional reaches, that fine sediment covers up coarse particles. Different substrates offer different ecological values (niches) to fisheries, wildlife, and botanical species.

Gradient – Stream slope, which is classified by percent and in relative terms. High gradient is > 10 percent. Moderate gradient is 4 to 10 percent. Low gradient is 2 to 4 percent. Extremely low gradient is < 2 percent.

Sinuosity – This is a ratio between the length of a stream and the length of its valley. The more a stream meanders back and forth along the valley, the greater its sinuosity. Valley width is a function of stream gradient and sinuosity; a high-gradient stream with low sinuosity will have a narrow valley width, whereas a low-gradient stream with high sinuosity will have an extremely wide valley width.

Rosgen stream classification – This classification system for natural rivers organizes stream characteristics into stream types. It categorizes stream types using the letters A to G based on their geomorphic characteristics, and the numbers 1 to 6 to include assessments of their channel cross-section, longitudinal profile, and plan-form (pattern) (Rosgen 1996).

Bank angle – This is the angle of the streambank between the streambed and the stream's flood terrace. Stream energy, substrate type, and stream manipulations (e.g., roads, culverts, dams) all affect bank angle. High bank angles can be nearly vertical and, in the context of Lake Creek, exist because substrate size is fine and the stream is incised. Bank erosion and collapse is common where bank angles are high.

Erosion potential – This is a relative description of how likely Lake Creek is to experience erosion and sediment mobilization. It can also be related to the amount and type of debris present, in addition to substrate size and how well vegetated and thereby stable the stream banks are.

Riparian area description – This relates direction to both the infrastructure that could potentially be lost in a flood as well as the "roughness" of the valley, which affects flood water velocity. With little roughness, floodwaters are largely unattenuated, whereas a rough valley (with trees, boulders, buildings, bridges, etc.) can slow floodwater velocity to some degree.

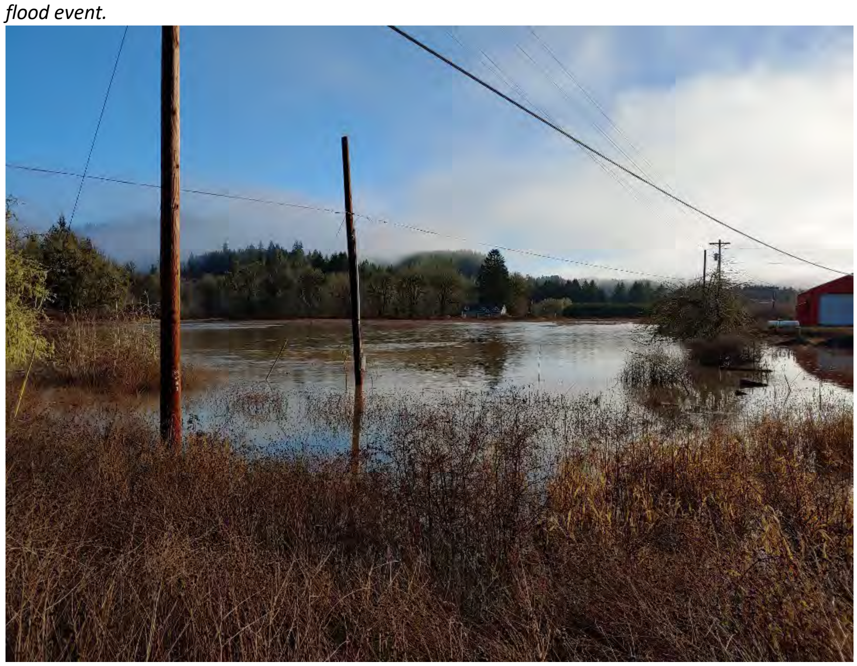
Table 3-1. *Lake Creek Geomorphology Throughout the Project Area*

Stream reach[1]	Sediment action	Substrate	Gradient	Sinuosity[2]	Valley width[3]	Rosgen channel type	Bank angle,[4] erosion potential	Riparian description
Triangle Lake to Swartz Creek	Deposition	Silt, clay, sand	Extremely low	High	Extremely wide	E5, E6	High, low	Grasses and shrubs. Agricultural fields and rural developments including homes and roads.
Swartz Creek to Pucker Creek	Deposition	Sand, gravel	Low	Moderate	Wide	E5, F5	High, moderate	Grasses and shrubs with riparian hardwood component. Agricultural fields and rural developments including homes and roads.
Pucker Creek to Hult Reservoir	Transport	Cobble (due to sediment starvation from Hult Pond Dam)	Moderate	Low	Narrow	G3, A3	High, moderate	Mixed conifer/hardwood overstory with grassy understory. Minimal floodplain interaction. Roads parallel and cross Lake Creek.
Lake Creek above Hult Reservoir	Transport	Gravel	Moderate-high	Low	Narrow	A4, B4	Moderate, high	Mixed conifer/hardwood overstory with grassy understory. Roads parallel and cross Lake Creek.

1. See Figure 1-3 (*Hult Pond Dam Inundation Zone*) for locations.
2. Sinuosity: High = > 1.5; moderate = 1.2–1.5; low = < 1.2.
3. In the context of Lake Creek, a narrow valley width is < 100 ft. A wide valley width is 100–500 ft. An extremely wide valley width is > 500 ft.
4. Bank angle: High = 45–90 degrees; moderate = 20–45 degrees; low = < 20 degrees.

Progressing up Lake Creek from Triangle Lake, stream size diminishes as does its propensity for meandering. A straighter stream means a higher gradient and velocity and a substrate size that gradually increases. In its lower reaches, Lake Creek Valley is wide and occupied by rural developments including roads, homes, out-buildings, and agricultural fields. The riparian zone experiences some degree of flooding on a nearly annual basis (see Figure 3-2). Farther up the valley, developments diminish, but roads, bridges, and culverts remain factors in flow dynamics. The riparian area and floodplain gradually narrow until nearly nonexistent between Pucker Creek and Hult Pond Dam. Upstream of Hult Pond Dam, the catchment area (12.3 square miles) is entirely timberlands. This area (the headwaters) of Lake Creek and its tributaries are generally well buffered from the effects of timber harvest and, while steep in gradient, are also stable. Absent a randomly occurring event like a wildfire, large winter storm, or landslide(s), stream bed and banks in the headwaters will remain intact.

***Figure 3-2**. Lake Creek Flooding on January 13, 2021, as Seen from State Highway 36 Near Blachly, Oregon*
In this flood event, Lake Creek left its banks, crossed its floodplain, and crossed Highway 36 in several locations despite being only a 2.7-year flood event.



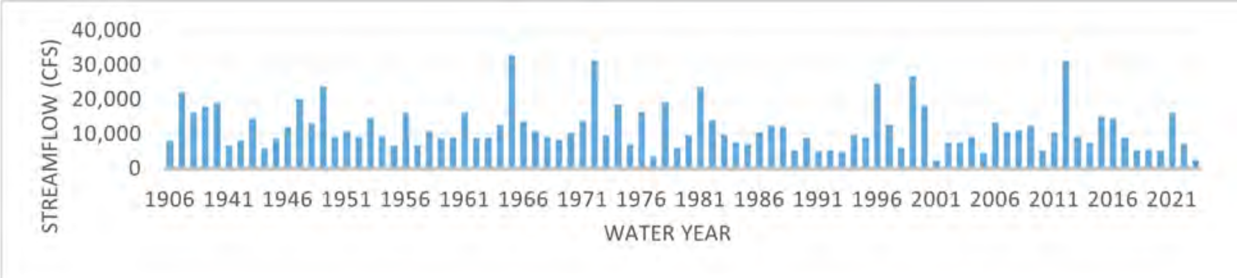
Seasonally, Lake Creek is similar to the rest of western Oregon, where most of its annual 71 inches of precipitation fall in the winter months, generally October through April, from moisture-laden storms rolling in from the Pacific Ocean. While snow can fall throughout the project area, it is rare, minimal, and transient (subject to rapid melting). Winter storms typically last 2–7 days, but the hydrologic rise and fall of a peak event is usually contained within 48 hours. On rarer but still regular occasions, storm events can be more significant in duration and magnitude when driven by so-called atmospheric river events. These “rivers” are usually warm and loaded with moisture from tropical latitudes. All the major floods in western Oregon for the past 160-plus years have been attributable to atmospheric rivers that landed on snow, resulting in overwhelmed drainage networks (Harr 1981).

During the dam’s life span, there have been major floods across the Pacific Northwest in 1964, 1996, and 2012. Although effects varied by location, the 1964 flood has generally been calculated to be a 100-year flood, the 1996 flood a 50-year flood, and the 2012 flood a 25-year flood. See Figure 3-3 displaying annual peak stream discharges for the Luckiamute River, also located in the Coast Range, but with a relatively long period of record absent in Lake Creek. It should be noted that Hult Pond Dam “survived” each of these flood events, with some caveats:

- It is possible the 1964 flood seriously damaged Hult Pond Dam, but that it was quickly repaired or rebuilt the following spring. The BLM was unable to locate records from this point in time, but aerial photos of the project area show extensive stream damage from the 1964 flood (see Appendix A, Issue A-20, *How would implementation of the alternatives affect sediment transport?*). At the time, with heavy equipment on hand and fewer environmental regulations in place, the dam could have easily been rebuilt in a short period.
- The 1996 flood may have damaged Hult Pond Dam and/or its spillway, but again, the BLM was unable to locate records of how large the flood was, what damage was caused, and what repair work, if any, occurred afterward. Also, the 1996 flood’s effects were more variable in the western United States, and it’s possible that flooding was not as significant in Lake Creek as elsewhere.
- The 2012 flood was the smallest of the three large floods and resulted in no infrastructure damage to Hult Pond Dam or its spillway, but it triggered the EAP with water levels less than a foot from breaching the spillway dike.

With only rare exceptions, peak stream discharges in Lake Creek history are expected to mimic those observed in the Luckiamute River, with differences only in magnitude. While floods in the Luckiamute River range from 5,000–30,000 cfs, peak stream discharges on Lake Creek typically range from 15–1,000 cfs. This is closer to the daily and seasonal variation seen on East Fork Lobster Creek, a gaged stream located west of the project site but with a much shorter data record.

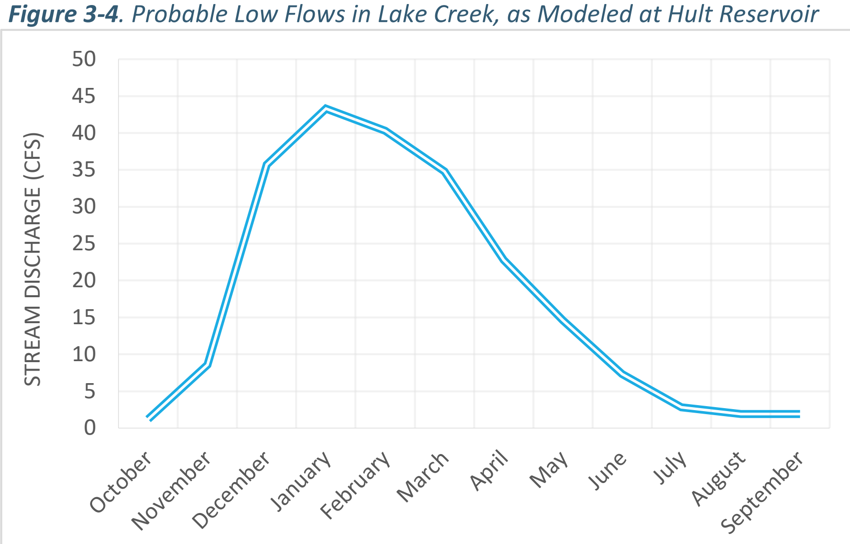
***Figure 3-3**. Annual Peak Stream Discharges in the Luckiamute River[1]*



1. Located approximately 40 miles north of Hult Reservoir but subject to similar precipitation and drainage patterns. Data record is 1906–1910 and 1941–present.

Any flood event greater than approximately a 2-year recurrence interval (flood event) is likely to see water exceeding bank capacity and spilling onto floodplains, as seen in Figure 3-2. Statistically, for a 2-year flood event, there is an exceedance probability (likelihood of the event occurring annually) of 50 percent. For most streams, flooding of this magnitude is localized, causes little damage, and is not a threat to human safety. Because of its geomorphology, and as its name implies, Lake Creek is somewhat unique in that it sees widespread flooding when waters exceed its bank capacity. Property loss and damage to infrastructure are usually minimal: Most buildings are either insured against floods or have been constructed far enough away from the flood zone of an annual flood event. Fortunately, and again because of geomorphology, Lake Creek Valley is generally wide between Pucker Creek and Triangle Lake; any flood event in this area would be relatively wide, shallow, and slow moving.

***Figure 3-4**. Probable Low Flows in Lake Creek, as Modeled at Hult Reservoir*



During the dry season, generally May through September, little to no precipitation falls in the area, and watershed processes are driven primarily by runoff in the early summer, transitioning to groundwater inputs by late summer. While Lake Creek high flows theoretically have no limit, monthly low flows can be accurately predicted (see Figure 3-4). By the end of summer, Lake Creek's baseflows are sustained only by groundwater inputs, which results in approximately 1.5 cfs of flow.

Environmental Consequences

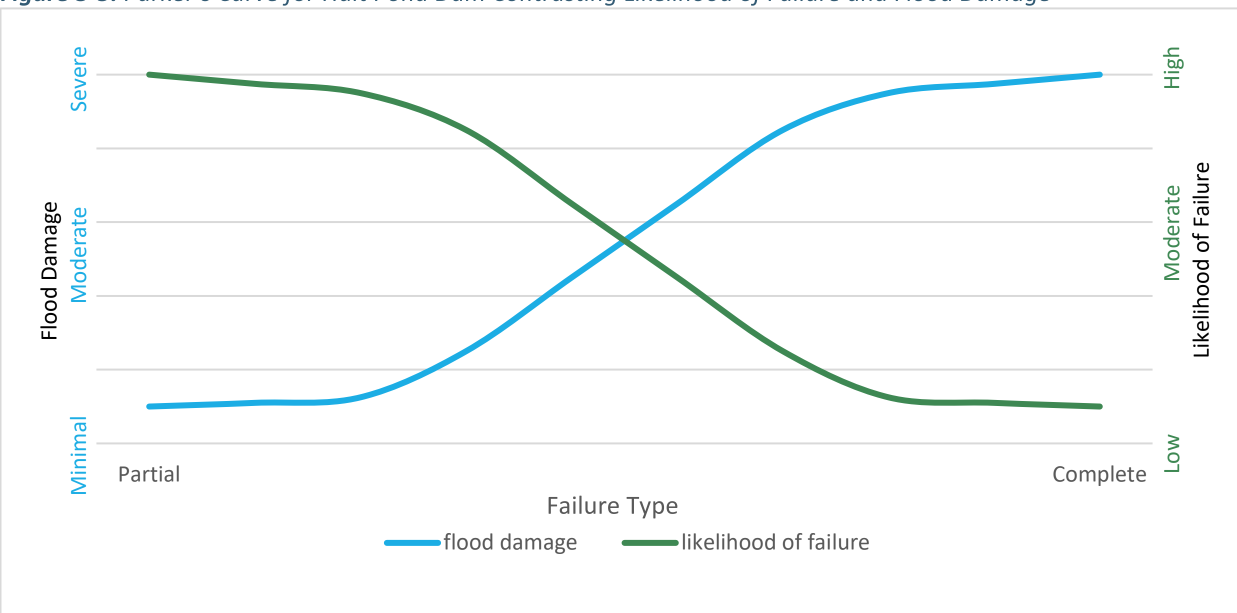
Direct and Indirect Effects

Effects resulting from flooding can all be tied back to elevations as measured at Hult Pond Dam and spillway. The crest elevation of the embankment dam is 820 feet (above sea level) at the main dam, tapering along the spillway dike to a minimum of 814.5 feet at the spillway; the spillway crest is 811 feet, which regulates the (normal pool) reservoir elevation at 811 feet (or less) throughout the year (± 6 inches). Each elevation corresponds to a stream discharge, flood width, and flow depth. Different effects would be observed between Hult Reservoir and Triangle

Lake as a result of the same dam failure and flood event. For example, a typical winter storm may cause few to no effects to Lake Creek at Hult Reservoir but may result in localized flooding downstream near Highway 36. Similarly, if the existing or rebuilt Hult Pond Dam were to fail, the effects on the stream channel and floodplain immediately downstream of Hult Pond Dam (Hult Reservoir to Pucker Creek) would be substantial, but by the time those same flood waters reached Triangle Lake, the flow would be diffuse, shallow, and relatively slow.

The dam's existence presents a constant risk of failure, loss, and subsequent flooding. The likelihood of its failure, loss, and subsequent flooding damage varies depending on the circumstances leading to the failure. Similarly, the degree of flooding following a failure varies depending on the extent of loss experienced at the dam site. Figure 3-5 depicts a Parker's curve comparing the likelihood of failure and subsequent flood damage resulting from varying types of dam failures for Hult Pond Dam.

Figure 3-5. *Parker's Curve for Hult Pond Dam Contrasting Likelihood of Failure and Flood Damage*



Hult Reservoir has a volume of 364 acre-feet (USACE 2019), or approximately 16 million cubic feet. The dam and spillway have a maximum discharge rating[68] of approximately 1,250 cfs. Under normal or typical flow conditions, assuming structural integrity is maintained, Hult Pond Dam can adequately pass a range of flows. However, under relatively benign storm conditions, which occur almost annually, the low-level outlet at Hult Reservoir must be activated to prevent reservoir elevations from reaching a critical level. The January 2012 flood event, the largest flood in recent memory, was a 9.1-year flood event (see Table 3-2), the likes of which have an 11 percent chance of occurring in any given year. Reservoir elevations in 2012 reached near-critical levels, and the EAP was triggered before reservoir levels began to drop. At floods greater than 1,250 cfs, dam infrastructure begins to sustain damage. Although it is unknown how much damage existing infrastructure could sustain before failure occurs, the likelihood of partial or complete failure compounds beyond 1,250 cfs. A flood of 1,250 cfs is an 11.1-year flood event and has a 9 percent chance of being exceeded annually.

[68] The maximum amount of water the structures should safely pass when the reservoir is at its maximum designated water surface elevation of 814.67 ft.

***Table 3-2**. A Few Key Lake Creek Discharges and Their Likelihood of Occurring in Any Given Year*

Lake Creek discharge (cfs)	Description	Recurrence interval[1] (years)	Exceedance probability[2]
45	Typical winter. Water crests the spillway dike.	1.0	100.0%
250	January 2022 storm. Low-level outlet drain opened fully. Safe, maximum downstream channel capacity.	1.4	71.7%
1,000	January 2012 storm. EAP triggered.	9.1	11.0%
1,250	Maximum safe passage of flows.	11.1	9.0%

1. Recurrence interval is the predicted period of time between events of a certain magnitude; often described as an X-year event.
2. Exceedance probability is the likelihood of an event of a certain magnitude being exceeded in any given year.

Extreme hydrology, like one would expect from a dam failure event, will produce large discharges, depths, and flood extents. If this inundation is short, as seen in Alternative 3, incremental risk and damage to resources and infrastructure would be less than that sustained under Alternative 1.1 and Alternative 2. An appropriate analogy would be a single gust of wind; it may be intense but short-lived compared to a hurricane, which is both intense and long in duration. Both are capable of damage, but assuming the peaks are the same, the extent of damage will always be greater from a hurricane.

As in streams everywhere, the effects to riparian areas, floodplains, and infrastructure from gradually increasing storm flows and dam failures would also increase with the magnitude of the discharge in Lake Creek. Under stream discharges greater than 250 cfs, channel morphology would not noticeably change; flooding would be limited, and only small substrate would mobilize. Beyond that discharge, however, larger substrate mobilizes, flooding begins, and morphology starts changing. New stream channels may form, streambanks in existing channels may collapse, riparian vegetation, including trees, may be uprooted and transported downstream, and any infrastructure on the floodplain may be at risk of damage or loss.

Notably, a flood from a storm event is likely to increase in effect as it moves down the watershed. Flooded tributaries add to the overall stormwater discharge, and the stream grows wider and deeper and activates a larger floodplain. However, the opposite occurs in a dam failure event. If Hult Pond Dam were to fail, the effects to stream morphology would be greatest in Lake Creek between Hult Pond Dam and Pucker Creek (see Figure 2-1 in Chapter 2), where the entire volume of Hult Reservoir would push through. In this region, all vegetation and infrastructure would be lost, streambanks would collapse, new channels would be carved, and Lake Creek would likely incise downwards until bedrock was reached or the reservoir was completely drained. However, in each successive downstream reach, the effects of flooding from dam failure would lessen as the valley widens significantly. While the flood may extend valley-wide laterally from Lake Creek, the depth would be relatively and progressively shallower, while the velocity would be relatively and progressively slower. By the time the flood reached Triangle Lake, it would look less like a wave of fast-moving water and more like an incoming tide.

Alternative 1.1: No Action Alternative (Dam Failure)

The Hult Pond Dam spillway dike represents the lowest elevation of all the water retention structures at the site. As the reservoir stage rises, water would first spill through the fish ladder, then the spillway, then the low-level outlet would be activated, and finally, water would spill over the top of the spillway dike. Assuming the spillway holds up to a flood event that exceeds its rated capacity, the spillway dike would not, as it is not designed to pass any water. If water begins to spill over the spillway dike, Hult Reservoir would begin to drain in unintended ways that would damage the spillway dike. Drainage rates depend on the magnitude of the flood and how quickly the water "cuts" through the spillway dike. If flows reach this point, Hult Pond Dam faces at least partial failure.

Whether the dam fails partially or completely, if the event coincides with a storm event (rainy day failure), flooding would be additive in Lake Creek. That is to say, natural stream discharge would be added to the volume of water impounded in Hult Reservoir, which would drain through a failure point within hours (see Table 3-3, *Potential*

Inundation Zones Under Each Alternative). Although the volume of Hult Reservoir could drain in a matter of hours, the ongoing effects from the storm event would continue until the storm dissipated days or even weeks later.

A sunny day failure would be more sudden and unexpected. Failure in summer would likely be associated with an earthquake, internal erosion, terrorism, or burrowing animals. With a sunny day failure, Hult Reservoir would be drained within minutes, assuming the failure was complete. Because the failure would happen in the summer, a sunny day failure would see Lake Creek return to base levels as soon as flood waters drained from the floodplains. See Figure 1-3 (*Hult Pond Dam Inundation Zone*) in Chapter 1 for a depiction of the extent of floodwaters under a sunny day failure.

Alternative 1.2: No Action Alternative (Drain Reservoir)

Regular inspections at Hult Pond Dam could result in a decision to immediately drain Hult Reservoir if the BLM determined that the dam's integrity was compromised and risk of failure was elevated. The reservoir could be drained by opening the headgate if flows on Lake Creek are low, but drainage could also be accomplished with a siphon or pump or by breaching the dam. Under this scenario, the reservoir would be drained within a matter of days, when flows in Lake Creek are well below flood stages. Although the inspection could take place in the winter, when most floods occur, a stream's flood stages are a relatively rare event and usually only happen for a few days out of any given year. During the drawdown of Hult Reservoir, downstream flows in Lake Creek would be contained within its bed and banks, and no flooding would occur. (See Table 3-3, *Potential Inundation Zones Under Each Alternative.*)

Alternative 2: Remove the Existing Dam and Build a New Dam to Maintain Hult Reservoir

A newly designed Hult Pond Dam would impound a volume of water similar to what the current dam impounds (between 364 and 481 acre-feet). Since the new dam constructed under Alternative 2 would have a similar crest elevation, in the unlikely event that it was to fail,[69] the downstream area of inundation would be similar to Alternative 1.1, as depicted in Table 3-3 (2,381 acres or more depending on the conditions of Lake Creek at the time of failure).

Risk of dam failure and downstream flooding is difficult to quantify under Alternative 2 because, although the flood discharge following a failure event would be similar in magnitude and timing to the dam failure described in Alternative 1.1, the incremental risk would be substantially less because the new dam would be built to withstand specific and significant flood events, would be built in geologically stable areas, and would contain structurally sound low-level outlets capable of responding to an event that required the immediate draining of a reservoir.

The rainy day discharge of Lake Creek capable of damaging or destroying a newly constructed and well-engineered dam built under Alternative 2 would be sizeable, and the timing of downstream effects would be approximately the same as in Alternative 1.1. Dam failure after implementation of Alternative 2 would see Hult Reservoir drained within 16 minutes. The duration of downstream inundation would also be similar to Alternative 1.1.

Alternative 3: Remove Hult Reservoir; Add Little Log Pond

Hult Reservoir and the existing dam would be removed, eliminating the potential for Hult Pond Dam's failure, thus greatly reducing risk of flooding compared to Alternative 1. A new dam at Little Log Pond would impound approximately 35 acre-feet of water. Dam failure and effects of downstream flooding are difficult to quantify under Alternative 3, but the dam constructed at Little Log Pond would be built to withstand 500-year flood events, would be built in geologically stable areas, and would contain structurally sound low-level outlets capable of responding to an event that required the immediate draining of a reservoir. The incremental risk of failure and

[69] Barring a catastrophic seismic event, there is low probability that a newly constructed, well-engineered dam would fail.

flooding would be substantially less than Alternative 1.1, and the area of Lake Creek inundation downstream following a dam failure at Little Log Pond would be limited to less than 30 acres. The direct effects from downstream inundation would distribute similarly under a dam failure event under either Alternative 2 or 3, but the extent of inundation would be less under Alternative 3 owing to the fraction of water stored at Little Log Pond.

The rainy day discharge of Lake Creek capable of damaging or destroying a newly constructed and well-engineered dam at Little Log Pond would be sizeable under Alternative 3. The timing of downstream effects would be less (quicker) than the timing under Alternative 2. Dam failure after implementation of Alternative 3's Little Log Pond would see the pond drained within 2 minutes. Duration of downstream inundation would be similar to Alternative 2, but only in the areas of inundation common to Alternatives 2 and 3. Also, since inundation would be less under Alternative 3, the effects to geomorphology would be proportionately less.

Alternative 4: Preferred Alternative (Remove Hult Reservoir)

Lake Creek and the lower reaches of some of its tributaries would return to a natural and free-flowing condition without any dams. Ultimately, flows in Lake Creek under Alternative 4 would be similar to the other alternatives since, with an impounded reservoir managed at full capacity, water in effectively equals water out. Flooding under Alternative 4, however, would not result in the addition of stored reservoir water to Lake Creek because there would be no dams impounding any water on Lake Creek. Additionally, project design features (e.g., instream structure placement) and mitigation measures (e.g., wetlands, beaver dam analogs, and flood channels) potentially implemented in Alternative 4 could slow flood velocities to a small degree. In general, however, as flood events increase in magnitude, so too would Lake Creek discharge in Alternative 4. Project design features and mitigation measures are meant to stabilize streambeds and banks and provide habitat for fish and wildlife species, not impound flood waters. However, with more miles of stream and acres of wetlands, additional flood routing and energy attenuation are expected to occur (see Issue 9, *How would implementation of the alternatives affect riparian areas, wetlands, and lentic systems?*).

Summary of the Impacts of the Alternatives

Under the No Action Alternative, multiple scenarios could result in a dam failure, either partial or complete. The failure could occur at any time of the year. Since the BLM closely and regularly monitors dam conditions, the most likely failure scenario is a rainy day failure, which would see the partial or complete draining of Hult Reservoir down Lake Creek in addition to the storm flows Lake Creek already is experiencing. Flooding on Lake Creek occurs almost annually, and a dam failure event would exacerbate these conditions. Effects would be most prominent close to Hult Pond Dam and lessen as the flood reaches Triangle Lake, which would rise a maximum of 1.7 feet. In addition to incremental risk to human safety and infrastructure, changes to geomorphology would be most pronounced close to Hult Pond Dam, where the velocity and depth of the flood waters would be the greatest.

Alternative 2 would see similar-sized flood events resulting from a dam failure. Still, the risk of this occurring would be lower because a new dam would use better construction techniques and materials and updated design. Similarly, under Alternative 3, a large flood could occur from dam failure, but the overall inundation would last only a couple of minutes and inundate much fewer downstream acres. None of the dams, either existing or proposed, offer any meaningful degree of flood control and protection. Therefore, under Alternative 4, in which there are no dams on Lake Creek, the incremental risk to human safety and infrastructure from naturally occurring floods is not any greater than non-dam failure scenarios under any alternative. Project design features and mitigation measures offer limited flood energy attenuation under Alternative 4, although those benefits cannot be quantified at any downstream location. However, under Alternative 4, the risk of a sunny day dam failure is zero.

Table 3-3. *Potential Inundation Zones Under Each Alternative*[1]

Alternative	Best case		Worst case	
	Scenario	Inundation (acres)	Scenario	Inundation (acres)
Alt. 1.1	Sunny day failure (instant and complete)	2,381	Rainy day failure (instant and complete)	2,381 + inundation already occurring
Alt. 1.2	Sunny day / partial failure / orderly drain	0	Rainy day / complete failure / quick drain (approx. 3 days)	0 (if flooding is not already occurring) to 2,381+ (if flooding is already occurring)
Alt. 2	Sunny day / partial failure / orderly drain	0	Rainy day failure (instant and complete)	2,381 + inundation already occurring
Alt. 3	Sunny day / partial failure / orderly drain	0	Rainy day failure (instant and complete)	< 30 from Little Log Pond + inundation already occurring
Alt. 4	Typical summer (no flooding)	0	100-year flood event	1,564

1. Inundation acres between the dam and Triangle Lake are based on FEMA 100-year flood data.

Cumulative Effects

Timber harvest and road construction can play a role in peak flow enhancement, and the entire 12.3-square-mile catchment above Hult Pond Dam is forest land where some timber harvest would occur. However, a large percentage of a catchment must be clearcut or otherwise converted to canopy openings before these effects are realized. Typically, only wildfires covering tens of thousands of acres can influence peak flow enhancement. Climate change, however, has ushered in new meteorological patterns that are only beginning to be understood, and the effects of which appear to be increasing annually. For western Oregon, including the project area, climate change means sustained drought. Winter storms, atmospheric rivers, and even transient snow will still occur, but these events will be less regular and more significant than they would have been a century ago. Larger atmospheric pressure differences create greater storms and larger windstorms, which can lead to more trees being blown down. While rain will be in annual deficit, individual storms will yield more precipitation, which can lead to greater runoff, hillslope failures, and flood events. Flooding on Lake Creek and its tributaries will continue to occur under each alternative. Similarly, snow events, when they occur, will be more prone to rapid melting and flooding.

Issue 2: How would the implementation of the alternatives affect the potential for loss of life and property?

Several public comments received during the January 2022 scoping period and the May 2022 draft Chapters 1 and 2 public comment period questioned or expressed concerns about the impact of dam failure and/or flooding on downstream residents and the subsequent risk to public safety and property.

As described in Chapter 2 and Issue 1 (Flooding), the BLM manages Hult Reservoir at full capacity for recreation purposes, and the dam provides little to no flood control. Likewise, new dams (as proposed under Alternatives 2 and 3) would not be built for flood control. In other words, the seasonal flooding downstream is expected to occur with or without a dam in the project area, and the presence or absence of the dam on Lake Creek would not change seasonal flood levels. This seasonal flooding may cause property damage or even loss of life in extreme cases, but none of the alternatives would impact the effects of seasonal flooding. Hence, this issue will address the impact that a potential dam failure would have on public safety and property.

This issue is addressed in detail as it responds to the public safety portion of the purpose and need of this project (see Chapter 1).

Analytical Process

Assumptions

As described in the Bureau of Reclamation's *A Procedure for Estimating Loss of Life Caused by Dam Failure*, the loss of life resulting from dam failure is influenced by three factors:

1. The number of people occupying the dam failure floodplain (e.g., the population at risk),
2. The amount of warning that is provided to the people exposed to dangerous flooding, and
3. The severity of the flooding (USDI 1999:11)

These three factors may vary for the following reasons:

- Because of seasonal recreational usage, time of day, or special events, the population at risk at the time of dam failure can only be estimated.
- It is not known exactly when a dam failure warning message would be given.
- The time of dam failure (day, week, season) and conditions existing at the time of failure (clear, rain, snow, darkness) can impact the severity of flooding (USDI 1999:12).

Hult Pond Dam, like all BLM high and significant hazard[70] dams, has an EAP describing actions that the agency would take in case of pending or initiated failure. Monitoring instruments (including sensors monitoring weather and water pressure) are installed at Hult Pond Dam as part of that. These can be used to identify incidents that would lead to potential emergency conditions. Table 3-4 displays an initial estimate of when a dam failure warning would likely be initiated, depending on the failure's cause and time and whether the potential failure was observed either by monitoring equipment or in person (USDI 1999:15).

Table 3-4. *Estimated Failure Warning Initiation*[1]

Cause of failure		*Time of failure*	*When dam failure warning would be initiated*	
			If observed at dam	*If not observed at dam*
Overtopping		Day	¼ hrs before dam failure	¼ hrs after floodwaters reach populated area
		Night	¼ hrs after dam failure	1 hr after floodwaters reach populated area
Failed piping		Day	1 hr before dam failure	¼ hrs after floodwaters reach populated area
		Night	½ hrs after dam failure	1 hr after floodwaters reach populated area
Seismic	Immediate	Day	¼ hrs after dam failure	¼ hrs after floodwaters reach populated area
		Night	½ hrs after dam failure	1 hr after floodwaters reach populated area
	Delayed	Day	2 hrs before dam failure	½ hrs before floodwaters reach populated area
		Night	2 hrs before dam failure	½ hrs before floodwaters reach populated area

1. Taken from Table 2, Guidance for Estimating When Dam Failure Warnings Would Be Initiated (Earthfill Dam), in *A Procedure for Estimating Loss of Life Caused by Dam Failure* (USDI 1999:15).

Flooding severity from dam failure can be categorized as low, medium, or high based on the following guidance from the Bureau of Reclamations (USDI 1999:35):

1) "Use low severity for locations where no buildings are washed off their foundation.
2) "Use medium severity for locations where homes are destroyed but trees or mangled homes remain for people to seek refuge in or on.
3) "Use high flood severity only for locations flooded by […] an earthfill dam that turns into 'jello' and goes out in seconds rather than minutes or hours. In addition, the flooding caused by the dam failure should sweep the area clean and little or no evidence of the prior human habitation remains after the floodwater recedes. Nearly all the events used in defining this category caused very deep floodwater that reached its ultimate height in just a few minutes. The flood severity will usually change to medium and then low as the floodwater travels farther downstream.

[70] See Table 1-1 in Chapter 1 for definitions of high and significant hazard.

4) "In determining whether flooding is low severity or medium severity, use low severity if most of the structures will be exposed to depths of less than 10 feet and medium severity if most of the structures will be exposed to depths of 10 feet or more. (Note that low severity flooding can be quite deadly to people attempting to drive vehicles)."

Given flood severity and warning time (and the additional factor of whether the public understands and heeds the warning), Table 3-5 calculates loss of life based on the percentage of the population at risk in that area of the floodplain.

Table 3-5. *Fatality Rates for Estimating Loss of Life Resulting from Dam Failure*[1]

Flood severity	*Warning time*	*Public understanding of flood severity*	*Fatality rate (fraction of population at risk expected to die)*[2]	*Example fatality rate with a population at risk of 100*
High	Any[2]	Any[2]	0.30 to 1.00	30 to 100
Medium	No warning	Not applicable	0.03 to 0.35	2 to 46
	15 to 60 minutes	Vague	0.01 to 0.08	1 to 10
		Precise	0.005 to 0.04	0 to 5
	More than an hour	Vague	0.005 to 0.06	0 to 8
		Precise	0.002 to 0.02	0 to 3
Low	No warning	Not applicable	0.0 to 0.02	0 to 3
	15 to 60 minutes	Vague	0.0 to 0.015	0 to 2
		Precise	0.0 to 0.004	0 to 1
	More than an hour	Vague	0.0 to 0.0006	0
		Precise	0.0 to 0.0004	0

1. (USDI 1999:38)
2. The fatality rate in this case is applicable to the number of people who are in the dam failure floodplain at the time of the flood, including those who remain after warnings are issued.

In the absence of other information, for the purposes of this analysis and to show a comparison of the alternatives, the BLM assumes that:

- Recreationalists would be at Hult Reservoir on good weather days and may camp overnight in the floodplain. However, they would not be at Hult Reservoir during bad weather/storms.
- Horton, Blachly, and Triangle Lake (the communities within the floodplain) all have similar populations and property.
- Similar to loss of life, property damage can be calculated based on the amount of property in the dam failure floodplain and the severity of the flooding (See Table 3-6).

Table 3-6. *Property Damage Rates Resulting from Dam Failure*

Flood severity	*Property damage rates*
High	0.30 to 1.00 structures
Medium	0.03 to 0.35 structures
Low	0.0 to 0.02 structures

Assumptions described in Issue 1 about the potential for dam failure under Alternatives 1, 2, and 3 are also applicable here.

Summary of Analytical Methods

The geographic scale of this issue is the floodplain below Hult Pond Dam and the temporal scale is 6 hours, starting with dam failure. The impact indicators for this analysis will be potential for lost lives and the potential for property damage.

Affected Environment

Hult Reservoir, a recreation site, is located above the community of Horton and upstream from the communities of Blachly and Triangle Lake (See Figure 1-1 in Chapter 1). As described in the U.S. Army Corps of Engineers' *Dam Safety Facts for Hult Pond Dam* (USACE Fact Sheet), the population at risk downstream from Hult Reservoir (i.e., in the floodplain) is estimated to be between 70 and 130 people (USACE 2018a). This number will vary based on time of year and time of day.

According to the USACE Fact Sheet, there are approximately 40 structures in the floodplain, and property in the floodplain area is valued at approximately $27 million (in 2018 dollars: USACE 2018a). Structures in the community of Horton that would be impacted are more than 2 miles downstream of the dam. As shown in Figure 1-3 (see Chapter 1), Triangle Lake School and the Blachly Post Office are outside of the floodplain. Horton Market, portions of Horton Road and Highway 36, and several bridges may be in the floodplain depending on the type of dam failure that occurs.

Environmental Consequences

Direct and Indirect Effects

Alternatives 1.1: No Action Alternative (Dam Failure) and 2: Remove the Existing Dam and Build a New Dam to Maintain Hult Reservoir

A rebuilt Hult Pond Dam (under Alternative 2) would meet Federal dam safety guidelines (FEMA 2005) and be expected to have a lower chance of failure. That said, because it would impound a similar volume of water as the existing dam, the BLM expects that the downstream consequences of its failure would be similar to those of dam failure under Alternative 1.1, with a similar population at risk. Flood severity from a failed (existing or rebuilt) Hult Pond Dam will be based on the conditions around the failure. However, based on the area's geography, the BLM assumes that a high severity flood would change to medium severity by the time the flood reaches the intersection of Horton Road and Congdon Creek Road (2 miles downstream of Hult Pond Dam) and low severity after Blachly. [71] Table 3-7 shows the expected flood wave arrival time in each of the local communities following Hult Pond Dam failure as well as the potential amount of flow.

Table 3-7. *Expected Flood Arrival Time Following a Potential Hult Pond Dam Failure*

Community	*Distance from dam (miles)*	*Flood wave arrival time max. stage (hours)*	*Flow (cfs)[1]*
Horton	0–5	0:00–1:15	> 3,500
Blachly	5–10	1:00–4:00	> 1,000
Triangle Lake	> 10	> 3:45	

1. Lake Creek flow is generally 1.5–15 cfs in summer months and 15–45 cfs in winter months.

The potential for loss of life would range from 0 to 11 deaths, depending on whether people were recreating at the dam, warning times, and the population's understanding of the warning that they were receiving. Flooding would be expected to harm one to ten structures (and property damage would range from $270,000 to $6,480,000).

[71] The USACE Fact Sheet does not specify where populations at risk are located within the flooded area but states that "the potential for loss of life will be highest between the dam and Highway 36, with the loss of life concerns decreasing substantially beyond the town of Blachly" (USACE 2018a).

Alternatives 1.2: No Action Alternative (Drain Reservoir) and 4: Preferred Alternative (Remove Hult Reservoir)

Under these alternatives, there would be no lives lost nor any property damage due to dam failure. Under Alternative 1.2, the BLM assumes that the dam is breached to prevent its imminent failure. Under Alternative 4, there is no dam to fail.

Alternative 3: Remove Hult Reservoir; Add Little Log Pond

As stated in the description of Alternative 3, a dam built at Little Log Pond may be classified as significant hazard.[72] The dam would impound approximately 35 acre-feet of water, about one-tenth the volume of Hult Reservoir. For that reason, if this dam were to fail, the resulting flood wave would be expected to be smaller compared to a flood wave caused by failure of the existing dam. At the same time, its location upstream from the community of Horton is the determining factor in its hazard classification. If Little Log Pond Dam were to fail, no loss of life would be expected, flooding would be expected to be low severity, and the floodplain would cover a smaller area. Flooding would harm zero to one structures (and property damage would range from $0 to $180,000).

Cumulative Effects

Events that could contribute to dam failure include (but are not limited to) earthquakes (under Alternatives 1.1, 2, and 3) and flooding (under Alternatives 1.1 and 3), both of which may contribute to additional loss of life and property damage in the floodplain. Also, there is a potential that an earthquake/hydrologic event could leave the dam intact but expose a concern that would lead the BLM to create a preemptive breach (Alternative 1.2). This would vary based on the size of the earthquake or flood. The project area and all of the Pacific Northwest is susceptible to Cascadia Subduction Zone earthquakes. An earthquake that contributes to Hult Pond Dam failure may cause additional loss of life and property damage. A large (magnitude 8 or greater) Cascadia Subduction Zone earthquake occurs every 300 to 900 years, with the most recent occurring in 1700 (Witter et al. 2003). A large Cascadia Subduction Zone earthquake would be expected to result in widespread property damage and loss of life throughout the Pacific Northwest (Schulz 2015).

Likewise, flooding can cause property damage and loss of life. In the event of a probable maximum flood event, Lake Creek would be expected to flow at greater than 9,000 cfs. The rebuilt dam and reservoir in Alternative 2 would be constructed to be able to pass this event (i.e., the dam would not be expected to fail). However, a 9,000 cfs flood in Lake Creek would be expected to be a high severity flood throughout the watershed, leading to loss of life and property damage. Under Alternative 1.1, that flood (and other smaller floods) would also lead to dam failure (see Issue 1).

[72] As described in Chapter 1, a significant hazard dam has the potential to have economic, environmental, and lifeline (critical services) losses if it fails. A significant hazard rating is lower than a high hazard rating: High hazard dams (like the existing dam and the dam described in Alternative 2) are so designated because of the potential for loss of life in the event of failure. Low hazard ratings indicate that there is not a potential for loss of life or economic, environmental, and lifeline (critical services) losses. Hazard ratings are not related to the *potential for failure,* but rather describe what would happen if a failure were to occur.

Issue 3: How much would it cost to implement the alternatives (including maintenance, operations, implementation, and failure)?

Several public comments received during the January 2022 scoping period and the May 2022 draft Chapters 1 and 2 public comment period questioned or expressed concerns about the costs associated with the dam: How would the BLM pay for the proposed actions, and how much would the actions cost.

Costs are arguably not a potential effect to the human environment, and thus this section is not required by NEPA. However, in this case, it furthers NEPA objectives to display the factors the decision-maker will use to select from among the alternatives, and fiscal responsibility to the public is part of the purpose and need.

Analytical Process

Assumptions

Numbers in this section are estimates, and references to specific funding mechanisms do not imply that the money would necessarily be available.

Funding would come from a variety of sources, and funds may be designated for specific purposes:

- *Great American Outdoors Act* funding addresses maintenance and infrastructure in recreation areas,
- Oregon Watershed Enhancement Board provides grants to help protect and restore healthy watersheds, and
- The Pacific Coastal Salmon Recovery Fund was established by Congress to reverse the decline of West Coast Salmon

Implementation costs are divided into engineering, recreation, and restoration costs. Engineering costs include the removal of the existing dam and design and construction of potential new dams, spillways, and bridges, as well as the creation of a new EAP. These costs also include removal of the existing fish ladder and work on a roughened channel for fish passage. Restoration costs include planting, seeding, and constructing beaver dam analogs. Recreation costs cover the development of new camp host site with partial hook-ups, a group campsite, and trails. Mitigation costs include building turtle habitat (see Issue 13), restoring wetlands (see Issue 9), building trails (see Issue 4), and costs associated with seeking public input on recreation in the area (see Issue 7).

Annual costs (e.g., operations and maintenance) include regular inspections required by policy or by the EAP as well as dam operations, law enforcement, host site maintenance, and invasive plant management.

Costs included in this section were estimated by BLM specialists, including engineers, recreation planners, botanists, fisheries biologists, hydrologists, and budget specialists.

The cost of dam failure includes downstream property damage (which is described in Issue 2 in 2018 U.S. dollar estimates) and assumes that the failed dam would not be repaired. This analysis does not attempt to quantify the cost of emergency services, environmental damages, disruption of government services, cleanup, the disruption of people's lives, or other categories of loss that would follow a dam failure, as data are unavailable. However, as described in the U.S. Bureau of Reclamation's *Economic Consequences Methodology for Dam Failure Scenarios,* economic impacts could include labor reduction, capital reduction, water shortages, and lost tourism (USDI 2009b:14).

Summary of Analytic Methods

The geographic scale for implementation and annual costs would include the project area. The geographic scale for the cost of failure includes the floodplain below Hult Reservoir. The difference in alternatives for implementation and annual costs is quantified in 2022 U.S. dollar estimates.

Effects by Alternative

Tables 3-8 and 3-9 indicate implementation and annual costs by alternative.

Table 3-8. *Implementation Costs, by Alternative*

Implementation costs	***Alternative 2***	***Alternative 3***		***Alternative 4***	
			With Mitigation		***With Mitigation***
Engineering	$19,000,000 – $27,000,000	$17,000,000 – $25,000,000		$5,000,000 – $7,500,000	
Recreation	$10,000	$180,000		$180,000	$580,000
Restoration		$440,000	$5,027,000	$440,000	$5,027,000
Total	*$19,010,000 – $27,010,000*	*$17,620,000 – $25,620,000*	*$22,207,000 – $30,207,000*	*$5,620,000 – $8,120,000*	*$10,607,000 – $13,107,000*

Table 3-9. *Annual Costs, by Alternative*

Alternative 1	***Alternative 2***	***Alternative 3***	***Alternative 4***
$50,000	$57,000	$67,000 ($92,000 with mitigation)	$24,000 ($49,000 with mitigation)

Common to Alternatives 1.1, 2, and 3

As stated in the analytic assumptions, no attempt is made to quantify the cost of emergency services, environmental damages, disruption of government services, cleanup, the disruption of people's lives, or other categories of loss that would follow a dam failure, as data are unavailable. However, as described in the U.S. Bureau of Reclamation's *Economic Consequences Methodology for Dam Failure Scenarios,* economic impacts of dam failure could include labor reduction, capital reduction, water shortages, and lost tourism (USDI 2009b:14)

Alternative 1: No Action Alternative (Continue Current Management)

Under the No Action Alternative, the BLM would continue to spend approximately $50,000 annually on operations and maintenance. These costs include monthly inspections; an annual inspection; dam, spillway, bridge, and vegetation maintenance; law enforcement; winter operations; monitoring; and EAP work (see Table 3-9).

Under Alternative 1.1, property damage from dam failure would range from $270,000 to $6,480,000 (see Issue 2).

No implementation work would occur under the No Action Alternative.

Alternative 2: Remove the Existing Dam and Build a New Dam to Maintain Hult Reservoir

Under Alternative 2, the BLM would spend an estimated $19 million to $27 million on implementation. This would include dam and spillway removal, including moving materials offsite, design of a new dam and bridge, construction of the dam and bridge, and a new EAP. In addition, a new camp host site would be built, and the existing fish ladder would be removed and replaced with a roughened channel (see Table 3-8). The cost per acre-foot of reservoir storage would range from $52,000 to $74,000.[73]

The BLM would spend approximately $57,000 annually on operations and maintenance. In addition to the costs described under Alternative 1, this would include costs associated with the camp host site (see Table 3-9).

In the unlikely event of dam failure, property damage would range from $270,000 to $6,480,000 (see Issue 2).

Alternative 3: Remove Hult Reservoir; Add Little Log Pond

Under Alternative 3, the BLM would spend an estimated $17.6 million to $25.6 million on implementation. This would include dam removal and moving materials into the spillway, design and construction of a new bridge, design and construction of the dam at Little Log Pond, and a new EAP. In addition, a new camp host site would be built. The fish ladder at Hult Reservoir would be removed and a roughened channel for fish passage would be built at Little Log Pond. Restoration in the Hult Reservoir restoration area would include riparian replanting, seeding, mulching, and bank stabilization, and the addition of in-stream wooden structures and beaver dam analogs (see Table 3-8). The cost per acre-foot of reservoir storage would range from $486,000 to $714,000.

The BLM would spend approximately $67,000 annually on operations and maintenance. In addition to the costs described under Alternatives 1 and 2, this would include costs associated with invasive plant management in the Hult Reservoir restoration area (see Table 3-9).

Property damage in the unlikely event of Little Log Pond dam failure would range from $0 to $180,000.

Proposed Mitigation (Alternative 3)

Mitigation would include restoration activities to compensate for the loss of aquatic resource function in wetlands (see Issue 9) and loss of habitat for western pond turtles (see Issue 13) and rare aquatic plants (see Issue 11). Implementation would cost approximately $5 million. Annual costs associated with these mitigation measures would include maintenance of turtle ponds.

Alternative 4: Preferred Alternative (Remove Hult Reservoir)

Under Alternative 4, the BLM would spend approximately $5.6 million to $8.1 million on implementation. This would include dam removal, moving materials into the spillway, and design and construction of a new bridge. In addition, a new camp host site would be built. Restoration in the Hult Reservoir restoration area would include riparian replanting, seeding, mulching, bank stabilization, and the addition of in-stream wooden structures and beaver dam analogs.

The BLM would spend approximately $24,000 annually on operations and maintenance. This would include costs associated with invasive plant management in the Hult Reservoir restoration area (also applicable to Alternative 3), the camp host site (also applicable to Alternatives 2 and 3), and law enforcement (also applicable to all other alternatives).

Proposed Mitigation (Alternative 4)

Mitigation would include additional restoration activities to compensate for the loss of aquatic resource function in wetlands (see Issue 9) and loss of habitat for western pond turtles (see Issue 13) and rare aquatic plants (see Issue 11). Implementation would cost approximately $5 million. In addition, new trails built for recreation are expected to cost approximately $350,000 (Issue 4). The BLM expects mitigation that explores recreation options by

[73] BLM engineering uses cost-per-acre-foot of reservoir storage as a determining factor for the feasibility of a project.

conducting public outreach to cost $50,000 (Issue 7), but the costs associated with suggested improvements would be unknown until that public outreach is complete. Annual costs associated with these mitigation measures would include maintenance of turtle ponds.

Issue 4: How would implementation of the alternatives affect visitor access and the type and quality of recreation opportunities in the BLM-administered Recreation Management Areas (RMAs) that overlap the project area?

The BLM received comments during the January 2022 scoping period and the May 2022 draft Chapters 1 and 2 public comment period that questioned:

- How would implementation of the alternatives affect visitor recreation access and opportunities at Hult Reservoir?
- Would the alternatives cause the public to lose access to affordable/free recreation opportunities?
- How would the alternatives manage long-term camping, vandalism, and trash and how would a camp host mitigate these negative impacts?
- How would the alternatives affect family-friendly recreation at Hult Reservoir?
- How would implementation of the alternatives affect the BLM-managed RMAs (e.g., changes to visitor activities listed in the RMA frameworks)?
- How would the alternatives impact boating, fishing, hiking, day-use, camping, and other activities?
- Are there other recreation sites available in the region that could provide opportunities lost or changed under the alternatives?

This issue statement and associated impact analysis address these questions.

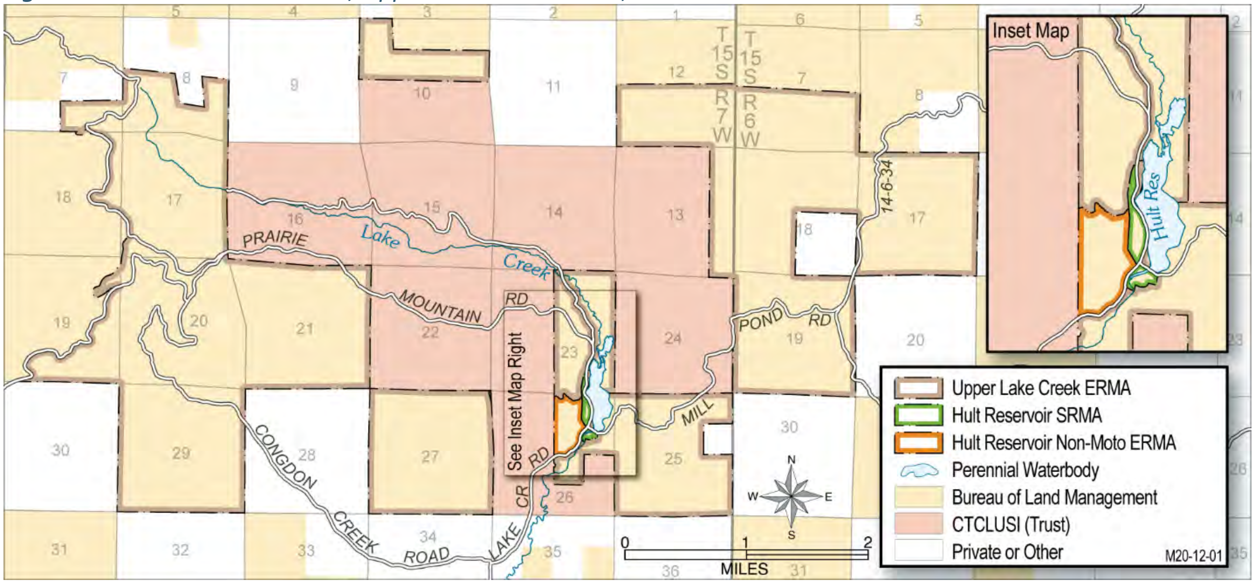
The BLM has managed recreation on BLM lands adjacent to Hult Reservoir since the land was transferred to the agency in 1994. The BLM's approach to meeting recreational use demand encompasses two distinct RMA land use allocations. These are Special Recreation Management Areas (SRMAs) and Extensive Recreation Management Areas (ERMAs). The regional distribution of RMAs ensures that a range of recreational settings, opportunities, and benefits exists in relative proximity to communities throughout the region. The designation of RMAs increases the BLM's ability to protect and enhance the targeted activities, experiences, benefits, and desired recreation setting characteristics on a long-term basis.

Analytical Process

The geographic scale for this analysis comprises the Hult Reservoir SRMA, Upper Lake Creek ERMA, and the Hult Reservoir Non-Motorized Trail ERMA (see Figure 3-6). As noted in Chapter 1, within the former Eugene District, the BLM selected SRMA boundaries based on the general staging area for the recreation activities and values associated with the SRMA and the larger encompassing ERMA. At the Hult Reservoir Recreation Area SRMA, this included the main parking areas at Hult Reservoir, but not the reservoir itself. (The Salem District and Eugene Districts were combined in 2016 to create the Northwest Oregon District.) The Hult Reservoir Recreation Area SRMA includes 21 acres west and south of the reservoir.

Relative to Hult Reservoir's location, the analysis defines the local area as that within the communities of Blachly and Horton and their immediate vicinity; the surrounding area as being up to a 1-hour drive from Hult Reservoir; and the region as being within an approximately 2-hour drive of Hult Reservoir.

Figure 3-6. *Hult Reservoir SRMA, Upper Lake Creek ERMA, and the Hult Reservoir Non-Motorized Trail ERMA*



The temporal scale for this analysis depends on the degree to which the direct and indirect effects of the alternatives affect recreation over time. For the purposes of this analysis the temporal scale has been defined as short term and long term:

- **Short-term:** This is the time frame in which work is being implemented within the project area. Note that project activities would require closures within the area to ensure public, contractor, and/or BLM employee safety for approximately 3 years (Alternative 2 and 4) or 4 years (Alternative 3) starting from the beginning of project implementation. For Alternative 1, short term would be the period before and immediately following dam failure or the BLM draining the reservoir to prevent imminent dam failure.
- **Long-term:** This is the time frame of 3 or 4 years up to 20 or more years following implementation of the action alternatives, when the resulting recreation opportunities are made available (or in the case of Alternative 1, following the dam failure or reservoir draining).

Activities at Hult Reservoir

The management direction for RMAs is in Appendix G of the 2016 RMP (USDI 2016a:251–262). As part of the RMP, the BLM designated portions of the landscape as either SRMAs or ERMAs (USDI 2016a:251). BLM established Recreation Area Management (RMA) frameworks for each of the RMAs, which established recreation and visitor service objectives, supporting management actions, and allowable uses (USDI 2016a:251). The Upper Lake Creek ERMA framework defines visitor activities in the ERMA as including hiking, equestrian riding, camping, picnicking, day use, driving for pleasure, swimming, boating/rafting, fishing, and wildlife viewing (USDI 2016c:116). Activities defined in the Hult Reservoir SRMA and Hult Reservoir Non-Motorized Trail ERMA are a subset of these activities (USDI 2016c:39, 42; see Table 3-11, *Visitor Activities Available at Hult Reservoir Recreation Management Areas, Relationship to Water, and Current Quality*).

For the purposes of this analysis, the BLM is using the following definitions to characterize recreational activities:

- **Water-dependent:** Activities for which the presence of water is required, including boating, swimming, and fishing.
- **Water-influenced:** Activities for which the presence of water enhances the activity but is not required. These include dispersed camping, wildlife watching and picnicking/day use.
- **Non-water-influenced:** Activities for which the presence of water has little or no influence on the activity. These include horseback riding or hiking on the multiple-use trail system near the reservoir.

The principal measurement indicator for evaluating project effects is the quality of the recreational experience for each visitor activity across alternatives. The quality of recreation in the area is defined in terms of nonexistent, low, medium, and high:

- **Nonexistent (0):** The recreational activity does not exist. There are no facilities designed to support the activity, and public interest in the activity is essentially nonexistent due to an inadequate setting, lack of supporting infrastructure to adequately facilitate access to the activity, or for other reasons.
- **Low (1):** The activity ranges from nearly nonexistent to existing but with poor quality. Participation and interest in the activity are low due to lack of supporting infrastructure to facilitate access to the activity, or for other reasons. No recreation fee is charged, and there are often no supporting amenities specifically designed to facilitate participation in the activity. Controls for the activity are typically for resource protection only. The site's use levels are generally low, and its parking areas are seldom if ever at capacity. The activity quality is low compared to similar areas in the region where the activity is pursued.
- **Medium (2):** There is demand for the activity, which ranges from consistent throughout the year or for a portion of the season. Often there is basic infrastructure and/or amenities that support the activity, such as a parking lot, trailhead, and signs and/or information specifically addressing the activity. At peak use times, such as weekends during the primary use season, there can be enough demand to fill parking areas; however, during non-peak use periods, parking capacity is usually not met. The activity quality is comparable to similar areas in the region where the activity is pursued.
- **High (3):** There is strong demand for the activity, which is often consistent throughout the year and/or during a portion of the season. Parking areas are often full during higher use seasons, peak use periods such as weekends and holidays, and occasionally during non-peak use periods, and a parking fee is often charged. However, use levels are not so high that crowding and conflict are present. Typically, there is robust infrastructure supporting the activity, such as a paved parking lot, restrooms, garbage receptacles, and information signs. Often signage provides detailed visitor information about the activity to improve visitor experience, define rules and regulations, and describe fee payment systems. The activity quality is considered high compared to similar areas in the region where the activity is pursued.

Table 3-10 shows these details by activity.

Table 3-10. *Quality Scale Definitions for Visitor Activities for Hult Reservoir Recreation Management Areas*[1]

Activity	*Low quality (1)*	*Medium quality (2)*	*High quality (3)*
Water-dependent activities			
Boating/ Rafting	Small waterbody, limited shoreline complexity, low aesthetic value compared to other nearby waterbodies.	Medium-sized waterbody, moderate shoreline complexity, moderate aesthetic value compared to other nearby waterbodies.	Large waterbody, high shoreline complexity, high aesthetic value compared to other nearby waterbodies.
Swimming[1]	Low demand due to water temperature, lack of clarity, or other undesirable settings such as shallow water, muddy banks, dense vegetation, or human development. Poor access to water.	Some basic infrastructure in place to support water access, such as boat ramps, piers, docks, or beach areas; however, these facilities are not specifically designed to facilitate swimming. Swimming tends to be a secondary activity that often uses facilities designed for other water access purposes.	Infrastructure present that is specifically designed to support swimming, such as floating docks, beach areas, designated swimming zones, shower/changing stations, or other amenities.
Fishing	Low demand due to low productivity fishery or undesirable setting such as muddy banks, dense vegetation, or human development. Poor access to water.	Targeted fish species quantity and quality is moderate. Primarily attracts local use with some use from the surrounding area. Basic fishing access amenities, such as rudimentary boat ramps, fishing piers, or shoreline access trails, usually exist.	Targeted fish species quantity and quality is high. Attracts visitors from the local and surrounding area and region. Fishing access amenities such as piers, docks or other shoreline access areas are well developed and designed specifically to improve access for anglers.

Activity	***Low quality (1)***	***Medium quality (2)***	***High quality (3)***
Water-influenced activities			
Camping	Dispersed campsites are not adjacent to major recreation attractors such as waterbodies, areas with scenic vistas, or other features of interest. No developed campgrounds. Visitors are typically from the immediate area.	Dispersed sites are typically adjacent to a feature of interest such as a waterbody, scenic vista, or other moderate quality feature of interest. Developed campgrounds may be present but are rustic with minimal amenities. Visitors are typically from the local and surrounding area.	Dispersed sites are adjacent to high-quality features of interest that are unique in the region of comparison. Developed campgrounds are generally busy and full during high-use periods. Campgrounds typically provide expanded amenities and services. Visitors are often from the surrounding area and region.
Picnicking/ day use	Little to no specific amenities provided. Most users come from local communities.	Picnic tables, benches, trash receptacles and basic vault restrooms are often provided and maintained. Visitors are typically from the local and surrounding area.	Picnic tables, trash receptacles, restrooms are always present and frequently maintained. Restrooms may provide flush toilets or other amenities. Visitors are typically from the local and surrounding area and region.
Watching wildlife	No facilities exist to support wildlife viewing. Visitors are mostly local.	Some facilities exist that indirectly support wildlife viewing but are not specifically designed for this use.	Wildlife viewing often focuses on specific species of interest. Facilities often exist that are specifically designed to enhance the wildlife viewing experience, such as viewing platforms, stationary binoculars, and interpretive signs or displays describing the wildlife in the area.
Non-water-influenced activities			
Equestrian	Trails are low use and not consistently maintained. Use tends to be from local area. Surfacing is unimproved with little to no built features.	Trails are maintained during high-use season. Surfacing is often modified or enhanced, and some equestrian trail features exist. Visitors are typically from the local and surrounding area.	Trails are consistently maintained year-round or during primary use season with equestrian-specific needs in mind, such as removal of higher vegetation and maintenance of water crossings. Surfacing is often highly modified. Designed equestrian trail access features such as hitching posts, corrals, and stock loading ramps are common. Visitors come from the local and surrounding area and region.
Driving for pleasure	Roads are not designed with specific features that facilitate driving for pleasure, such as pull-offs with pleasant views. Visitation is mostly from the local area.	Some pull-offs or parking areas may provide pleasant viewing opportunities but are not specifically designed as viewing areas. Visitors come from the local and surrounding area.	Often the roadway is designated in some way, such as a scenic byway. Pull-offs and parking areas are present and specifically designed to provide viewing opportunities and vistas. Often signage that supports recreational driving, such as interpretive kiosks, is present. Visitors come from the local and surrounding area and region.
Hiking	Trails are low use and not consistently maintained. Surfacing is unimproved with little to no built features. Users tends to be from local area.	Trails are maintained during high-use season. Surfacing is often modified or enhanced, and some trail features exist, such as short foot bridges over creeks or other design features that protect resources and trail quality. Visitors are typically from the local and surrounding area.	Trails are consistently maintained throughout the year or primary use season. Surfacing is often highly modified and may be compacted gravel, asphalt, or raised boardwalk. Designed trails have features such as bridges, steps, railings, and benches. Interpretive signs are common. Visitors come from the local and surrounding area and region.

1. Visitor origination definitions: Local area = Within the communities of Blachly and Horton and their immediate area; Surrounding area = Up to a 1-hour drive from Hult Reservoir; Region = Within an approximately 2-hour drive of Hult Reservoir.
2. In this analysis, swimming includes activities such as water play and bathing.

A quality rating of zero for an activity (i.e., activity is nonexistent or not possible) is permissible in the short term. If, under an alternative, the activity becomes nonexistent or not possible (quality rating – zero) for the long term, that alternative would not be consistent with the relevant SRMA (USDI 2016c:42) or ERMA (USDI 2016c:39, 116) frameworks. In this case, in accordance with the 2016 RMP, the BLM would have to update the relevant RMA framework consistent with land use planning regulations that allow for changes to an approved RMP (USDI 2016a:251).

Because the BLM has limited baseline data associated with the specific activities of recreationalists in the project area, anticipated effects are described qualitatively in narrative form. This is the most accurate form of analysis that can be done with the available data.

Any new facilities that are designed, built, or altered would be subject to the 1968 *Architectural Barriers Act*, which requires access to facilities that are designed, built, or altered with Federal funds or leased by federal agencies. (The *Americans with Disabilities Act* has similar design mandates but applies to facilities in the private sector and the State/local government sector without regard to Federal funding.)

Affected Environment

The BLM recognizes that under the status quo the primary attractor to Hult Reservoir and its immediate surroundings is the presence of a relatively large and accessible freshwater body where water-dependent or water-influenced activities are what visitors appreciate. Although the area supports other non-water-dependent or water-influenced recreation, the core recreation value at the RMAs within the project area is Hult Reservoir itself.

Hult Reservoir is surrounded by public land and provides water-dependent recreation and a wide range of other visitor activities in a predominantly natural setting. The reservoir offers the opportunity to fish for trout and introduced non-native warm-water species such as bass and blue-gill panfish. Boating is a popular activity, especially during the summer months. There is a multiple-use equestrian-oriented trail system and several established dispersed campsites near the reservoir's shoreline and below the dam along Lake Creek. Rustic facilities, such as regularly serviced vault restrooms and trash cans, provide basic visitor amenities. BLM recreation staff routinely work in the area to clean and maintain recreation facilities, observe and record problematic behaviors or activities, and interact with visitors. Law enforcement also regularly patrols the area. Typically, a host is present during the summer. On-site hosts help with basic maintenance, keep the BLM informed about conditions, provide visitors with a sense of management oversight, and help to curtail unwanted uses such as illegal dumping, long-term residing, and uncontrolled partying.

The reservoir shoreline is heavily forested and undeveloped except for the dam and small-scale supporting infrastructure (see Figure 1-2 in Chapter 1). Low-use gravel roads provide access to and around portions of the reservoir and are frequently used by visitors and agency staff and support timber harvest activities, including log-haul.

The BLM manages Hult Reservoir and the surrounding area as RMAs where a range of visitor activities have been identified for public use and enjoyment. The BLM actively manages the RMAs in the project area to maintain and/or improve these activities and, to this end, provides a range of amenities at Hult Reservoir. These include an approximately six-vehicle parking lot, a small viewing and fishing platform (accessible in compliance with the Architectural Barriers Act design requirements), a rudimentary gravel boat ramp, two vault restrooms, a day-use area with concrete picnic tables, a short walking path to the day-use area, several signs and kiosks, plus an equestrian-oriented trailhead composed of a large, paved parking area, hitching posts, and a corral.

Six officially recognized dispersed campsites along the banks of the reservoir provide room for a few vehicles each in boulder-defined parking spots. These first-come, first-served campsites provide no developed recreation amenities and the BLM maintains them with natural resource protection as the primary management intent.

A multiple-use, equestrian-oriented trail system is accessible from the equestrian parking lot across the access road leading to the reservoir. The trail system is located on both BLM and CTCLUSI lands. The trail system and associated supporting infrastructure appear to be underutilized and are in generally poor condition.

Recreational fishing at the reservoir for non-native warm-water species such as bass, crappie, and sunfish has been popular for many decades and represents one of few opportunities in the region to fish for these species. Rainbow and coastal cutthroat trout are also present in the reservoir and commonly fished for. Anglers typically fish from the shore near dispersed use sites, from other areas near the road, or from the fishing platform. Because the majority of the reservoir's shoreline has no roads or developed trails and is heavily forested, anglers often utilize small, non-motorized watercraft such as kayaks, canoes, or inflatables to access prime fishing locations. Motorized use on the reservoir is restricted to electric trolling motors only. Due to this restriction, the relatively small size of the reservoir, and the rudimentary boat launch, watercraft are typically small, easily portable, and generally under 10 feet in length.

Boating for pleasure independent of fishing is a popular activity at the reservoir, and in recent years, the use of stand-up paddle boards has increased. Swimming and bathing are not predominant recreational uses, but during hot summer months, some visitors engage in these activities in areas where access to the water has been improved, near the boat ramp, and adjacent to some dispersed use sites. During the winter, visitation is lower, and BLM staff have observed that local visitors appear to account for the majority of use. During the summer, use increases dramatically as people throughout the area begin seeking outdoor recreation activities that provide access to water, and visitors from the surrounding area and region begin to make up a larger component of total visitation, especially on weekends.

Many visitors from local communities are greatly concerned about the potential loss of Hult Reservoir, as expressed in public comments and in the stakeholder analysis (Langdon Group 2017). The availability of the same activities at different locations, even if people could afford to go there, would not be a substitute for visitors who have a strong place attachment to Hult Reservoir, developed over generations in some cases. When sense of place and place attachment are a large part of the visitor's experience, those experiences cannot be replaced by visiting other locations, even those with similar characteristics, levels of development, or activity opportunities (Schroeder 1996, Farnum et al. 2005).

The BLM focuses its active day-to-day management efforts during the summer. Day-to-day maintenance involves garbage service, restroom cleaning, graffiti removal and litter pickup, general vegetation management, sign maintenance, and other groundskeeping tasks. In addition, BLM staff provide a uniformed presence in the area to provide education and outreach-focused public contacts, address problematic activities or behaviors via voluntary compliance efforts, and document and report issues as needed to law enforcement and leadership.

Unwanted uses such as illegal dumping, vandalism, garbage, long-term residing, illegal or irresponsible fires, partying, and other problematic behaviors have been and continue to be a management challenge at Hult Reservoir. Local residents have expressed concerns about these activities. Typically, the BLM addresses unwanted activities or behaviors through an integrated visitor management approach using an engineering, education, and enforcement strategy. Engineering controls include designated parking areas, vehicle access barriers, and improved day-use areas and facilities. These amenities and control features are actively maintained. Education and outreach efforts have historically included a combination of active measures (in-person public contacts) and passive approaches (signs and other administrative controls). Law enforcement officers routinely make contact with visitors who are engaging in unwanted activities or behaviors and work with the BLM's recreation program and leadership to develop mitigation strategies.

There is no cellular service in the immediate area, which poses additional safety concerns for BLM staff and visitors. The BLM typically provides an on-site volunteer camp host to improve management presence, assist visitors by disseminating information about the area, and report unwanted activities or behaviors to the BLM. The camp host site lacks power or other utility services such as water or electrical hookups, and the absence of these amenities greatly reduces the BLM's ability to attract and retain the kind of hosts the agency desires to have present at this location.

In general, Hult Reservoir provides high-quality water-dependent recreational activities, medium-quality water-influenced activities, and low-quality non-water-influenced activities (see Table 3-11).

Table 3-11. *Visitor Activities Available at Hult Reservoir Recreation Management Areas, Relationship to Water, and Current Quality*

Activity	Quality	Hult Reservoir SRMA[1]	Upper Lake Creek ERMA[1]	Non-Motorized Trail ERMA[1]
Water-dependent				
Swimming	Medium	✓	✓	
Boating	High	✓	✓	
Fishing	High		✓	
Water-influenced				
Camping	High	✓	✓	
Day use/picnicking	Medium	✓	✓	
Watching wildlife	Low		✓	
Non-water-influenced				
Equestrian	Low	✓	✓	✓
Driving for pleasure	Low	✓	✓	
Hiking	Low	✓	✓	✓

1. Defined as an activity in the RMA's framework in the 2016 RMP.

Hult Reservoir is unique in the recreation region as the only freshwater body of substantial size that is entirely non-motorized, surrounded by public land, and provides water-dependent recreation and a wide range of other visitor activities in a predominantly natural setting. There are no local, free non-motorized waterbodies of similar or greater size that provide opportunities to participate in the water-dependent visitor activities at Hult Reservoir.

The only locally available freshwater bodies that warranted consideration were Triangle Lake and Upper Lake Creek Falls. However, Triangle Lake was not considered a viable replacement site because it is a fully motorized waterbody where motorized boat use is the dominant form of water-based recreation. The main boating activities there include water-skiing, wakeboarding, and tubing, which are less compatible with swimming and more sedate boating activities popular at Hult Reservoir, such as kayaking and stand-up paddleboarding. Additionally, public access to the water is limited, and the more developed shoreline of Triangle Lake is substantially different from the recreation setting characteristic at Hult Reservoir, which is largely undeveloped, less crowded, quieter, and natural in comparison. Lower Lake Creek Falls provides a series of rock "slides" and a small pool where swimming is possible. This pool is too small to serve as a viable replacement for swimming or open-water boating at Hult Reservoir, although it does provide a reasonable alternative for bathing and water play.

Fern Ridge Reservoir, Cleawox Lake, and Siltcoos River Canoe Trail are all an approximate 1-hour drive from Hult Reservoir. Water-based recreation sites available farther away include Olalla Reservoir, Willamette Mission State Park Reservoir, Silverton Reservoir, Leaburg Lake Reservoir, Eckman Reservoir, and Blue River Reservoir (all within approximately a 2-hour drive from Hult Reservoir).

Environmental Consequences

Direct and Indirect Effects

Alternative 1: No Action Alternative (Continue Current Management)

As described at the beginning of Chapter 3, the BLM assumes that within 8 years, either the dam would fail or the reservoir would be drained to prevent imminent dam failure.

The long-term effects to recreation under Alternative 1.1 (dam failure) and 1.2 (reservoir drained) are expected to be comparable. Water-dependent and water-influenced activities would be impacted the most; the quality of non-water-influenced activities would remain low. However, a dam failure could cause access disruptions due to downstream road damage and closures for public safety, and the uncontrolled release of water could cause changes in stream morphology downstream that may impact water-dependent activities there.

Swimming would be constrained to the newly created Lake Creek channel within the former Hult Reservoir basin and to the creek channel below the former dam. It is likely that during this time frame the newly created stream channel through the reservoir basin would be in a continuous and stochastic state of change unmitigated by human manipulation (e.g., no instream features such as log jams) and would be characterized by shifting channels, unpredictable debris jams, an unconsolidated stream bed, and unstable bank characteristics. These conditions are expected to make swimming undesirable and essentially nonexistent as a viable recreational activity.

Swimming below the dam has been historically limited to very shallow water wading in small pools and riffles during summer, when flows are low, and is sometimes enhanced by user-created dams. This activity is more accurately described as bathing or water play in splash pools rather than swimming as it is traditionally defined. Existing opportunities for swimming below the dam would remain relatively unchanged. However, the rapid release of water downstream due to an uncontrolled dam failure may change stream morphology below the dam, which could improve or degrade existing areas where limited wading and water play occur. These specific effects cannot be predicted accurately but are not expected to create new swimming opportunities compared to the existing conditions below the dam.

Boating in the project area would be constrained to the newly created Lake Creek channel within the former reservoir basin and to Lake Creek below the dam. Boating historically does not occur in Lake Creek below the dam, and the removal of the dam is not expected to change this condition. Boating on the stream channel in the reservoir footprint would be subject to the same mid-term stream morphology effects described for swimming. These conditions would likely result in a watercourse that is not amenable to swiftwater boating.

Warm-water fishing as a recreational activity would be eliminated, as warm-water fish species would be unable to survive in the post-reservoir environment because of the complete loss of their habitat. It is unlikely that a viable swiftwater recreational fishery would emerge within the long-term. However, some salmonid species (e.g., trout) may be present in low numbers, so fishing as a recreational activity would be likely to exist.

The campsites are popular due to their proximity to the reservoir, and their presence also benefits trails from which the reservoir can be seen. Without the reservoir, even if the campsites are maintained (which is not certain under this alternative), they would likely be less popular because the current water-based activities would not be available. It is not expected that there would be any significant impacts to other non-water dependent visitor activities described in the RMA because of dam failure or reservoir draining except for possible short-term access disruptions if access roads are damaged by flood waters or due to administrative closure of the area for public safety.

The reduction of these water-based recreation opportunities would be especially important for local visitors due to the lack of available alternative sites that provide a similar package (i.e., set) of activities. The local population may lack the resources to travel to those comparable sites. Even if comparable sites were available nearby, they would not provide a substitute for the long-term sense of place and attachment many local visitors have developed for Hult Reservoir. The same could be the case for regional residents who have an attachment to recreation at Hult Reservoir, but most others would likely visit other sites in the region for fishing, boating, and swimming.

Alternative 2: Remove the Existing Dam and Build a New Dam to Maintain Hult Reservoir

Under Alternative 2, Hult Reservoir would be drained during project implementation, which would result in the loss of game fish inhabiting the reservoir (see Issue 15: Game Fish). This would affect visitors who fished as one of their main activities at Hult Reservoir. During the construction phase of the dam, it is expected that public access to the reservoir would be restricted for safety reasons. These periodic and unpredictable public safety closures are expected to last for approximately 3 years. During later phases of construction, it is likely that there would be periods of time when access to the reservoir via roads and access points outside the immediate construction zone may be possible. The quality of swimming, boating, and fishing during this time would be low because of the frequency and unpredictability of public access restrictions particularly during the early stages of project implementation. Once the new dam is constructed, the existing opportunities would be restored and, in many cases, improved.

The existing amenities at the reservoir (parking lot, viewing and fishing platform, rudimentary gravel boat ramp, vault restrooms, etc.) would be rebuilt accessible in compliance with the Architectural Barriers Act design requirements if the building of the new dam at Hult Reservoir has impacted them. Over the long term, the reservoir would be available for the public to pursue all the water-dependent visitor activities described for the RMAs, and the BLM expects the reservoir would return to its pre-project condition for swimming, boating, and other water-related recreation except for fishing. As described Issue 15, warm-water fishing for bass would no longer be available. Fishing for cutthroat trout would continue.

In addition to the existing free dispersed camp sites, a new camp host site with partial hookups including phone service would provide some improvements for the comfort and safety of visitors. Interpretive signs at day-use area parking lots, interpretive pamphlets, and/or other interpretive materials would be provided.

Driving for pleasure would be enhanced by interpretive signs at parking lots and the availability of interpretive materials.

Alternative 3: Remove Hult Reservoir; Add Little Log Pond

Under this alternative, Hult Pond Dam would be removed and Hult Reservoir drained. A new, smaller dam would be built below the existing reservoir near the old mill site, restoring the former log pond for recreational use. A new multiple-use trail system with benches would be built adjacent to the newly created Little Log Pond and at the Hult Reservoir Restoration Area. A new day-use area with picnic tables, a group campsite, and a new partial hookup camp host site (including phone service) would be constructed. These features would be accessible in compliance with the Architectural Barriers Act design requirements.

In the short term, water-dependent recreational activities would not be available due to the reservoir being drained and the need to close most of the project area for construction.

The much smaller Little Log Pond is expected to provide enough surface water acreage to support swimming as a recreational activity, and the swimming sub-set activities of wading, bathing, and water play would be enhanced by the creation of easily accessible shallow water play areas which would also serve to improve entry and exit for open water swimmers seeking a more rigorous physical activity.

The approximately 90 percent reduction in available surface water for boating and subsequent reduction in shoreline amount and complexity would correspondingly decrease boating enjoyment compared to pre-project conditions.

It is unlikely that warm-water fish species targeted by recreational anglers at Hult Reservoir prior to project implementation, such as bass, would be available naturally in Little Log Pond. (There would also be a loss of an accessible fishing and viewing platform at Hult Reservoir, which would further decrease the quality of fishing.) Because of the pond's small size, the BLM does not expect the Oregon Department of Fish and Wildlife to stock it with trout, and natural repopulation at this time scale would be unlikely to produce a viable number or quality of target fish species for anglers. For these reasons, the BLM expects fishing at Little Log Pond to be of low quality.

As was the case under Alternative 1, the loss of these opportunities would be especially important for local visitors due to the lack of available alternative sites that provide a similar package of activities. The local population may lack the resources to travel to comparable sites. Even if comparable sites were available nearby, they would not provide a substitute for the long-term sense of place and attachment many local visitors have developed for Hult Reservoir. The same could be the case for regional residents who have an attachment to recreation at Hult Reservoir, but most others would likely be able to visit other sites in the region for fishing, boating, and swimming if desired. It is uncertain to what extent the absence of fishing and boating opportunities would also limit swimming. If these activities are commonly packaged together by visitors, they may not swim at the smaller pond if the other activities are no longer available.

The quality of the experience for dispersed camping, day use and picnicking, and wildlife viewing is expected to decline because of the loss of Hult Reservoir. Proximity to a large waterbody is the principal reason why these sites originated where they are. An upgraded camp host site would be operational, which would improve the comfort and safety of campers in dispersed campsites. The newly built group campground would dramatically increase the overall overnight stay capacity, comfort, and safety for campers in the immediate area. Some lingering effects from restoration and/or construction, primarily to vegetation and landforms, are expected to remain evident but would decline, reaching near zero by 20 years post-project. The site would be enhanced by the presence of interpretive signs at day-use area parking lots and by the availability of interpretive pamphlets and/or other interpretive materials.

The quality rating for hiking is not expected to change under this alternative because there would be no changes to the trail system or access to trails. Driving for pleasure would be enhanced by the presence of interpretive signs at parking lots and by the availability of interpretive materials.

The newly created multiple-use trail(s) adjacent to Little Log Pond and the Hult Reservoir Restoration Area would be available, and the trail experience enhanced by interpretive signage and/or other interpretive materials. Some lingering effects of project implementation are expected to be noticeable, primarily by local residents or frequent, long-time visitors who can compare pre-project conditions with the current condition. These lingering effects are likely to be in the form of vegetation succession, landscape modifications, and trail tread within the trail corridor. Whether or not the lingering evidence of these project-related effects are negative, positive, or neutral for the visitor would depend largely on the point of view of the visitor, particularly for local residents or long-time visitors from the surrounding area or region.

A mitigation measure to protect western pond turtles (see Issue 13) calls for building Little Log Pond before lowering and removing Hult Pond Dam. This would be protective of pond turtles and allow for movement into new ponded habitat. It would also allow non-native game fish currently in Hult Reservoir to become established downstream in Little Log Pond. If this mitigation were adopted, fishing at Little Log Pond would be expected to be of moderate quality.

Alternative 4: Preferred Alternative (Remove Hult Reservoir)

Under this alternative, the BLM would remove Hult Pond Dam, resulting in the loss of Hult Reservoir. Some new recreation facilities would be built, including a group campground, an improved camp host site with partial hookups, and day-use areas. In the long term, current recreation opportunities and experiences are expected to be lower quality than recreation at Hult Reservoir.

In the short term, during dam removal, water-dependent recreation activities, including fishing, swimming, and boating, would not be possible because Hult Reservoir would not exist, and no other locations within the project area support water-dependent activities to any appreciable degree, with the exception of the low-quality streamside wading and water play/bathing that occurs downstream from the dam where Lake Creek is slower and slightly deeper than above the Hult Reservoir Restoration Area. (This area is accessible from a trail/old road near the Little Log Pond location.) As described under Alternative 1, swimming below the dam has been historically limited to water wading in small pools and riffles during summer, when flows are low, and is sometimes enhanced by user-created dams. This activity is more accurately described as bathing or water play in splash pools rather than swimming as it is traditionally defined.

In the Hult Reservoir Restoration Area, water-dependent recreation activities are not expected to be available in the very near term due to administrative closures for safety during project implementation. The newly established creek is unlikely to have sufficient water volume to support boating during the summer and unlikely to attract whitewater boating interest during the winter. In addition, the planned placement of hundreds of logs in and around the stream channel for restoration purposes would likely prohibit boating. Due to the cold water temperature, unconsolidated stream bed, lack of access, and unstable banks along the newly created Lake Creek channel through the basin, swimming is unlikely to be a viable visitor activity. The existing warm-water fish population would be eliminated[74] with the removal of the dam, and fish are not expected to repopulate the newly established creek within this period, so fishing is expected to be nonexistent. For these reasons, the quality rating for all water-dependent activities under this alternative in the short term would be nearly nonexistent or zero.

Streams are in a constant state of evolution (see Figure 3-8). A permanent and stable condition is not possible, but as stream evolution progresses, in general, the stream does become more stable and its disposition more constant. As Lake Creek settles into a relatively stable condition through the project area, instream features such as pools, riffles, and rapids would establish, as would the bed and banks of the stream. Primary successional vegetation,[75] such as willows and alders, is expected to become established, adding additional bank stability. With these stabilizing effects, swimming and other water-related activities, such as bathing and water play in shallow pools, would become possible; the BLM expects it to be similar in quality to the water play/bathing/wading that currently occurs downstream of the dam. It is expected that visitors will have established short social trails from parking access areas, providing some degree of improved access. The cold water temperature would be a limiting factor for swimming and immersive water-related activities. For these reasons, swimming would remain a low-quality activity.

Fishing for warm-water species is not expected to be possible due to the loss of the reservoir and subsequent lack of adequate warm-water habitat. It is possible that trout and/or other salmonids may reestablish a fishable population in Lake Creek; however, the relative abundance and quality of target species would likely result in a low-quality recreational fishery. As directed by current Oregon Department Fish and Wildlife fishing regulations, trout fishing would be available in Lake Creek approximately 5 months a year (May 22 to October 31), and Lake Creek is closed to salmon fishing.

Visitors would continue to have vehicle access to the dispersed camping sites, but camping would decline in quality because these existing sites, which are situated along the shore of the reservoir, would no longer have immediate access to a large freshwater body, and no new camping facilities would be created to offset this reduction in campsite quality. The trail system would be available, although trail quality would not have changed and would remain low quality.

In the long term, driving for pleasure would be fully available. This activity would be enhanced by the presence of interpretive signs at parking lots and the availability of interpretive materials. In the long term, driving for pleasure

[74] Fish in Hult Reservoir would be salvaged and non-native fish would be transported down to Triangle Lake.
[75] The first plants that become established after an area has been disrupted.

is expected to be moderately enhanced, as evidence of project-related activities would no longer be evident and interpretive signs and materials would provide interest for visitors.

As was the case under Alternative 1, the reduction of these water-based recreation opportunities would be especially important for local visitors because of the lack of available alternative sites that provide a similar package of activities. The local population may lack the resources to travel to those comparable sites. Even if such sites were available nearby, they would not provide a substitute for the long-term sense of place and attachment many local visitors have developed for Hult Reservoir. The same could be the case for regional residents who have an attachment to recreation at Hult Reservoir, but most others would likely visit other sites in the region for fishing, boating, and swimming.

A camp host site would provide some improvements for the comfort and safety of campers in dispersed campsites and the group campground. The group campground would increase the overall overnight stay capacity for the immediate area. Dispersed camping would still be free and available on a first-come, first-served basis.

The site would be enhanced by interpretive signs at day-use area parking lots and by the availability of interpretive pamphlets and/or other interpretive materials. Creation of a trail-accessible viewpoint with day-use area amenities would provide additional quality. These features would be accessible in compliance with the Architectural Barriers Act design requirements.

Potential Mitigation for Alternative 4

The following mitigation would be expected to reduce adverse impacts to recreation at Hult Reservoir under Alternative 4:

- Extend and improve the existing multi-use trail system and build a connector trail to a viewpoint and day-use area.
- Build a one-way, downhill-emphasis mountain bike trail with bike-specific trail features accessible from both the Hult Reservoir recreation complex and the proposed day-use area viewpoint.

These potential mitigation measures would not mitigate for the decrease in quality of water-based recreation that would be caused by the removal of Hult Reservoir. However, the BLM expects the mitigation measures would improve other recreational activities in the project area so that the project area is still a draw as a recreation site. These mitigations center around trail improvements and enhanced day-use areas by creating a scenic viewpoint at a higher elevation with basic amenities, such as tables, benches, and interpretive signs. The improved portion of the existing equestrian-oriented trail would create enhanced hiking, biking, and horseback riding opportunities and provide access to the scenic viewpoint day-use area. This multiple-use trail segment would restrict bike use to one-way uphill travel only to reduce user conflicts and improve safety while also providing a loop route accessible from the recreation complex for mountain bikers. A new bike-only one-way travel (downhill) mountain bike trail would be constructed from the scenic viewpoint or other higher elevation location and would descend back to the Hult Reservoir recreation complex. These mitigation measures would retain and improve the multiple-use trail system and add a downhill segment with bike-specific trail features that would appeal to a new use type.

These measures may create a new activity, mountain biking, that could help to mitigate the recreational use loss due to the removal of Hult Reservoir as the key driver of recreation demand. If all were implemented, tailored visitor improvements could be provided at the day-use areas, campground, and camp host site, such as bike racks, cleaning and maintenance stations, or other mountain bike-oriented amenities. Equestrian improvements could include improved horse corrals, hitching posts, and other equestrian facilities. Although these improvements could help attract visitors, and therefore economic activity, they would not replace the experiences that would be lost without Hult Reservoir.

In addition, mitigation proposed in Issue 7 (Environmental Justice) explores additional recreation mitigation options by conducting public outreach. The BLM expects this mitigation, if adopted, would improve recreational opportunities in or near the project area.

Summary of Direct and Indirect Effects

Table 3-12 summarizes the levels of quality for each activity expected under each alternative over the short term and the long term. The quality levels obscure some of the specific details and uncertainties described in the text under each alternative, so readers are encouraged to read those and not rely exclusively on the table for impacts.

Table 3-12. *Overall Quality Ratings Across Temporal Scales, by Alternative*

Activity	Existing condition	Temporal scale	Alternatives 1.1 and 1.2	Alternative 2	Alternative 3	Alternative 4	Alternative 4 with mitigation
Water-dependent activities							
Swimming	Medium (2)	Short	NA (0)	NA (0) or Low (1)	NA (0)	NA (0)	NA (0)
		Long	Low (1)	Medium (2)	Medium (2)	Low (1)	Low (1)
Boating	High (3)	Short	Low (1)	NA (0) or Low (1)	NA (0)	NA (0)	NA (0)
		Long	Low (1)	High (3)	Low (1)	Low (1)	Low (1)
Fishing	High (3)	Short	NA (0)	NA (0) or Low (1)	NA (0)	NA (0)	NA (0)
		Long	Low (1)	High (3)	Low (1)	Low (1)	Low (1)
Water-influenced activities							
Camping	High (3)	Short	Low (1)	Low (1)	Low (1)	Low (1)	Low (1)
		Long	Medium (2)	High (3)	High (3)	Medium (2)	Medium (2)
Day use/picnicking	Medium (2)	Short	Low (1)	Low (1)	Low (1)	Low (1)	Low (1)
		Long	Medium (2)	High (3)	High (3)	Medium (2)	High (3)
Watching wildlife	Low (1)	Short	Low (1)	Low (1)	Low (1)	Low (1)	Low (1)
		Long	Low (1)	Low (1)	Low (1)	Low (1)	Low (1)
Non-Water-Influenced Activities							
Equestrian	Low (1)	Short	Low (1)	Low (1)	Low (1)	Low (1)	Low (1)
		Long	Low (1)	Low (1)	Low (1)	Low (1)	Medium (2)
Driving for pleasure	Low (1)	Short	Low (1)	Low (1)	Low (1)	Low (1)	Low (1)
		Long	Low (1)	Medium (2)	Medium (2)	Medium (2)	Medium (2)
Hiking	Low (1)	Short	Low (1)	Low (1)	Low (1)	Low (1)	Low (1)
		Long	Low (1)	Low (1)	High (3)	Low (1)	High (3)

NA = Not available

Cumulative Effects

Timber harvest and related activities have occurred, are presently occurring, and are expected to continue in the reasonably foreseeable future on adjacent BLM-managed lands and private lands in the immediate vicinity of the project area. The primary effect of timber harvest activities for visitors in the project area is traffic on access roads due to timber haul along with noise and dust. However, it is recognized that timber harvest has been taking place within the vicinity of the project area for many decades preceding the development of the RMAs, and the existence of Hult Reservoir itself is a result of timber harvest activities. Timber harvest and associated activities were considered and taken into account as a known component of the overall recreation experience and setting expected during the BLM's establishment of the RMAs.

Issues 5, 6, and 7: Socioeconomic Issues

During the January 2022 scoping period and the May 2022 public comment period on draft Chapters 1 and 2, the BLM received comments expressing concern about the impact of the alternatives on the local economy and businesses, quality of life for local residents, availability of recreation opportunities for low-income users of the Hult Reservoir recreation area, and members of local Tribes.

This section addresses:

- Issue 5: How would the implementation of the alternatives affect the local economy?

- Issue 6: How would the implementation of the alternatives affect quality of life for local residents?
- Issue 7: Would the implementation of the alternatives have any disproportionate adverse effects on environmental justice [76] populations?

Analysis of these issues is necessary to determine the significance of the impacts.

Analytical Process

Analytical Assumptions

Short-term effects on the local economy will depend on the nature and extent of the dam work/construction period, as well as any effects on recreational uses of the site. Long-term effects on the local economy will be based largely on any changes in recreational use patterns resulting from the alternatives.

Effects on quality of life will be based on economic effects, safety considerations, and effects on traditional recreational uses at the project site.

Effects on environmental justice populations will be based on short-term effects on the local economy from construction activity and, over the long term, on peoples' ability to engage in traditional activities at the site.

Effects on Tribal populations are analyzed and discussed in Issue 8 and Appendix A (specifically Issues A-4, A-5, A-6, and A-7) and are not discussed in this section.

Effects on ecosystem services, such as riparian and wetland areas and water resources, are addressed in sections dealing with biological issues.

Unless otherwise noted, data in this section come from reports generated by the Headwaters Economic profile system (https://headwaterseconomics.org/apps/economic-profile-system) (Headwaters 2022).

Summary of Analytical Methods

The geographic scale is Lane County, with an emphasis on local communities closer to Hult Pond Dam (Horton, Blachly, and the immediate area).

The short-term temporal scale for this analysis is the construction period for the action alternatives, which would be approximately 3 (Alternatives 2 or 4) or 4 (Alternative 3) years. The long-term temporal scale is the 10-year period following completion of dam work.

Economic effects are expressed qualitatively in terms of likely effects on jobs and income produced by the alternatives during construction, and on any anticipated changes in recreational use patterns as defined by the recreation analyses.

[76] Environmental justice populations are defined as racial or ethnic minorities and low-income or Tribal populations (USDI 2022). Lane County (especially the Middle Siuslaw River-Triangle Lake Census County Division) is considered to be an environmental justice population due to its proportion of low-income residents.

Quality-of-life effects are described qualitatively using the outputs of the other analyses (economics, recreation, safety, invasive plants, [77] firefighting) coupled with information received from the public during the stakeholder assessment, public meetings, and other public comments received.

Environmental justice effects are described qualitatively based on identification of affected environmental justice populations and comparisons of effects on those populations with effects on non-environmental justice populations.

For each of the three issues, anticipated effects are described qualitatively in narrative form. This is the most accurate form of analysis that can be done with the available data.

Affected Environment

Social and Economic Conditions

The project is located in Lane County, which is considered the socioeconomic planning area. The county's population in 2020 was 377,749, an increase of nearly 9 percent since 2010 and slightly less than the statewide population increase of 11 percent. The percentage of the county population that is white alone (86 percent) is greater than statewide (83 percent), and the county contains a lower percentage of Blacks, American Indians, and Asians than Oregon as a whole. The county also contains a lower percentage of residents who are Hispanic or Latino (9 percent) than does the State (13 percent). Lane County has a higher percentage of residents who graduated from high school, but a slightly lower percentage who have a bachelor's degree or higher level of education compared to Oregon overall. Lane County residents have a lower per capita income (about $31,000) than the average for Oregon residents (about $35,000) and a higher proportion of individuals living below the poverty level (17 percent) than the statewide percentage (12 percent).

The presence of minority and low-income populations is of special interest due to BLM environmental justice policy (USDI 2022), which calls for the fair and equitable treatment and involvement of all people, and avoidance of disproportionate adverse effects on low-income and minority populations. Based on BLM definitions of environmental justice populations, Lane County is considered to be an environmental justice population due to its proportion of low-income residents.

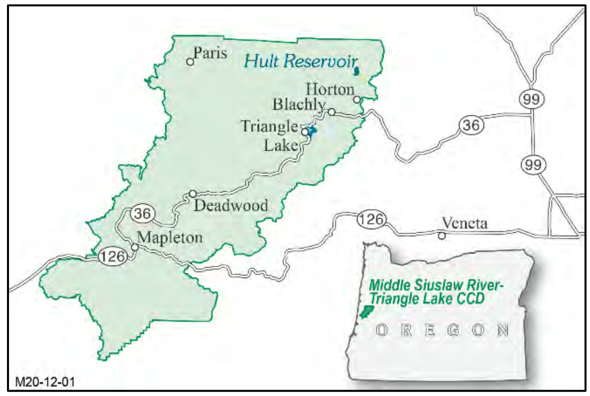
Lane County residents have occupation patterns similar to those statewide, with the highest proportion employed in management, professional, and related jobs, followed by sales and office, service industry, and production and transportation industries. As is the case with Oregon as a whole, Lane County household earnings come primarily from labor income (reported by 74 percent of households), followed by Social Security (reported by 36 percent of households), retirement income (23 percent), and Supplemental Nutrition Assistance Program (SNAP, formerly known as food stamps; an income source in 19 percent of county households). [78]

Of the nearly 3 million acres in the county, about 58 percent are Federal public lands. About 48 percent of the county is National Forests, compared to just under 10 percent Bureau of Land Management. In Fiscal Year 2019, Federal Government payments to Lane County totaled just over $20 million, of which 11 percent were payments-in-lieu-of-taxes, 42 percent were Forest Service payments, and 47 percent were BLM payments (a portion of

[77] Invasive plants are non-native aggressive plants with either the potential to cause significant damage to native ecosystems, cause significant economic losses, or both. A 2014 report prepared for the Oregon Department of Agriculture described the direct negative economic impacts associated with invasive plants in the State of Oregon, the additional costs associated if noxious weeds expand to new areas, and the positive return on investment associated with control (Research Group 2014). That study estimated annual losses of $83.5 million to the State's economy from 25 noxious weed species.
[78] Data from the U.S. Census Bureau American Community Survey (accessed January 6, 2022, at https://data.census.gov/all?q=Lane+County,+Oregon).

receipts generated on BLM-administered lands, including grazing fees collected under the *Taylor Grazing Act* and timber receipts generated on Oregon and California Railroad Revested (O&C) grant lands or payments to counties with O&C lands under the *Secure Rural Schools and Community Self-Determination Act*).

Figure 3-7. *Middle Siuslaw River-Triangle Lake Census County Division*



Lane County demographic information is relevant to provide a regional context for the project area, but perhaps a better local context is the Middle Siuslaw River-Triangle Lake Census County Division (CCD). [79] CCDs, or Census County Divisions, are a subdivision of counties used by the Census Bureau. CCDs are statistical entities established in conjunction with state and local governments to represent community areas focused on trading centers or major land use areas. This CCD, which covers 350 square miles, has a population of about 2,094 and includes Blachly, Triangle Lake, Horton, Deadwood, Paris, and Mapleton (see Figure 3-7). Compared to Lane County as a whole, residents are older (average of about 51 compared to 40 years of age) and have lower levels of education (17 percent have a bachelor's degree or higher level of education, compared to 32 percent countywide). A higher percentage of CCD residents are living in poverty (just over 18 percent). As would be expected of a more rural population, they have a much longer average commuting time than county residents (36 minutes compared to about 20). A higher percentage of the CCD residents are veterans, 12 percent, compared to the county rate of about 8.5 percent. In summary, the CCD residents are also an environmental justice population, more so than are county residents as a whole.

Residents' Attitudes and Values

Many comments received during the 2022 scoping period expressed social and economic concerns. Twenty comments discussed social impacts such as the reservoir's value to the community and families. Nine comments addressed economic impacts, especially loss of revenue for the Horton Market if fewer recreators visited the area. Six comments said the area provides opportunity for low-cost recreation. One hundred and four comments concerned recreation at the reservoir and impacts on recreation opportunities, including fishing, boating, swimming, and camping. While most of these comments focused on potential loss of recreation opportunities, some suggested adding hiking trails, picnic areas, swimming holes, and more camping infrastructure. Forty-nine comments addressed the reservoir as a water source for local fire suppression, citing its use as a helipond and pump chance. It is therefore not surprising that the majority of comments about potential actions on the dam favored alternatives that would either maintain the dam in its current state, repair or modify the dam, or remove the existing dam and construct a new dam.

Public meetings about this project have been held at the Blachly Grange (2018), at the dam (2018 and 2021) and at Triangle Lake School (2022 and 2023). In verbal and written comments, attendees asked questions about the safety of the dam, but voiced few concerns over the safety of the existing structure. They told the BLM that the reservoir behind Hult Pond Dam was a favored location for fishing, camping, hiking and other recreational activities, providing opportunities important to the local community. They supported increased management activities to reduce vandalism, unauthorized camping, campfires, drug use, excessive alcohol use, and trash.

Another source of information considered is the Stakeholder Assessment conducted for the BLM (Langdon Group 2017). The goal was to identify the spectrum of ideas and concerns held by members of the public with regard to

[79] Data on this CCD come from the U.S. Census Bureau American Community Survey (accessed January 6, 2022, at https://data.census.gov/all?q=Middle+Siuslaw+River-Triangle+Lake+CCD,+Lane+County,+Oregon). Map of CCD is from https://censusreporter.org/profiles/06000US4103991889-middle-siuslaw-river-triangle-lake-ccd-lane-county-or/.

the management of Hult Reservoir and the Lower Lake Creek fish ladders and determine the public's level of interest in participating in the EIS process. Sixteen people (primarily from the Triangle Lake community) were interviewed in person, including representation from Cascade Family Fly Fishers, Siuslaw Watershed Council, Triangle Lake School District, Horton Store, Lakeview Grocery, Keystone Ranch, and local property owners. They strongly supported continued recreational opportunities:

> Most stakeholders stated that they were interested in seeing continued public access to Hult Pond. Hult Pond was regularly described as a treasured asset to the community for a variety of reasons. It provides a peaceful, quiet place to fish and hike, as well as an option for camping and family picnics. Triangle Lake was often described as overrun by tourists in the summer. Motorized boats impact fishing. Thus, Hult Pond is the "secret" spot that locals go to. These stakeholders stated that they would not support an alternative that included dam removal.

Stakeholders also described how the loss of these opportunities would have negative economic effects. For example, if recreation use dropped, it could affect the Horton Store, one of the few places community members can go to buy groceries and gas locally.

A primary concern was the undesirable impacts of non-designated camping at the unofficial six to eight dispersed sites around the reservoir that people described as not being actively managed by the BLM. People described large groups that create safety concerns while camping, including uncontrolled campfires, use of drugs and firearms, and trash and human waste impacts. Effects on reduction to downstream water quantity and water rights, fish populations, and the ability to draw water from the reservoir to fight fires were also mentioned. The majority of stakeholders did not believe the dam at Hult Reservoir posed a threat to nearby homes or property because they believed there was not sufficient water to cause significant damage or a risk of flooding due to overflow.

Environmental Consequences

Direct and Indirect Effects

Alternative 1: No Action Alternative (Continue Current Management)

This alternative would continue existing management practices. As stated under Issue 2 (public safety), the potential for loss of life under Alt. 1.1 would range from 0 to 11 deaths, depending on whether people were recreating at the dam, warning times, and the population's understanding of the warning that they were receiving. Flooding would be expected to harm 1 to 10 structures and property damage would range from $270,000 to $6,480,000. Under Alternative 1.2, BLM assumes that the dam is breached to prevent dam failure, so no lives would be lost, nor any property damaged.

Effects on the local economy

There would be little effect on local business as long as the dam and reservoir remained. When the dam either fails or is drained, the BLM would have no approved plan to address what happens to the area afterwards. It would be at least several years after the failure/drainage before the BLM could take action. The BLM expects there would be negative effects on local businesses because recreation would likely be severely limited during this time. If the BLM rebuilt the dam after failure or emergency reservoir drainage (which would involve additional NEPA analysis), over time the effects would resemble those under Alternative 2. If the BLM did not rebuild the dam, the effects would eventually resemble those under Alternative 4.

Effects on local residents' quality of life

As described in Issue 4 (recreation at Hult Reservoir), decreases in the quality of water-dependent recreation (swimming, boating, and fishing) are expected for both sub-alternatives, because of the change of the waterbody from a reservoir to a creek after the dam fails or the reservoir is drained. Because proximity to a large waterbody is part of the appeal of the campsites, the quality of camping is also expected to decrease with loss of the reservoir. These are the opportunities most appreciated by area residents.

Issue 4 also suggests that local residents would not be likely to travel to pursue similar opportunities elsewhere. That analysis also notes that the alternative sites do not compare directly to Hult Reservoir, so even if residents were able to travel to those sites, the experience would be diminished. Finally, it is clear that many area residents have an attachment to Hult Reservoir based on years, and sometimes generations, of recreating there. For people having a strong sense of place regarding a particular area, substitute sites cannot provide the same experience, even if they can participate in the same activities there. Under Alternative 1, the BLM makes the assumption that within 8 years, the dam would fail or the reservoir would need to be drained to prevent imminent dam failure, and the absence of the reservoir would decrease the quality of life for many area residents.

Local fire departments would continue to use the reservoir to draft water for fire suppression equipment (fire engines, helicopters, etc.) until dam failure or reservoir drainage. Once that happened, the ability to use reservoir water would cease, perhaps suddenly. If alternative sources had not been identified, the ability to fight local fires could be impeded, posing risks to local residents and resources.

As described in Issue 12 (Invasive Plants), Alternative 1.1 has the highest risk rating for terrestrial invasive plant invasion and spread. [80] This could increase spread of invasive plants to neighboring private properties. Alternative 1.2 also has a high risk rating but is slightly lower because draining the reservoir could cause less disturbance than rapid flooding.

Effects on environmental justice populations

In the short term, there would be no adverse effects on environmental justice populations in the area. Over the long term, the decrease in quality of life due to loss of recreation opportunities described above would result in an adverse, disproportionate impact to environmental justice populations, particularly to residents of the Middle Siuslaw-Triangle Lake CCD.

Alternative 2: Remove the Existing Dam and Build a New Dam to Maintain Hult Reservoir

This alternative would remove the existing dam and construct a new dam with a low-level valve to help the reservoir self-regulate during high flows and a roughened channel (designed to allow fish passage) added to pass—at a minimum—a 500-year flood event in place of the existing spillway.

While a newly built dam would not be expected to fail, the same population would still be at risk, and a dam failure would have the same consequences as failure under Alternative 1. As described in Issue 2 (Public Safety), the potential for loss of life under Alternative 2, in the unlikely event of dam failure, would range from 0 to 11 deaths, depending on whether people were recreating at the dam, warning times, and the population's understanding of the warning that they were receiving. Flooding would be expected to harm 1 to 10 structures, and property damage would range from $270,000 to $6,480,000.

[80] Invasive plants are non-native aggressive plants with either the potential to cause significant damage to native ecosystems, cause significant economic losses, or both.

Effects on the local economy

In the short term, construction-related activities could provide a boost to local businesses and possible jobs for local residents. Over the long term, effects would be comparable to those under Alternative 1 prior to an anticipated dam failure or drainage of the reservoir, which is to say, similar to current conditions.

Effects on local residents' quality of life

As described in Issue 4 (recreation at Hult Reservoir), the BLM expects the quality of much water-dependent recreation (swimming, boating, but not fishing) at the reservoir to remain the same as at present, as is the quality of water-influenced recreation (camping, day use/picnicking, and wildlife watching), except for the periods of time when the new dam is being constructed and public access is restricted or the recreation opportunities are not available.

Local fire departments would continue to use the reservoir to draft water for fire suppression equipment (fire engines, helicopters, etc.). The risk of invasive plant spread for Alternative 2 is moderate because the reservoir would be drained during dam construction (see Issue 12). This would leave the reservoir footprint exposed and available for colonization by reed canarygrass and other priority invasive plants, which could possibly be transported downstream or along roads during and after dam construction.

Effects on environmental justice populations

Some local residents and businesses could benefit directly or indirectly from construction activities. There would be short-term effects on quality of life during the construction period, when access to the area may be restricted and recreation opportunities may temporarily be unavailable. Over the long term, most recreation opportunities at Hult Reservoir would remain, so there would be no adverse, disproportionate effects on environmental justice populations.

Alternative 3: Remove Hult Reservoir; Add Little Log Pond

This alternative would remove the dam and associated infrastructure but would create "Little Log Pond" to use for water-based recreation, restoring and maintaining a five-acre reservoir located downstream from the existing Hult Reservoir that was used for the mill from the mid-forties or fifties to the mid-seventies.

As stated under Issue 2 (public safety), in the unlikely event that Little Log Pond Dam were to fail, no loss of life would be expected, flooding would be expected to be low severity, and the floodplain would cover a smaller area. Flooding would harm zero to one structures and property damage would range from $0 to $180,000.

Effects on the local economy

In the short term, construction-related activities could provide a boost to local businesses and possible jobs for local residents. The presence of the smaller pond and improved facilities would be expected to attract recreation visitors, likely reducing some of the negative effects of Hult Reservoir's removal over the long term.

Effects on local residents' quality of life

As described in Issue 4 (recreation at Hult Reservoir), the BLM expects the quality of swimming to remain about the same, while the quality of fishing and boating would decrease. The quality of water-influenced recreation is expected to remain the same or increase due to the creation of Little Log Pond and new facilities that would be developed. The quality of non-water-influenced activities is expected to increase over time, primarily due to improvements in the trail system. However, as described in the impacts of Alternative 1, people who have a strong sense of place regarding Hult Reservoir may not consider Little Log Pond as an acceptable substitute. Not only would it be much smaller, but it simply would not be the same place. For those experiencing this loss, the ability to participate in the same activities, even with upgraded facilities, would not be a replacement.

The smaller pond could still be used by fire engines and water tenders and as a helicopter dip site for fighting fires, so this function would not be lost. The risk rating for spread of invasive plants under Alternative 3 is high because the reservoir would be drained, leaving the footprint exposed and available for colonization by reed canarygrass and other priority invasive plants. Construction of the smaller dam and Little Log Pond would provide additional opportunities for invasive plant introduction and spread (see Issue 12).

Effects on environmental justice populations

Some local residents and businesses could benefit directly or indirectly from construction activities. There would be short-term effects on quality of life as described above while Hult Reservoir was not available and before the smaller pond was operational. It is likely that fishing and boating are opportunities valued by local environmental justice populations who may not be able or willing to travel farther away for similar opportunities. In addition, they are likely to have an attachment to Hult Reservoir in its current state. So even though Little Log Pond would provide swimming and related activities with some enhancements, there would be a disproportionate adverse impact to environmental justice populations.

Alternative 4: Preferred Alternative (Remove Hult Reservoir)

This alternative would remove the dam. As stated under Issue 2 (public safety), there is no dam to fail, so there would be no lives lost nor any property damage caused by dam failure under this alternative.

Effects on the local economy

In the short term, demolition-related activities could provide a boost to local businesses and possible jobs for local residents, although the much smaller construction budget suggests that benefits would be lower than under the other alternatives. Over the long term, economic effects would depend on how many people are attracted to the new recreation opportunities along Lake Creek.

Potential recreation mitigation for this alternative includes a multiple-use trail system and mountain bike trail (see Issue 4). The economic effects are uncertain because the BLM has not analyzed local or regional demand for mountain biking or trail use, nor conducted a comparative analysis between the new opportunities here and other opportunities for those activities available within the local area and region.

Effects on local residents' quality of life

As described in Issue 4 (recreation at Hult Reservoir), the BLM expects the quality of water-based recreation to decrease markedly even with proposed recreation mitigation measures. The quality of boating on Lake Creek would be low due to the placement of hundreds of logs within and along the streambank. The quality of water-influenced recreation (i.e., camping, day use/picnicking, and wildlife watching) stays the same or increases—more so with proposed recreation mitigation measures that would increase (non-water-based) recreation in the area. The quality of non-water-influenced recreation increases over time, especially with proposed mitigation actions. Many area residents have an attachment to Hult Reservoir based on years, and sometimes generations, of recreating there. For people having a strong sense of place regarding a particular area, substitute sites cannot provide the same experience, even if they can participate in the same activities there. This alternative, which has no reservoir or pond and under which the type of recreation opportunities would differ greatly from those available today, would likely decrease the quality of life for those accustomed to recreating at the reservoir. Some may be attracted to the new setting, in which case the impacts would be lessened.

A pond or reservoir would not be available as a helicopter dip site for fighting fires but a draft site for fire engines off Lake Creek and an improved roadway would allow engines with limited maneuverability quick access in and out of the site. The risk rating for spread of invasive plants under Alternative 4 is high because the reservoir would be drained, leaving the footprint exposed and available for colonization by reed canarygrass and other priority invasive plants. Risk is slightly lower than under Alternative 3 because there would not be construction of the smaller dam and Little Log Pond (see Issue 12).

Effects on environmental justice populations

Over the long term, the decrease in quality of life described above results in a disproportionate adverse impact to environmental justice populations, particularly to residents of the Middle Siuslaw-Triangle Lake CCD. Issue 4 (recreation) suggests that local residents would not be likely to travel to pursue similar opportunities elsewhere. The adverse effect may be lower than under Alternative 1, which does not include any accompanying improvements in recreation infrastructure.

Potential Mitigation Measure for Alternative 4

The BLM expects the following mitigation would reduce adverse impacts to Hult Reservoir to environmental justice populations in the Middle Siuslaw Triangle Lake CCD:

- Explore the development of non-water-based recreational opportunities in or near the project area by working with the BLM Office of Collaborative Action and Dispute Resolution to conduct a follow-up to the 2017 *Upper Lake Creek Management Plan Update EIS Stakeholder Assessment* (Langdon Group 2017) to engage with the local public.

In its comments on the draft EIS, the Environmental Protection Agency and others recommended consulting with local residents and other populations affected by the removal of the reservoir to gather input on additional recreational opportunities that the BLM could provide in the area. While these opportunities would not replace those formerly available at the reservoir, they could provide opportunities for recreation desired by local low-income residents and others. The BLM would design the outreach process to identify desired local recreation opportunities, which could help offset the potential impacts the loss of reservoir-related opportunities could have on quality of life and the local economy. Any additional recreational mitigation would be dependent on funding available, but the BLM is committed to reducing environmental justice impacts to the extent possible.

Issue 8: How would the implementation of the alternatives affect archaeological or historic resources and values (including downstream of the dam)?

The BLM received comments during the January 2022 scoping period that asked about the historical value of the area and stated that the mill site constitutes a valuable part of Oregon logging history. Analysis of this issue is necessary to determine the significance of the impacts. This analysis assesses effects of all project alternatives to features of the Hult Lumber Company Mill and Dam site, as recorded in the edited and updated 2017 Determination of Eligibility.

The project area occurs within and throughout the boundaries of the previously recorded Hult Lumber Company Mill and Dam historic site. The BLM has determined the site is eligible for listing in the National Register of Historic Places (NRHP) under Criterion A (sites associated with events that have made a contribution to the broad patterns of our history) and potentially eligible under Criterion B (sites associated with the lives of persons significant in our past). The Oregon State Historic Preservation Office (SHPO) has concurred with the BLM's determination, in consultation with the Tribal Historic Preservation Officer of the Confederated Tribes of Coos, Lower Umpqua, and

Siuslaw Indians (CTCLUSI), that the site is eligible for listing in the NRHP under the previously mentioned criteria. After the 2018 *Western Oregon Tribal Fairness Act* was signed into law, land around the reservoir, including a portion of the mill site, was transferred into trust for the benefit of CTCLUSI and is now under Tribal management.

Of the site's 43 individual features (see Table 3-14 below), some have been determined to contribute to the larger site's eligibility while others do not. Under Section 106 of the *National Historic Preservation Act*, effects of project actions to contributing and unevaluated features of an NRHP-eligible site must be considered and if found to be adverse, mitigated. However, there can be *no effect* to non-contributing features from implementation of any of the action alternatives. This does not mean there are no effects at all to non-contributing features under the *National Environmental Policy Act* (NEPA). As such, effects to these features are considered and assessed in the *Environmental Consequences* section alongside effects to contributing features. The Determination of Eligibility for the site, originally completed in 2017 but not submitted due to a project hiatus, was edited, updated, and submitted to SHPO for concurrence in consultation with CTCLUSI.

In addition to the above-ground historic mill and dam resources, there remains the possibility of unknown, buried historic and pre-contact archaeological deposits to be present beneath the surface. Records indicate one previous survey within the area to date, which was conducted as part of the 2017 documentation and determination of eligibility of the historic mill and dam site mentioned above. However, this inventory does not constitute formal archaeological survey, as no Section 106 inventory report describing that specific effort was ever produced. The survey focused solely on the mill and dam areas and did not cover ground adjacent to the reservoir; it also could not have included the reservoir footprint, as the reservoir was full of water at the time of the survey. Such deposits could be damaged or destroyed during implementation of the action alternatives, and so the risks to these resources are also assessed under this issue.

Analytical Process

Assumptions

- The *National Historic Preservation Act* and BLM's protocol agreement (USDI and Oregon SHPO 2015) with the Oregon State Historic Preservation Office (SHPO) provide guidance and direction for Federal agencies to preserve and protect cultural resources. The BLM will complete the proposed project in compliance with these directives.
- BLM archaeologists have surveyed the BLM-administered lands within the project area and have identified and recorded all sites on the surface. This survey used the GIS-based Northwest Oregon District 2020 Archaeological Probability Model, as would any future surveys.
- Unknown buried archaeological sites would be impacted by digging and potentially blasting in the dam and reservoir areas and by other ground-disturbing actions in the north and south mill areas.
- Cultural resources are unevenly distributed throughout the project area. Certain types of cultural resources, such as pre-contact sites, are generally associated with discrete landforms, favorable aspects, and access to water. Other types, such as historic sites, generally occur across the landscape with less patterning, and it is more difficult for archaeologists to predict where they will find unrecorded historic sites.
- Cultural site density and probability for encountering new sites varies by physiographic[81] region. In general, the BLM and archaeologists consider the Coast Range, where the project is located, to have low probability for identifying new, unrecorded cultural resources.
- The potential to affect cultural resources increases as the total number of acres of project activity increases.

[81] Physiography divides land into large regions based on their geological characteristics.

- Although the type and level of surface and sub-surface disturbance of the project alternatives are defined, in some cases the locations of some actions are not. Therefore, the range of effects to specific, known site features are difficult to predict and as such must be generalized.
- The following are expected to have the potential to adversely affect known historic resources and values of the Hult Lumber Company Mill and Dam Site:
    - Replacement or removal of the existing dam and associated surviving historic features
    - Proposed recreational project design features within the north and south mill portions of the site
- Actions cited above are also expected to have the potential to adversely affect unknown and unevaluated buried archaeological deposits and sites, as are the following:
    - Restoration within the former reservoir footprint (the Hult Reservoir Restoration Area)
    - Invasive plant treatments (e.g., digging) in the project area
    - Blasting and digging with heavy equipment
    - Flooding, whether due to dam failure or large storm event
- Unknown archaeological sites or artifacts may be buried within the footprint of the reservoir; alternatives that kept a reservoir would not be expected to affect these sites or artifacts. Data and records do not indicate heavy pre-contact use of the immediate area, so any future finds near the surface would be expected to be historic and/or associated with the Hult Lumber Company Mill and Dam site. Pre-contact sites and artifacts, if present, would be expected to be buried much deeper, beneath the layer of reservoir sediment that has been accruing since construction of the reservoir was completed in the 1930s or 1940s.
- As described in Appendix D, archaeologists would monitor the site during project implementation. An inadvertent discovery plan will protect unknown cultural sites that may be found during project implementation.

Summary of Analytical Methods

Geographic scale: For cultural resources, the geographic scope is the same as the “area of potential effect” (APE). An APE is generally defined as encompassing any areas where project actions have the potential to impact cultural resources directly or indirectly.

Here, the cultural geographic scope and APE is the Hult Reservoir, any areas at the periphery and upstream of the reservoir that might involve project activities, the dam and spillway area, and areas along Lake Creek downstream of the dam and spillway past the south-southwestern boundary of the Hult Lumber Company Mill and Dam site, and from there, 13.4 river miles down to Triangle Lake. The geographic scope and APE attempts to capture the anticipated extent of discernible flooding effects below the dam, and the potential risks of flood damage to unknown and unevaluated cultural sites both related and unrelated to the Hult Mill and Dam site. However, the extent of such damage to specific sites not on BLM lands cannot be quantified, as the presence of these resources is unknown. Nearly all the property downstream of the Hult Mill and Dam site is privately held or on CTCLUSI lands, and no BLM actions related to the alternatives of this EIS are proposed on these other lands. As a result, no cultural resource surveys would take place to confirm or deny the presence of cultural sites. A portion of the site occupies CTCLUSI lands, but that area is still included in the cultural APE even though the BLM is not proposing any actions on Tribal lands.

Temporal scale: Temporal scale for direct effects to the historic mill and dam site are relatively limited as they would be immediately mitigated. The same is true for any unknown, unevaluated buried archaeological sites or artifacts that any survey might uncover. The temporal scale for indirect effects to the Hult Mill and Dam site and any unknown, unevaluated archaeological sites could be much longer. For example, recreational opportunities that are to be developed under the action alternatives within the north and south mill areas of the historic site would attract more people to those immediate areas, thereby increasing the potential for increased degradation, vandalism, and looting of historic features and artifacts. In addition, reservoir restoration project design features that include instream structure placement and tree planting as well as tributaries rejoining Lake Creek over the reservoir floor, would result in the feature “melting” back into the landscape over time. Eventually, it would be expected the reservoir footprint would become virtually indistinguishable from the rest of the surrounding, natural landscape. However, it is also possible the condition of the site may become degraded enough from initial direct effects that these types of longer-term impacts would no longer be capable of adversely affecting the site.

Impact indicators: This analysis assesses the degree to which features of the historic mill and dam site would be impacted under the alternatives. Impact indicators used to assess the potential for loss of or damage to specific historic mill and dam site features varied between the No Action Alternative and action alternatives, as summarized in Table 3-13.

- **Impact indicators for No Action Alternatives 1.1 and 1.2:** For No Action Alternatives 1.1 and 1.2, the potential for loss or damage to specific historic mill and dam site features was measured by their proximity to the projected maximum footprint of flooding resulting from a single, standalone dam failure event (i.e., not as a result of flooding from excessive rainfall). Features that have a high degree of certainty for total destruction under such a scenario receive a "loss of historic feature" designation. Features located within the flood footprint or on its outer boundary were classified as having a high potential for loss or damage. Features positioned outside of the boundary but on the same landform as those falling within the boundary received a moderate designation. Features located well outside the flood footprint boundary at higher elevations and on different landforms from high and moderate potential features were classified as having a low potential for loss or damage. Features for which no physical evidence remains on the ground were designated as having no potential for loss or damage. No Action Alternative 1.2 utilized the same impact indicators in order to highlight the difference between the two No Action sub-alternatives.

- **Impact indicators for action alternatives (Alternatives 2, 3, and 4):** Impact indicator definitions, while different from the those of the No Action alternatives, are the same among all the action alternatives. For these alternatives, the loss of historic feature classification represents those historic site features where total loss is virtually assured as a result of activities under a given action alternative. Those features that are the primary subject and focus of action alternatives, that are expected to be directly impacted, but where total loss may be less assured, are classified as having a high potential for damage or loss. This classification was also assigned to site features in situations where specific locations of certain ground-disturbing project actions are undetermined but known in general, as is the case with proposed recreational sites under the action alternatives. Features are designated as having a moderate potential for damage or loss where they are not directly targeted but are in close proximity to those that are and so may be inadvertently impacted. Features classified as having a low potential for damage or loss are far removed from action alternative activities, not directly targeted, and not located in the vicinity of moderate, high, and total loss features. Finally, those features for which there is no evidence present on the ground are classified as having no potential for loss or damage. Table 3-13 summarizes the different effect categories and impact indicators.

For any sites not yet identified with buried archaeological components, the impact indicator is generally the potential for ground disturbance within the geographic scope. Effects of alternatives on such sites had to be assessed in general terms because they are difficult to meaningfully quantify for sites and deposits whose location, type, depth, and subsurface distribution are unknown. For these reasons, unknown buried archaeological sites do not appear in Tables 3-13 and 3-14 below but are discussed in the narrative portion of the *Environmental Consequences* section.

Table 3-13. *Effect Categories and Impact Indicators, by Alternative, for Features of the Hult Lumber Company Mill and Dam Site*

Potential of loss or damage	***Impact indicator by alternative group***	
	Alt. 1.1: Dam Failure **Alt. 1.2: Drain Reservoir**	**Alt. 2: Build a New Dam** **Alt. 3: Add Little Log Pond** **Alt. 4: Remove Hult Reservoir**
Loss of historic feature	Feature lost by catastrophic dam failure	Feature directly targeted by action alternative activities where loss is assured
High	Feature occurs within projected inundation footprint resulting from catastrophic dam failure	Feature directly targeted by action alternative activities that would be impacted but where loss is not assured. Includes features that may not be directly targeted, but that have a high probability of being impacted should specific actions take place at their location (e.g., recreational project design features in the north and south mill areas).
Moderate	Feature positioned outside projected inundation footprint but on same landform as high potential features	Feature not directly targeted by action alternative activities, located in close proximity to those that are
Low	Feature located outside projected inundation footprint at higher elevations and on different landforms from high and moderate potential features	Feature not directly targeted and far removed from alternative actions, and not located in the vicinity of moderate, high potential, and loss features
None	No physical evidence of feature, so there can be no potential for damage or loss	No physical evidence of feature exists, so there can be no potential for damage or loss

Affected Environment

The Hult Lumber Company Mill and Dam site comprises three areas: the dam and log reservoir area, the north mill area, and the south mill area. The dam, spillway, and log reservoir features remain intact. All of the historic mill site's structures, both in the dam and mill areas, have been removed, and no physical evidence exists for many of their associated foundations. With the exception of the office building, aerial photos indicate that removal of all buildings and facilities associated with the mill and veneer plant had occurred by 1976, well before BLM ownership of the site. These features are referenced here with numbers assigned to them for identification in the NRHP Determination of Eligibility.

Ongoing natural degradation and weathering of foundation features that remain, and of any associated historic artifacts, are expected to continue regardless of which alternative is selected. Dispersed camping within the north and south mill areas likely contributes to some of the surviving features' degradation. Some vandalism (garbage dumping, graffiti) has occurred at the site and is ongoing.

Modern improvements such as the upstream gate/walkway/trash-rack inlet (feature 25) and fish ladder (feature 28) in the dam and log reservoir area, and a horse corral, bathroom, and picnic area in the south mill area have been installed within the site's boundary. Of these non-historic improvements, the bridge (feature 33), gate/walkway/trash-rack inlet, and fish ladder were the only ones to be assigned feature numbers in the NRHP Determination of Eligibility of the historic mill and dam site. While this feature numbering schema has been retained and utilized here, none of the modern improvements, including the three assigned feature numbers, are considered in the analysis. Hence, while the total number of features shown in Table 3-14 below is 43 (including the unnumbered horse corral), only effects to the 39 historic features are considered.

The status of any buried, previously unknown archaeological sites is undetermined as they haven't been discovered yet.

Table 3-14. *Features of the Hult Lumber Company Mill and Dam Site*

Feature	*Feature number(s)*
North Mill Area	
Maintenance buildings (demolished, no foundations for 2, 3, 5)	1–5
Concrete pad	35
Concrete wall	41
Shed	42
South Mill Area	
Veneer plant (demolished)	6–8
Boiler (demolished, no foundation or buried)	9
Sawmill (demolished, no foundations or buried)	10–13
Horse corral (BLM-constructed) *	
Elevated conveyor system (demolished, completely removed)	14
Covered green chain building (demolished, no foundation, possible northwest wall present)	15
Unidentified building (demolished, no foundation)	16
Office (demolished)	17
Beehive burner concrete pad and crumpled metal (demolished)	18
Hilltop reservoir	19
Log Pond	20
Concrete structure	36
Concrete pad	37
Concrete structure	38
Concrete structure	39
Concrete wall	40
Dam and Log Reservoir Area	
Unidentified buildings (demolished, no foundations)	21–23
Debris barrier	24
Upstream gate/walkway/trash-racked inlet structure *	25
Dam	26
Dike	27
Fish ladder*	28
Spillway weir	29
Concrete platform	30
Concrete wall	31
Hult Log Storage Reservoir	32
Bridge*	33
Spillway	34

*Not historic

Environmental Consequences

Direct and Indirect Effects[82]

Alternative 1: No Action (Continue Current Management)

Alternative 1.1 (Dam Failure): Direct Effects

Under this sub-alternative of the No Action Alternative, the dam would continue to age well beyond its originally intended useful life, and the potential for failure would increase over time as a result. If the dam fails, the dam

[82] As described in the introduction to Chapter 3, some issues analyze only direct and indirect effects because there are no other foreseeable actions that would contribute to cumulative effects for that issue.

itself would be lost or badly damaged, and downstream features of the north and south mill portions of the site would be impacted by flooding due to the sudden, uncontrolled release of water. In a dam failure scenario, 14 historic mill and dam site features are in the high potential category for loss or damage, 9 features have moderate potential, and 1 has low potential.

Fourteen site features have no potential for loss or damage, as no evidence of them exists on the landscape. As stated, one feature, the dam itself, would be lost entirely or at the very least severely damaged and as such is classified as a loss. The log storage reservoir would be a partial loss as a result of being emptied (not its normal historic condition) and is also given a high potential for loss or damage designation. Finally, dam failure would likely result in direct effects to unknown archaeological sites in the form of displacement and truncation of buried cultural deposits, depending on the proximity of such sites to the maximum flood footprint.

Alternative 1.2 (Drain Reservoir): Direct Effects

Under this sub-alternative, direct effects to historic mill and dam features are diminished, as water would not be released catastrophically in one event as in Alternative 1.1, but rather in a slow and controlled manner. Under such a scenario, all but one of the features having a high or moderate potential for loss and damage shift to low potential. The only effects remaining the same are to those features already designated as low potential; nonexistent, no-potential features; and the high potential log storage reservoir, which would still be drained and therefore suffer partial loss of its normal historic state due to being emptied.

Alternatives 1.1 and 1.2 Indirect Effects

Depending on the depth and proximity of unknown buried archaeological deposits to Lake Creek, dam failure (Alternative 1.1) or a flood event could erode and truncate subsurface cultural deposits in the short term as stated above, and also expose them to increased weathering and erosion over time. Indirect effects of draining the reservoir (Alternative 1.2) include increased potential for off-highway vehicle damage to the reservoir footprint and margins. Finally, particularly in the case of Alternative 1.2, continued degradation/vandalism of surviving features in the historic mill areas of the site may occur due to ongoing dispersed camping.

Alternative 2: Remove the Existing Dam and Build a New Dam to Maintain Hult Reservoir

Alternative 2 involves the removal and replacement of the current historic dam and construction of a roughened channel and bridge. Effects to the features of the historic mill and dam site are expected to be the greatest in the dam and reservoir area of the site. Specifically, the dam (feature 26), dike (feature 27), spillway weir (feature 29), and spillway (feature 34) would all be subject to total loss, whether via direct removal or during subsequent construction activities, which would use bulldozers and heavy equipment and may include blasting.

Given their proximity to the dam, roughened channel, and bridge construction activities, the debris barrier (feature 24) and the log storage reservoir (feature 32) have a high potential for loss or damage. The debris barrier would be at risk from the use of bulldozers, heavy equipment, and potential blasting, and the reservoir from the construction of a new drop intake structure, which would represent a modification to the historic feature.

The concrete platform and wall features (30 and 31, respectively) have a moderate potential for loss or damage, as they are the features farthest removed from activities within the dam and reservoir area of the site.

No evidence of features 21–23 remain within this area, and therefore there can be no potential for loss or damage. None of the features located on Tribal lands in the south mill area of the site (features 14–19, 36) have the potential to be lost or damaged, as no actions are proposed on Tribal lands under any alternatives. All remaining known historic site features on BLM lands within the two mill areas have either low potential for loss or damage, or no potential if they are no longer present on the landscape.

Any unknown, sub-surface archaeological deposits, whether they are related to the historic mill and dam or pre-contact in origin, that are located in the immediate vicinity of ground-disturbing activities have the potential for loss or damage.

While replacing the existing dam may reduce the risk of catastrophic failure, the new dam would still have little to no flood-control ability. Should the dam be overtopped by a large storm event that results in downstream flooding, indirect effects could be similar to the direct and indirect effects discussed for Alternative 1.1, wherein surviving historic surface features and artifacts as well as potential subsurface historic and pre-contact cultural deposits could be eroded and damaged in the short term and be subject to increased weathering and erosion over time.

An indirect effect of Alternative 2 stems from the exposed footprint of the drained reservoir, which could result in damage to unknown buried cultural deposits via recreational off-highway vehicle when the reservoir is drained. However, while this scenario remains a possibility, the likelihood of actual damage to sub-surface cultural strata, if they are present, is considered minimal given the depth of sedimentation known to be present within the reservoir.

Alternative 3: Remove Hult Reservoir; Add Little Log Pond

Alternative 3 involves the decommissioning of the historic dam, draining of the log storage reservoir, and the return of Lake Creek to its naturelike stream channel. Dam material would be used to fill in the spillway, and a new bridge over Lake Creek would be constructed. Implementation of Alternative 3 would result in the loss of the historic dam (feature 26), dike (feature 27), spillway weir (feature 29), log storage reservoir (feature 32), and spillway (feature 34). There is high potential for the loss of the debris barrier (feature 24) due to its close proximity to the dam, spillway, and bridge locations, all of which would be removed or highly modified with the use of bulldozers and other heavy equipment. The nearby concrete platform (feature 30) and wall (feature 31) have a moderate potential for loss or damage, as they are a bit more removed from the construction activities centered on the dam area under Alternative 3. No evidence of features 21–23 remain within the dam and reservoir area, and therefore there can be no potential for loss or damage. As with Alternative 2, under Alternative 3 there is the potential for unknown buried archaeological deposits, both historic and pre-contact, to be impacted by construction activities at the dam, spillway, and bridge area, as well as by restoration activities proposed within the Hult Reservoir Restoration Area.

This alternative also includes the aforementioned recreation sites comprised of developments within the north and south mill areas of the historic site, including restoration of the historic Little Log Pond (feature 20), and construction of a small dam, roughened channel, trail, and developed campsites and day-use areas. Depending on the specific locations of these proposals, there is high potential for loss and/or damage to features 1, 4, 6–8, 20, 35, and 37–42 of the north and south mill areas of the historic site. No evidence of features 2, 3, 5, 9–14, 16, and 17 have been found on-site, and therefore there can be no potential for loss or damage to these features. Further, surviving features fully located on CTCLUSI lands have no potential to be lost or damaged, as no actions are proposed on Tribal lands under any alternative. Surviving south mill features located on both CTCLUSI and BLM lands have been designated as having a low potential for loss or damage, as opposed to none, because of possible impacts from some of the aforementioned recreation sites on the BLM-owned portions of those features. As with the dam and reservoir area of the site, these activities have the potential to also disturb or damage unknown buried historic and pre-contact archaeological deposits.

Because more of the public would be steered to recreating within the north mill and BLM-owned portions of the southern mill area, there may be increased chance of vandalism to remaining visible features and looting of artifacts over time. Also, again depending on the locations of the specific proposals, if site features are incorporated into the recreation plan (e.g., a foundation is repurposed as a designated campsite), that feature would likely see increased wear and tear over the long term whether it be through use or ongoing maintenance. Similar to Alternative 2, an indirect effect of exposing the footprint of the drained reservoir could be damage to unknown buried cultural deposits from recreational off-highway vehicle use that might occur when the reservoir is initially drained. Again, while this scenario remains a possibility, the likelihood of actual damage to sub-surface cultural strata is likely minimal given the depth of sedimentation known to be present within the reservoir. A final, long-term indirect effect of permanently draining and restoring the log storage reservoir (feature 32) would be the eventual loss of the entire feature as it slowly "melts" back into the landscape over time.

Alternative 4: Preferred Alternative (Remove Hult Reservoir)

Alternative 4 is identical to Alternative 3 in terms of decommissioning the historic dam, draining the reservoir, and returning Lake Creek back to a naturelike stream channel. Therefore, direct effects to the historic mill and dam site features, as well as potentially unknown buried historic and pre-contact archaeological deposits, are identical in the dam and reservoir area to what is described above for Alternative 3.

Alternative 4 differs from 3 in its proposed recreational sites within the north and south mill areas of the historic site. Specifically, they are reduced in scope to the development of a camp host site, group camping site, and day-use area only. While direct effects to north and south mill area features of the site can be expected to be less due to the reduced number of actions, the risk of damaging or losing specific features is nonetheless similar to Alternative 3, as the final location of the sites are undetermined. Depending on the specific locations of the recreational sites that are included under this alternative, there remains a high potential for loss and/or damage to features 1, 4, 6–8, 20, 35, and 37–42. Potential impacts to other features and unknown buried historic and pre-contact archaeological deposits are the same as under Alternative 3.

Indirect effects would be similar to those under Alternative 2 and Alternative 3. Despite the reduction of recreational project design features in the north mill and BLM-owned portion of the south mill areas under this alternative, the public would still be steered to recreating within those areas, and therefore there may be an increased chance of vandalism to remaining features and looting of artifacts over time.

Summary of the Impacts of the Alternatives

Under Alternative 1.1, 14 features have been classified as having a high potential for damage or loss. Only one feature, the dam (feature 26), would be a total loss under 1.1, and this is the second lowest number in this category of all EIS alternatives, after Alternative 1.2. Alternative 1.2 is the least impactful of all EIS alternatives, with 61.5 percent of site features having a low potential for damage or loss, no features at risk of total loss, and only one having a high potential for damage or loss.

Alternative 2 is the overall least impactful action alternative, with 39 percent of historic mill and dam features having a low potential for damage or loss and only 5 percent of features at high risk for damage or loss. Analysis suggests there is no marked difference in effect category frequencies to features between Alternatives 3 and 4. However, this has more to do with the fact that the locations of recreational sites are undetermined than actual effects on the ground. If locations were known, it would be expected Alternative 4 would be less impactful because there are fewer recreational sites proposed under that action alternative. However, since their exact locations are not known, the potential for damage to and loss of historic features was assessed the same way between the two alternatives. In other words, they were quantified as though the recreational sites could occur anywhere within the areas they are planned (north and south mill areas). Such an approach results in identical effect frequencies, but the reality on the ground would not be the same, and lesser impacts are likely under Alternative 4. Table 3-15 summarizes the frequencies of feature effect categories under each of the alternatives.

Table 3-15. *Quantification of Effect Categories for Historic Hult Lumber Company Mill and Dam Site Features, by Alternative*

Effect category	*Alt. 1: No Action Alternative*		*Alt. 2: Build a New Dam*	*Alt. 3: Add Little Log Pond*	*Alt. 4: Remove Hult Reservoir*
	Alt. 1.1 Dam Failure	*Alt. 1.2 Drain Reservoir*			
Number of lost historic features	1 (2.5%)	0	4 (10%)	5 (13%)	5 (13%)
Number of features with high potential for damage or loss	14 (36%)	1 (2.5%)	2 (5%)	14 (36%)	14 (36%)
Number of features with moderate potential for damage or loss	9 (23%)	0	2 (5%)	2 (5%)	2 (5%)
Number of features with low potential for damage or loss	1 (2.5%)	24 (61.5%)	15 (39%)	2 (5%)	2 (5%)
Number of features with no potential for damage or loss	14 (36%)	14 (36%)	16 (41%)	16 (41%)	16 (41%)

Issue 9: How would implementation of the alternatives affect riparian areas, wetlands, and lentic systems?

The BLM received public comments during the January 2022 scoping period and May 2022 public comment period on draft Chapters 1 and 2 expressing concern about impacts to riparian areas and wetlands in the project area. In addition, the BLM received comments from the U.S. Army Corp of Engineers, Oregon Department of State Lands, and the Environmental Protection Agency regarding the necessity of fully understanding the effects to Waters of the United States, including riparian areas, wetlands, and lentic (standing freshwater) systems, and quantifying the changes to each.

As described in Chapter 1's *Conformance with Laws, Land Use Plan, and Other Decisions* section, Section 404 of the *Clean Water Act* regulates disturbance and management of Waters of the United States. In order to implement the action alternatives, the BLM will need *Clean Water Act* permits from the U.S. Army Corps of Engineers, Environmental Protection Agency, Oregon Department of State Lands, and Oregon Department of Environmental Quality. Similarly, discharge of dredged or fill materials affecting wetlands requires compensatory mitigation to restore, establish, enhance, or preserve wetlands (i.e., a National policy goal of "no net loss").

Analysis of this issue is necessary to determine the significance of the impacts.

Analytical Process

Assumptions

Wetlands are defined in 33 CFR 328.3(c)(1) as "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and other similar areas."

As described by the U.S. Army Corps of Engineers in the 1987 Wetlands Delineation Manual (Environmental Laboratory 1987:9–10), wetlands have the following general diagnostic environmental characteristics:

(1) Vegetation. The prevalent vegetation consists of macrophytes that are typically adapted to areas having hydrologic and soil conditions described [in the general definition] above. Hydrophytic species, due to morphological, physiological, and/or reproductive adaptation(s), have the ability to grow, effectively compete, reproduce, and/or persist in anaerobic soil conditions.

(2) Soil. Soils are present and have been classified as hydric, or they possess characteristics that are associated with reducing soil conditions.
(3) Hydrology. The area is inundated either permanently or periodically at mean water depths ≤ 6.6 ft, [83] or the soil is saturated to the surface at some time during the growing season of the prevalent vegetation.

The U.S. Army Corp of Engineers goes on to state the following:

> "Explicit in the definition is the consideration of three environmental parameters: hydrology, soil, and vegetation. Positive wetland indicators of all three parameters are normally present in wetlands. The interaction of hydrology, vegetation, and soil results in the development of characteristics unique to wetlands." (Environmental Laboratory 1987:6)

For mapping and delineation purposes, this analysis describes waterbodies, wetlands, and upland ecosystems by the presence and period of inundation:

- If a site is inundated with standing water of any depth, it is mapped as a waterbody. (Note that some of these areas are also mapped as wetlands.)
- If a site does not exhibit wetland characteristics (i.e., soil, botany, and water attributes) and is not inundated with water, it is mapped as an upland
- If the site is located in a transition between the two zones and exhibits wetland characteristics, it is mapped as a wetland. Wetlands may be inundated with standing water for parts of the year and dry for others, but always have the requisite wetland characteristics (i.e., soil, botany, and water). In addition, areas inundated to standing water depths of less than 6.6 feet deep that contain aquatic vegetation that is not submerged are marked as a wetland (in addition to being mapped as a waterbody).

Summary of Analytical Methods

Geographic scale:

The geographic scope of analysis is approximately bounded by the 15-7-35.0 Road to the west, the 15-7-23.1 Road to the north, the 15-7-26.4 Road to the east, and property boundaries to the south (133.1 acres). Although these boundaries may seem arbitrary, they effectively encapsulate all of the project area wetlands that could potentially be affected by the various alternatives. Although wetlands do occur beyond these boundaries in the project area, they would be unaffected by management of Hult Pond Dam and Reservoir. Canopy cover, shade, stream manipulation and evolution, aquatic/wetland mitigation, wetland plant communities, wetland soils, stream sinuosity, and stream form and function will all be contained within these boundaries; therefore, alteration to wetlands outside these boundaries is not expected.

Temporal scale:

Wetlands take time to dry up, as would be seen in a dam failure or removal operation. Similarly, wetlands take time to develop, as seen in restoration activities. Therefore, the change in wetland acres and riparian and lentic areas would be observed and noted over a period of 40 years.

Short-term: 0 to 1 years. Analysis and effects will focus on wetland loss, specifically in the areas of Lake Creek and tributary inflows where alluvial fans exist. In some of these areas, water could be immediately lost, and vegetation would begin to die. During the first winter, there would be headcutting and erosion, but water would keep these wetland sites hydrated. The wetland loss or gain would not be apparent and permanent until the following summer.

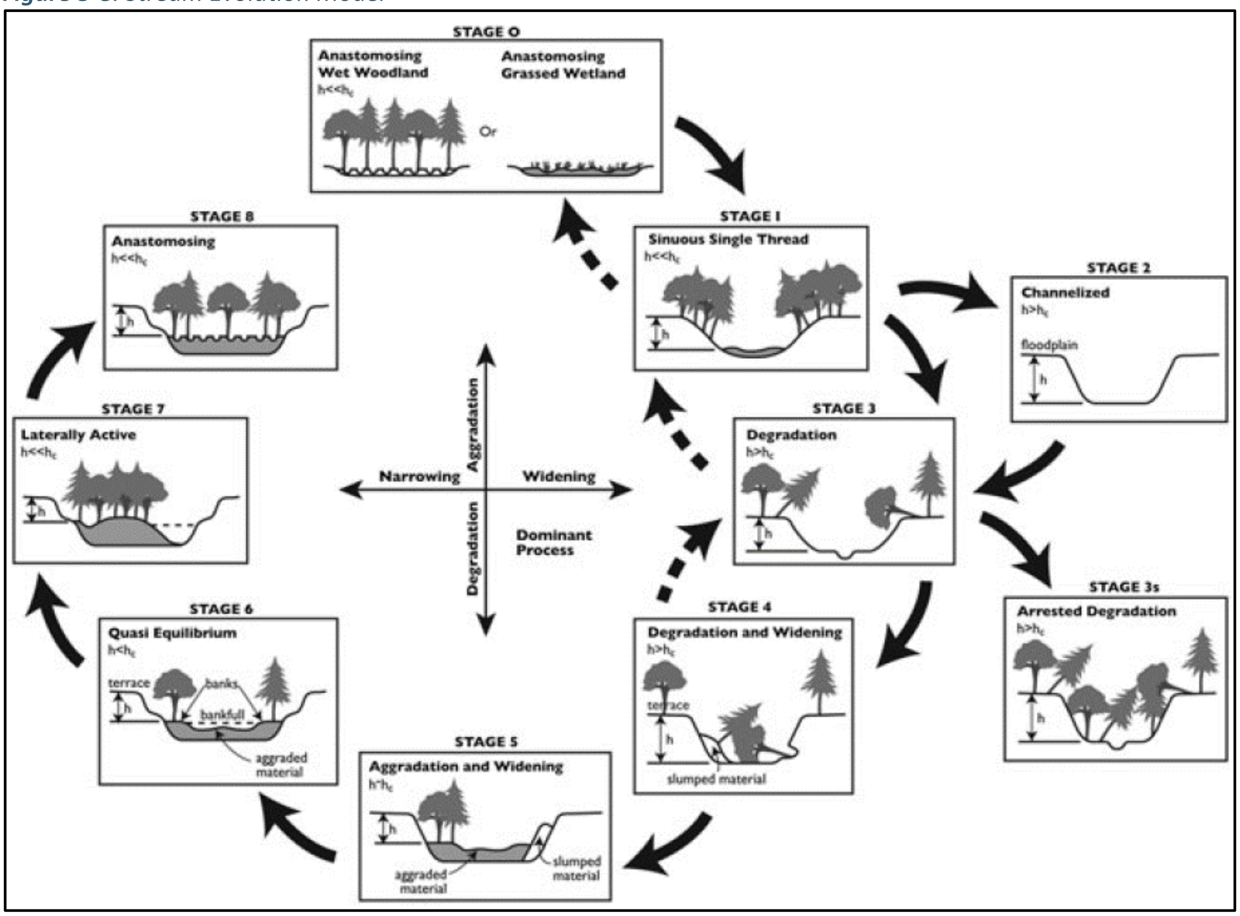
[83] Areas with ≤ 6.6 ft mean annual depth that support only submergent aquatic plants are vegetated shallows, not wetlands (Environmental Laboratory 1987:10). Vegetated shallows are considered to be open waters (USACE 2023).

Long-term: 1 to 40 years. Analysis and effects will focus on wetland creation, specifically within the Hult Reservoir Restoration Area. Although the sites would be inundated with water during the first winter, obligate wetland vegetation would take up to 2 years to establish itself. Wetland soils would begin to form quickly but take decades to develop depending on duration of inundation.

Affected Environment

Hult Pond Dam has been in place for many decades, during which disturbance (flooding and debris flows) led to the creation of most of the wetlands at the northern end of Hult Reservoir. This wetland area has been stable since early 1965. During the 1964 flood, approximately 60 acres of valley bottom flooded behind Hult Pond Dam, including an unknown area of wetlands, reshaping the aquatic resources of the area, especially Lake, Willow, and Sandy Creeks (see Figure 2-1 in Chapter 2 for stream names). This flood reset stream evolution in the valley and set in motion the gradual development of stream channels, riparian areas, and wetlands.

Figure 3-8. *Stream Evolution Model*[1]



1. Note that stream and/or riparian disturbance can either advance or reset the model (Cluer and Thorne 2014).

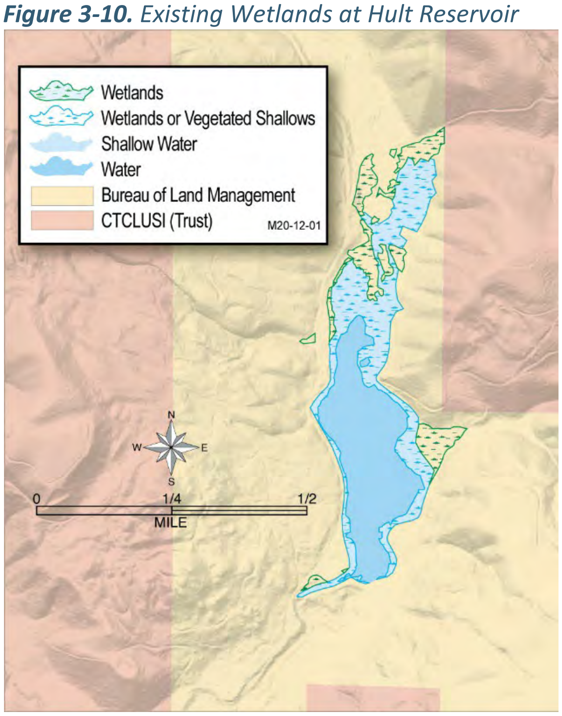
Figure 3-8 shows the conceptual model of stream evolution. The evolution of each stream advances according to different stimuli and on different time scales. Willow Creek prior to Hult Pond Dam, for example, likely resembled a stream in Stage 6 or "quasi equilibrium." The construction of Hult Pond Dam likely didn't affect it much, except for the inundated reaches. Subsequent logging, however, which occurred in the riparian areas and uplands, would have advanced Willow Creek to Stage 7 (laterally active) as logging slash was deposited in the stream, heavy equipment traversed it, and the stream tried to adjust. The 1964 flood accelerated stream evolution in Willow Creek past Stage 8 (anastomosing, i.e., interconnected channels) and reset evolution to Stage 0 (anastomosing, grassed wetland). In the subsequent decades, Lake, Willow, and Sandy Creeks have all stabilized and progressed back to Stage 6. The stream evolution model depicted in Figure 3-8 sets the stage for a future discussion of the project site's wetlands, riparian areas, and lentic areas.

Wetlands

Figure 3-9*. A Wetland Located on the Fringe of Hult Reservoir*

All wetlands in the project analysis area have formed because of impounded water from a dam, interrupted flow paths from roads, and/or debris flows from the 1964 flood. Some wetlands exist in a fringe around the edge of Hult Reservoir because Hult Reservoir maintains a nearly consistent water elevation. With near-constant inundation and little seasonal fluctuation, these fringe areas have become valuable wetlands simply by being immediately adjacent to a body of water (see Figure 3-9: note the presence of hydrology, inundated soils, and obligate wetland vegetation—the three basic requirements of a wetland). On the other hand, the dam that forms a rough outline of Little Log Pond creates a basin that captures and holds precipitation and water from rare flood events. This basin currently has no outlet, so water is held and drains very slowly, allowing wetlands to develop there. (see Figure 3-10).

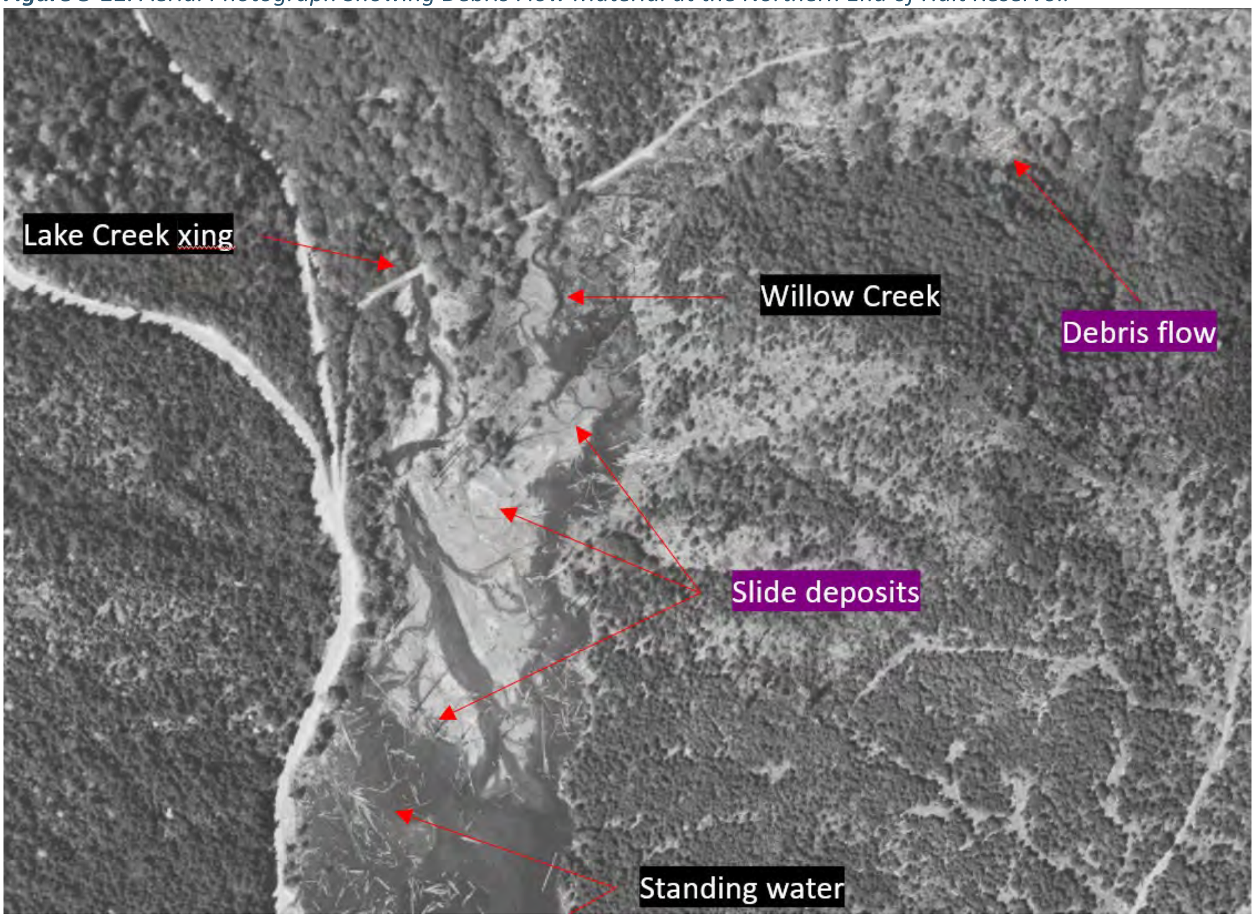
Figure 3-10. *Existing Wetlands at Hult Reservoir*



Similarly, the paved 15-7-35.0 Road on the west side of Hult Reservoir drain poorly in a few locations. Runout Creek has conveyed debris from past flood events down to and across the 15-7-35.0 Road. Following each flood event, the debris is cleaned up and piled on the upstream side of the road. All the flow of Runout Creek is channelized through one undersized culvert. Because water and debris are prevented from crossing the 15-7-35.0 Road, a wetland has formed on the upstream side of the road.

Finally, there are the wetlands that formed following the 1964 flood event. While there have been other subsequent floods (see Issue 1), the 1964 flood was by far the most destructive. The flood occurred shortly after liquidation of timber stands on nearby hillslopes and riparian areas. Entire hillslopes collapsed and washed into the streams below. Willow and Sandy Creek were the most affected streams in the project area, although flooding in these streams wouldn't have been as high as Lake Creek itself. Aerial photographs show large volumes of sediment and timber slash that would have washed downstream and downslope to deposit at the edge of Hult Reservoir (See Figure 3-11). Willow and Sandy Creeks carved new flow paths through this debris, and because the sediment was deposited at the edge of a reservoir, it formed an alluvial fan. While there will always be a primary stream flowing through these alluvial fans, water effectively saturates the entire area, which is stabilized by logging slash (large woody debris) from the late 1950s. Each new aerial photograph overflight shows stream evolution advancing as the stable wetlands grow ever-larger trees, the stream channels narrow and deepen, and the wetlands slowly transition to forest.

***Figure 3-11**. Aerial Photograph Showing Debris Flow Material at the Northern End of Hult Reservoir*[1]



1. Aerial photograph from 1965 showing a large volume of debris flow material from Willow Creek that was deposited at its confluence with Lake Creek at the northern end of Hult Reservoir. None of this sediment was present in a summer 1964 aerial photograph, which showed standing water throughout the area, impounded by Hult Pond Dam.

Across the project area, there are 11.7 acres of these types of transitional wetlands in these various configurations.

In addition, Hult Reservoir's standing water covers 53.9 acres in the project area and includes 25.6 acres of shallow (less than 6.6 feet) water capable of supporting emergent vegetation. These areas are important features because they support obligate wetland species of vegetation such as yellow pond-lily, floating pondweed, marsh seedbox, and common rush (see Table 3-17) and as a habitat type are somewhat rare. Although uncommon in the region, Hult Reservoir and these wetlands are an artificial construct. Nonetheless, the habitat afforded by Hult Reservoir benefits various botany, wildlife, and fisheries species.

Riparian Areas

Each body of water—stream, lake, or wetland—has an associated riparian area. Riparian areas perform different functions on different bodies of water. For example, a single Douglas fir may provide valuable stream shade on Gassy Creek, but on Willow Creek, the same role is performed by dense and continuous willow thickets. Of specific interest, riparian areas provide shade, inputs of structural material (coarse woody debris) that can be a surrogate for fish and wildlife habitat, and nutrient inputs. Every stream in the project area is well-shaded, except where inundated by Hult Reservoir. However, the overhead canopy composition is not the same on every stream; Trail, Grotto, Runout, Broad, Deep, Gassy, Wren, and Alluvial Creeks (see Figure 2-1 in Chapter 2) are primarily shaded by conifer (Douglas fir), whereas Sandy and Lake Creek are primarily hardwood (red alder) dominated (see Figure 3-12), and Willow Creek is primarily shaded by dense willow thickets.

***Figure 3-12**. Sandy Creek Where It Enters Hult Reservoir, Displaying a Mature Red Alder Canopy*
This riparian forest covers both Sandy Creek and an alluvial fan wetland.

Without structure, a stream will degrade through erosion. Structure can consist of material from and within (e.g., bedrock and immovable substrate) adjacent riparian areas. This structure, whether inorganic (rock) or organic (coarse woody debris), has variable sizes, which play different roles. A large boulder, for example, can provide velocity refugia for sand and gravel in a large stream, whereas the same boulder in a wetland may serve as an anchor point for a beaver dam.

Most streams in the project area have adequate structure, except Lake and Willow Creeks (see Figure 3-13). Due to a history of industrial logging, which cleared large swathes of riparian areas, and the size of each stream, contributions of structural material from their adjacent riparian areas are inadequate in both size and number. The evolutionary trend of these areas is unknown. While riparian areas are recovering from industrial logging, old slide material, which is currently acting as structure in these streams and wetlands, continues to lose function.

***Figure 3-13**. Lake Creek Near the Proposed Little Log Pond*

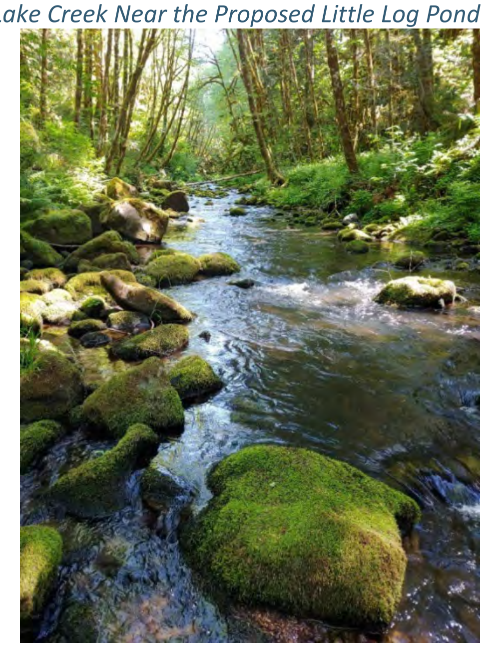


Figure 3-13 shows little to no stream structure beyond boulders in this section of Lake Creek. A stream of these dimensions in the Oregon Coast Range should have a component of instream large woody debris arranged in log jams, which provide habitat for fish and structure to the stream channel. Although recovering, Lake Creek's riparian area, is many years from being able to reliably supply large woody debris to instream debris jams.

Regarding nutrient inputs, most riparian areas in the project area supply a steady source of nutrients. Broadleaf vegetation (e.g., maple and alder) provide the greatest nutrient inputs to stream systems compared to conifers. To that effect, Lake, Willow, and Sandy Creek act as the greatest nutrient sources stimulating primary production[84] at the site. In each instance, nutrients slowly move through wetland complexes rather than being quickly flushed from the system. Ultimately, most nutrients end up in Hult Reservoir, where primary production is high.

[84] The process in which living organisms such as bacteria, algae, and plants form organic material from inorganic materials in the environment, usually through photosynthesis.

Lentic Areas

In a watershed context and hydrologically speaking, an artificially impounded body of water has low value. Although there may be some benefits, such as wetlands that have formed around the edge of the reservoir, they pale in comparison to the overall value of a functional and natural ecosystem.

Hult Reservoir's standing water covers 53.9 acres in the project area. Because Hult Reservoir is a relatively large body of water, it is impossible to shade even with the tallest trees. As a result, its water temperature can be high while its dissolved oxygen can be low. High water temperature and low dissolved oxygen, regardless of source, are not good for water quality (see Appendix A, Issue A-18: *How would implementation of the alternatives impact water quality and storm water discharges, especially during removal of the existing dam (and construction of a new dam?)).* To that effect, the value of Hult Reservoir as a lentic habitat is balanced with the detriment it causes to downstream aquatic resources.

Environmental Consequences

Direct and Indirect Effects[85]

Alternative 1: No Action Alternative (Continue Current Management)

Alternative 1.1 (Dam Failure)

Wetlands

Wetlands currently located in the narrow fringe surrounding Hult Reservoir would be mostly lost under Alternative 1.1. As a result, only fringe areas that border shallow depressions in the valley's natural topography would likely remain after a dam failure event.

The wetland near the bottom of Runout Creek would remain unaffected under Alternative 1.1 since the elevation of the site is entirely above Hult Pond Dam and Reservoir.

The wetlands currently in the drained Little Log Pond location would remain intact following a dam failure event. Although flooding would result in significant changes to Lake Creek's geomorphology, the presence of concrete and asphalt nearly surrounding the drained Little Log Pond wetlands would likely contribute to preserving some degree of the site's integrity, including the wetlands located there.

Wetlands formed at the bottom of Willow and Sandy Creek following the 1964 flood would reconfigure under Alternative 1.1. Without immediate efforts to stabilize the sites, these wetlands would drain to some degree, but wetlands in the footprint of the former reservoir would gradually transition to new wetlands.

The 25.6 acres covered in less than 6.6 feet of water that may be classified as wetlands or vegetated shallows water would disappear following a dam failure event.

Riparian Areas

Riparian shade would be affected under Alternative 1.1. All stream reaches in the current reservoir footprint would find themselves suddenly without any riparian canopy cover. Although it's likely the BLM would quickly adopt an aggressive riparian replanting strategy, a plan is not currently in place and ready to respond to an unexpected dam

[85] As described in the introduction to Chapter 3, some issues analyze only direct and indirect effects because there are no other foreseeable actions that would contribute to cumulative effects for that issue.

failure. Furthermore, downstream reaches of Lake Creek and some of its tributaries where they enter Lake Creek would be denuded of most riparian vegetation following a dam failure which would result in years of increased thermal loading from increased solar radiation. Even with an aggressive riparian revegetation plan, it would take at least 40 years until riparian vegetation would provide the degree of shade in the footprint of Hult Reservoir as there once was on Lake Creek and its tributaries.

Riparian structure under Alternative 1.1 would be drastically changed under a dam failure scenario. As described in Issue 1 (Flooding), downstream flooding would alter stream beds, stream banks, riparian areas and their vegetation, and stream channel configuration. Although the geomorphic changes would be significant and infrastructure or lives could be damaged and lost, the stream would return to a free-flowing condition. And although that free-flowing condition would look like a straightened and deepened channel devoid of riparian vegetation, the stream would begin to recover almost immediately, aided in part by the reintroduction of material that would provide stream and riparian structure.

Lentic Areas

All tributaries in the project area and Lake Creek itself are narrow and well drained, with no associated lentic areas (standing freshwater) aside from Hult Reservoir and spillway. The lentic areas under Alternative 1.1 would disappear following a dam failure event. A dam failure would result in most or all of Hult Reservoir draining at a velocity much higher than standard flow. An increased velocity would accelerate streambed and bank erosion as an otherwise sinuous stream channel straightens and deepens. The well-drained nature of the reconfigured Lake Creek and associated tributaries would eliminate most or all lentic areas in the project area.

Alternative 1.2 (Drain Reservoir)

Wetlands

Wetlands currently located in the narrow fringe surrounding Hult Reservoir would be mostly lost under Alternative 1.2. Only fringe areas that border shallow depressions in the valley's natural topography would likely remain after the reservoir is drained.

The wetland near the bottom of Runout Creek would remain unaffected under Alternative 1.2 since the site's elevation is entirely above Hult Pond Dam and Reservoir.

The wetlands currently located in the drained Little Log Pond location would remain intact following a dam draining event. The wetlands located here are a factor of captured precipitation unable to rapidly drain through fine sediment accumulated at the site when operated as a millpond and would be unaffected by upstream activities.

Wetlands that were formed at the bottom of Willow and Sandy Creek following the 1964 flood would reconfigure under Alternative 1.2. Without immediate efforts to stabilize the sites, these wetlands would drain to some degree, but wetlands in the footprint of the former reservoir would gradually transition to new wetlands.

The 25.6 acres of wetlands or vegetated shallows that occur in less than 6.6 feet water would disappear after the reservoir is drained.

Riparian Areas

Under Alternative 1.2, riparian shade would change. Hult Reservoir would be drained, and while its former riparian area would remain, it would no longer act as a riparian stand, since the nearest body of water may be hundreds of feet away. As with Alternative 1.1, even with an aggressive riparian revegetation plan, it would take at least 40 years to achieve the degree of riparian shade in the footprint of Hult Reservoir as there once was on Lake Creek and its tributaries. In the interim, aggressively planting willow and similar species would provide a stopgap measure to create riparian shade and outcompete invasive vegetation. In the long-term, there would be more acres of well-shaded riparian forest under Alternative 1.2 than exist now. The shade provided to Lake Creek in the area around Little Log Pond would remain unchanged.

The riparian structure of Lake Creek would be unaffected under Alternative 1.2. Although Hult Reservoir would be drained, Hult Pond Dam would still be in place, acting as a barrier to downstream conveyance of substrate and other structural material. As a result, downstream reaches of Lake Creek would remain largely free of any structure.

Lentic Areas

All tributaries in the project area and Lake Creek itself are narrow and well drained with no associated lentic areas (standing freshwater) aside from Hult Reservoir and spillway. The lentic areas under Alternative 1.2 would effectively disappear following a reservoir draining. Once drained, Hult Pond Dam would simply be infrastructure that would not impound water or facilitate lentic areas. The well-drained nature of Lake Creek and associated tributaries, absent any instream structure, would eliminate most or all lentic areas in the project area.

Alternative 2: Remove the Existing Dam and Build a New Dam to Maintain Hult Reservoir

Wetlands

Wetlands currently located in the narrow fringe surrounding Hult Reservoir would remain intact under Alternative 2 (see Figure 3-13). Although some obligate wetland vegetation might be lost as the project area is dewatered during reconstruction (see Issue 10), the wetlands would recover function as this vegetation regrows once re-watered.

The wetland near the bottom of Runout Creek would likely remain unaffected under Alternative 2 unless the undersized culvert under Lake Creek Road (15-7-35.0) were to plug or otherwise fail in some other event and a replacement was warranted.

The wetlands currently in the drained Little Log Pond location would remain intact following dam reconstruction. These wetlands are a factor of captured precipitation unable to rapidly drain through fine sediment accumulated at the site when operated as a millpond and would be unaffected by upstream activities.

Wetlands formed at the bottom of Willow and Sandy Creek following the 1964 flood would remain intact under Alternative 2. Hult Reservoir would refill as soon as Hult Pond Dam was rebuilt, and no lasting damage to the function of these two wetland units would occur.

Wetlands occurring in shallow water occurring under Alternative 2 would be identical to those described in the affected environment except for the area currently occupied by the spillway between the dam and the fish ladder, which would be replaced with a roughened channel to facilitate fish passage under Alternative 2.

Riparian Areas

In the short term, riparian shade under Alternative 2 would see increased thermal loading throughout the reservoir footprint once the reservoir was drained. However, in the long term, riparian shade would be unaffected in all locations under Alternative 2, except where vegetation must be cleared to accommodate construction activities. These areas are likely to be minimal in size and ultimately wouldn’t affect the thermal regime of Lake Creek or its tributaries.

Riparian structure would be mostly unaffected under Alternative 2. It is possible that a redesigned roughened stream channel on Lake Creek replacing the dysfunctional fish ladder could also pass some substrate and more coarse woody debris to downstream reaches. However, without a concerted effort to place structures downstream to capture this material, this material would likely continue to move through the system as it currently does.

Under Alternative 2, the downstream conveyance of upstream riparian nutrients would change. The constructed roughened channel would more readily pass nutrients to downstream reaches, although most nutrients are still expected to boost primary production within Hult Reservoir.

Lentic Areas

All tributaries in the project area and Lake Creek itself are narrow and well drained with no associated lentic areas (standing freshwater) aside from Hult Reservoir and spillway. Lentic areas under Alternative 2 would effectively disappear during construction, but would return and be similar in size, condition, and disposition to current lentic areas at Hult Reservoir.

Alternative 3: Remove Hult Reservoir; Add Little Log Pond & Alternative 4: Preferred Alternative (Remove Hult Reservoir)

Wetlands

Much of the wetland acreage anticipated under Alternatives 3 and 4 would be a direct result of draining the reservoir, which would allow the valley bottom to return to its historic condition. Natural topographic depressions would either be preserved or enhanced, allowing water to collect, soils to develop, and wetland vegetation to grow. Under these alternatives, select areas within the Hult Reservoir footprint (the Hult Reservoir Restoration Area) would have design features applied that would enhance fish and wildlife habitat while restoring what was likely a wetland or body of shallow water prior to Hult Pond Dam's construction. Natural stream sinuosity would be encouraged, and historic flood channels would be reconnected. Adjacent to nearly all these bodies of water, river-wetland corridors would be reestablished. These river-wetland corridors would act as a transition zone between upland ecosystems (surface) and hyporheic groundwater exchange (sub-surface) (Wohl et al. 2021). (Figure 2-5 in Chapter 2 shows wetlands in the Hult Reservoir Restoration Area under Alternatives 3 and 4.)

Under Alternatives 3 and 4 the disposition and configuration of wetlands would fundamentally change. For example, fringe wetlands currently surrounding Hult Reservoir would be lost entirely (to be replaced by "river-wetland corridors" (Wohl et al. 2021)), while an equal or greater acreage would be gained in the current reservoir footprint once the reservoir is drained. Soil saturation with water drives several aerobic and anaerobic microbial processes that provide critical ecosystem functions and services, including water quality improvement through denitrification and cycling of carbon and greenhouse gases, including carbon dioxide and methane (Mobilian and Craft 2022). The variable physical and chemical properties of wetland soils affect the ability of wetlands to perform these ecosystem services and act as carbon and nutrient sinks (Mobilian and Craft 2022). This could lead to a potential loss of aquatic resource function in the project area. (See also Appendix A, Issues A-21 and A-22.)

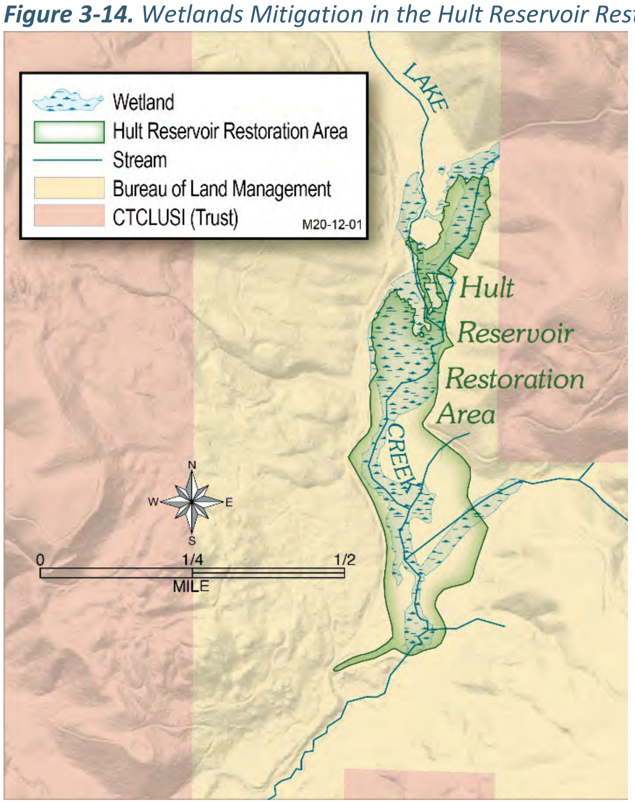
Proposed Mitigation Measures

The following mitigation, if selected, would be expected to compensate for the potential loss of aquatic resource function in the project area (see Figure 3-14):

- Remove, replace, and install three new culverts on Runout Creek (alluvial fan) and up to two new culverts on Broad Creek (currently none) where they cross Lake Creek Road (15-7-35.0).

- Regrade the valley in the Hult Reservoir Restoration Area such that the valley and stream grade (longitudinal profile) and valley width (lateral profile) are at the lowest possible angles.
- Cut a pilot channel for Lake Creek through the Hult Reservoir Restoration Area to mimic the natural/historic sinuosity index of 1.12 and locate Lake Creek in its historic footprint using bathymetry and historic site photographs.
- Within the Hult Reservoir Restoration Area, cut pilot channels for tributaries connecting to Lake Creek and install large debris jams of wood and logs at tributary junctions. Design for maximum stream sinuosity and minimum stream grade as appropriate with valley form.
- Ensure floodplain connectivity by designing and constructing low bank angles and shallow incision throughout the Hult Reservoir Restoration Area.
- Enhance natural topographic depressions in the Hult Reservoir Restoration Area (northwest and southeast corners of the existing reservoir) to sustain presence of wetlands.
- Cut pilot channels on the Hult Reservoir Restoration Area floodplain for energy dissipation and habitat provisions during winter floods.
- Add up to 1,500 additional pieces of structure (e.g., logs and trees with root wads) in the Hult Reservoir Restoration Area (stream, bank, floodplain, flood channels, and wetlands) to stabilize exposed soils; prevent headcutting, bank slumping, and other runoff and erosion; and provide habitat. These pieces would be arranged in a combination of strategically placed structures and scattered opportunistically across the landscape to provide appropriate habitat and turtle basking structures and to maintain flood flow capacity. Place more pieces than necessary to compensate for firewood theft.
- Construct up to five beaver dam analogs and/or post-assisted log structure complexes (multiple structures per complex) (see Figure 2-7 in Chapter 2) in the Hult Reservoir Restoration Area to attenuate stream energy in Lake Creek, tributaries, flood channels, and wetlands. When constructing beaver dam analogs in a sequence such that the structures work in concert with each other, space approximately 100 to 300 feet apart.

Figure 3-14. *Wetlands Mitigation in the Hult Reservoir Restoration Area*



Under Alternatives 3 and 4, if these aquatic/wetland mitigation measures are applied, natural stream drainage paths would be restored. This would entail removing the undersized culvert on Runout Creek at the 15-7-35.0 Road and replacing it with two to three culverts to accommodate multiple channels and channel migration in the alluvial fan. At any given time, one or two of the culverts may not pass any water. By restoring natural drainage paths, the wetland at this site would likely drain and diffuse flow downstream of the road crossing. This would mean that Runout Creek may go subsurface before ever reaching Lake Creek. Subsurface flow would be by design, as surface flow through an exposed reservoir footprint would lead to erosion and turbid water inputs into Lake Creek.

Under Alternatives 3 and 4, where Hult Reservoir would be drained, it is not expected that there would be any significant erosion in Willow or Sandy Creeks, because instream structures placed in these locations would slow stream velocity and erosive forces. With reduced or minimized headcutting, the water table in these areas would not drop enough to dry up the wetlands. These wetlands exist because the 1964 flood deposited debris at these locations, not because Hult Reservoir inundates either site.

Riparian Areas

Effects to riparian shade under Alternatives 3 and 4 would be similar to effects under Alternative 1.2, in which Hult reservoir would also be drained. The former riparian area would no longer act as a riparian stand, and even with an aggressive riparian revegetation plan, it would take at least 40 years to achieve the same degree of riparian shade in the Hult Reservoir Restoration Area as there once was on Lake Creek and its tributaries. In the interim, the mitigation measure of aggressively planting willow and similar species would provide a stopgap measure for riparian shade in addition to outcompeting invasive vegetation. In the long-term, more acres of well-shaded riparian forest would be present under Alternatives 3 and 4.

Alternative 3: Remove Hult Reservoir; Add Little Log Pond

Wetlands

Because Little Log Pond would be refilled under Alternative 3, the wetlands currently in the location of the drained Little Log Pond would be changed; instead of small, fragmented wetlands in the bottom of the former Little Log Pond, new wetlands would ring the footprint of the newly impounded Little Log Pond. But because Little Log Pond is likely to be the new focal point of recreational activities in the area, it is doubtful that it would have much physical or biological value as a wetland or as a vegetated shallows. Although the expected recreational activities (e.g., swimming, wading, boating, fishing) are generally low impact and compatible with physical and biological resources, Little Log Pond would likely be too warm in the summer and fall to provide refugia for native salmonids or rooting area for submerged vegetation.

Riparian Areas

Under Alternative 3, vegetation around Little Log Pond would be cleared to accommodate recreational activities, which would significantly reduce the shade provided to Lake Creek in the area. Although some trees and riparian vegetation around Little Log Pond would likely remain, the riparian canopy would not adequately filter solar radiation. While clearing riparian shade trees at Little Log Pond is not ideal, by regaining riparian shade at Hult Reservoir, the alternative still offers a net positive for riparian shade provisions.

Although Hult Pond Dam would be removed under Alternative 3, a smaller dam would be constructed in Lake Creek at Little Log Pond. A dam at this location would continue to alter the passage of substrate and coarse woody debris available to downstream reaches, including wetlands, thereby limiting downstream structure accumulation. However, Alternative 3 mitigation measures include the restoration of instream, riparian, and wetland structures in the form of large woody debris jams and physical channel manipulation to encourage sinuosity and flood channel reconnection.

Alternative 3 would increase riparian areas associated with Lake Creek and its tributaries in the Hult Reservoir Restoration Area. This, coupled with an aggressive riparian planting strategy consisting primarily of fast-growing, broadleaf, deciduous vegetation, is expected to increase the quality of nutrients, especially in Lake Creek. However, without Hult Reservoir, stream temperatures remain relatively cool, which would limit primary production. That said, for the first few years following dam removal, primary production would remain high because willows would not be established enough to provide much shade along Lake Creek and its perennial tributaries. On the other hand, because a dam would be constructed on Lake Creek to form Little Log Pond, the pond would become a sink for nutrients, albeit smaller than Hult Reservoir. As in Alternative 2, there would be a roughened channel constructed to pass flow, but many nutrients would not easily be passed, and instead would collect and decompose in Little Log Pond behind its dam.

Lentic Areas

All tributaries in the project area and Lake Creek itself are narrow and well drained with no associated lentic areas aside from Little Log Pond (Alternative 3), and Hult Marsh (Alternative 3 with mitigation). Under Alternative 3, the lentic area of Hult Reservoir would be downgraded from 53.3 acres to 4.7 or 7.4 acres depending on selected mitigation measures (see Table 3-16). In addition to being fewer in number, Little Log Pond would also be artificial.

If mitigation measures for special status species are selected (see Issue 11) that include the creation of a 2.7-acre pond ("Hult Marsh") in the northwest corner of the Hult Reservoir Restoration Area, it would be constructed in an area where there is already a natural topographic depression. Water would flow into and out of the pond via a reconnected flood channel. Beaver dam analogs or post-assisted log structures would likely be installed here if Hult Marsh is chosen as a mitigation measure.

Alternative 4: Preferred Alternative (Remove Hult Reservoir)

Wetlands

The wetlands currently in the drained Little Log Pond location would remain intact. The wetlands located here are a factor of captured precipitation unable to rapidly drain through fine sediment accumulated at the site when operated as a millpond and would be unaffected by upstream activities.

Riparian Areas

Riparian structure under Alternative 4 would see all the benefits to instream, riparian, and wetland structure development as Alternative 3, but would also see Lake Creek flowing unimpeded for the first time in nearly a century. Restoration design features, mitigation measures, and natural downstream conveyance would reseed downstream reaches of Lake Creek and tributaries in the project area with coarse substrate. Absent any dams in the project area, the sediment regime would be fully restored. Natural debris recruitment from upstream sources would add material onto placed instream and riparian structures.

Effects to nutrient availability under Alternative 4 would be similar to effects under Alternative 3: An increase in riparian areas coupled with an aggressive riparian planting strategy would increase the quality of nutrients. The greatest change to nutrient production and cycling under Alternative 4 would be the increased primary production from streams and wetlands within the Hult Reservoir Restoration Area and the fact that nutrients would be easily conveyed downstream without a dam impeding them.

Lentic Areas

All tributaries in the project area and Lake Creek itself are narrow and well drained, with no associated lentic areas (standing freshwater) aside from Hult Marsh (Alternative 4 with mitigation). Under Alternative 4, there would be 0 or 2.7 acres of lentic areas, depending on whether the Hult Marsh mitigation measure is selected. If mitigation measures for special status species are chosen (see Issue 11) that include the creation of 2.7-acre Hult Marsh in the northwest corner of the Hult Reservoir Restoration Area, the marsh would be designed with native materials (sediment and debris) from onsite and would be constructed in an area where there is already a natural topographic depression. Water would flow into and out of the pond via a reconnected flood channel. Beaver dam analogs or post-assisted log structures would most likely be installed here if Hult Marsh is chosen as a mitigation measure.

Summary of the Impacts of the Alternatives

Table 3-16 summarizes the acreage of wetlands, standing water, and upland areas within the analysis area under each alternative and with and without mitigation measures. Note that Hult Marsh mitigation is described in detail in Issue 11 (Special Status Plants).

Table 3-16. *Wetlands, Standing Water, and Upland Acres*

Acres	Affected Environment	Alt. 1.1 (Dam Failure) and Alt. 1.2 (Drain Reservoir)	Alt. 2: Build a New Dam	Alt. 3: Add Little Log Pond			Alt. 4: Remove Hult Reservoir		
					Mitigation			Mitigation	
					Aquatic/ Wetland	Hult Marsh		Aquatic/ Wetland	Hult Marsh
Wetlands[1]	37.1	29.9	36.7	31.0	41.9	41.9	28.5	39.4	39.4
Standing water[2]	53.9	0.0	53.3[3]	4.7	4.7	7.4	0.0	0.0	2.7
Wetlands or vegetated shallows[4]	25.6	0.0	25.0	2.8	2.8	5.5	0.0	0.0	2.7
Upland[5]	67.5	103.2	68.1	100.2		89.3	104.6		93.7

1. Wetlands are defined in the *Analytical Process* section of this issue. Wetlands may be inundated with standing water for parts of the year and dry for others, but always have the requisite wetland characteristics (i.e., soil, botany, and water).
2. If a site is inundated with standing water of any depth, it is mapped as a waterbody. Note that some of these areas are also mapped as wetlands.
3. Standing water area would be reduced slightly under Alternative 2 by the removal of the existing spillway and its replacement with a roughened channel for fish passage.
4. These acres are a subset of standing waters and wetlands. Areas inundated to standing water depths of less than 6.6 feet deep that contain aquatic vegetation that is not submergent are marked as a wetland (in addition to being mapped as a waterbody). Areas at the north end of Hult Reservoir and within Hult Marsh, for example, are classified as wetlands because they contain emergent vegetation and thereby do not meet the definition of vegetated shallows.
5. If a site does not exhibit wetland characteristics (i.e., soil, botany, and water attributes) and is not inundated with water, it is mapped as an upland.

Alternatives 1.1 and 1.2 see an elimination of standing water. Alternative 2 would affect wetlands, riparian areas, and lentic areas very similarly to how Hult Pond Dam and Reservoir affects them at present, and there would be very little change compared to the affected environment. Alternative 3 sees a decrease in the amount of wetlands compared to present. Standing water would be reduced with the draining of Hult Reservoir, although not entirely lost, due to Little Log Pond. Alternative 4 also sees a decrease in wetlands compared to present. Standing water disappears entirely unless specific mitigation measures for special status species (Hult Marsh) are employed. Riparian areas generally improve from Alternative 1.1 to 1.2 to 2 to 3 to 4, as historic streams and riparian areas are increasingly restored to their full potential. Lentic areas are eliminated under Alternatives 1.1 and 1.2. Under Alternative 2, lentic areas remain largely unaffected. Under Alternatives 3 and 4, lentic areas are significantly reduced, but not necessarily eliminated, as Little Log Pond would be created (Alternative 3) and mitigation measures (Alternative 3 and 4) may be selected. Although lentic areas would be lost, under Alternatives 3 and 4, natural and pre-dam conditions are being restored in the area currently occupied by Hult Reservoir.

Issue 10: How would implementation of the alternatives affect the wetland vegetation types at the reservoir?

The 2016 RMP directs the BLM to “support the persistence and resilience of natural communities including those associated with forests…meadows, and wetlands” and to “maintain and restore natural processes, native species composition, and vegetation structure in natural communities through actions such as…maintaining water flow to wetlands.…” (USDI 2016a:86–87). Public scoping revealed concern regarding how the alternatives would affect specialized habitats, unique ecosystems, and wetland vegetation associated with the reservoir. The BLM is addressing this concern in part by looking at the effects to wetland vegetation types at the reservoir (related concerns are addressed in Issue 9 and Issues 11 through 14, and in Appendix A, Issues A-9 through A-13). Analysis of this issue is necessary to determine the significance of the impacts.

Analytical Process

Assumptions

Impacts to wetland vegetation types are projected by considering their current distribution, and changes to the underlying hydrology with the alternatives.

- Wetland vegetation types are a function of underlying soils and hydrology, and disturbance history.
- Changed hydrology will alter vegetation types, with current hydrology and vegetation correlations predicting the vegetation at new hydrologic configurations.
- Where there is a current overstory of red alder (*Alnus rubra*), the understory plant community would shift with wetland drainage, potentially from a wetland to a non-wetland community. Likewise, areas of shrub wetland (willow; *Salix* spp.) would retain shrubs, but associated plants would shift.
- Standing water in the project area is frequently "open" (i.e., non-forested) and can support native wetland vegetation types (unconsolidated bed, aquatic bed, emergent wetland). Under Alternatives 3 and 4, where Hult Pond Dam is removed, these habitat types would occur only where standing water is predicted (see Table 3-16).
- Where there is no current overstory of alder or willow, reed canarygrass (*Phalaris arundinacea*; an invasive plant species) would tend to dominate wetlands that also do not have stable perennial standing water. (Reed canarygrass could additionally dominate some seasonally moist uplands, although upland vegetation types are not considered in this issue.) This occurrence is predicted based on observations of reed canarygrass in open areas that have undergone disturbance elsewhere in the upper Lake Creek watershed. An area upstream from Hult Reservoir had the alder overstory removed in order to convert it to a western redcedar stand, which led to a large increase in reed canarygrass. Likewise, in an area at the north end of Hult Reservoir, beaver activity raised the water table, killing the previous alder forest and leading to a preponderance of reed canarygrass.
- Monospecific reed canarygrass stands (dense clumps of reed canarygrass that has crowded out other plants) are common lower in the watershed in low areas that have been disturbed, such as roadside ditches, deforested areas, or heavily grazed areas. Control of reed canarygrass has often focused on the restoration of overstory shrubs and trees (e.g., Miller et al. 2008), but flooding has also been used to manage it (Jenkins et al. 2008). Perennial saturation or standing water appears important to limit reed canarygrass; roots may be killed if anaerobic conditions occur because of ponding (Stannard and Crowder 2001 in Miller et al. 2008). Seasonal water level fluctuations can leave sites susceptible to reed canarygrass regrowth despite disking and herbicide treatments (Kilbride and Paveglio 1999).
- Special status species mitigation (Hult Marsh, see Issue 11) would retain the aquatic bed vegetation at the site if selected.
- Little Log Pond (Alternative 3) would create unconsolidated bed vegetation at the site. This vegetation type would be more likely than aquatic bed vegetation because of greater hydrologic flow, the new advent of the habitat, greater water level fluctuation, and high recreational use at Little Log Pond.

Summary of Analytical Methods

The geographic scale includes wetland areas at Hult Reservoir and the upper portion of the Lake Creek watershed above Triangle Lake, where extensive low-lying open areas are often dominated by reed canarygrass, especially on private land. There are also some restoration efforts on other BLM-administered land near Hult Reservoir.

For direct effects under the action alternatives, the temporal scale includes the short-term time frame of active dam work, estimated at 1 to 4 years. The temporal scale for indirect effects is 10 years, to allow for the stabilization of vegetation. For Alternative 1, short-term would be the period before and immediately following dam failure or the BLM draining the reservoir to prevent imminent dam failure; long term would be the 10 years following dam failure or reservoir drainage. Vegetation may change due to continued drainage, erosion, and vegetation growth within the Hult Reservoir Restoration Area (under Alternatives 3 and 4).

Impact indicators include acres of the various vegetation types expected with the alternatives. The analysis considers quality and value of vegetation types; uncommon vegetation types are highlighted, while vegetation dominated by invasive species is discussed.

Affected Environment

In August 2017, BLM soils and botany personnel conducted field surveys recording areas of generally uniform vegetation based on aerial photos, ground observation, and soil test pits.

BLM botany specialists identified wetland vegetation, with three broad types observed: lacustrine (lake associated), palustrine (marsh and smallpond associated), and riverine (stream bed associated). Further subtypes include aquatic bed (pond-lily (*Nuphar luteum*) and pondweed (*Potamogeton natans*), floating vegetation), unconsolidated bottom (submerged sediments), emergent wetlands (e.g., rushes or cattails), forested wetlands (alder stands that can be classified as jurisdictional wetland), and scrub-shrub wetlands (willow thickets).

Table 3-17 presents these results with detailed descriptions of the wetland vegetation types. Species dominant in plots are listed in the order of their frequency of dominance within each stratum or level (trees, shrubs, herbs). Dominant plant species are the most abundant species in the community; they contribute more to the character of the community than do the other non-dominant species. In general, dominant species are the most abundant species that individually or collectively account for more than 50 percent of the total vegetation coverage in the stratum, plus any other species that alone accounts for at least 20 percent of the total (USACE 2010).

Table 3-17. *Existing Wetland Vegetation Types at Hult Reservoir*

Vegetation type	***Vegetation description***	***Acres mapped***	***Soil Test Pits***
Lacustrine – unconsolidated bottom	Shallow water around pond edges. The characteristic vegetation is stonewort (*Chara* spp.), an alga, on sediments.	15.1	0
Lacustrine – aquatic bed	Floating and submerged plants, including yellow pond-lily (*Nuphar luteum*) and floating pondweed (*Potamogeton natans*).	6.3	0
Palustrine – aquatic bed	Beaver ponds just above Hult Reservoir with floating pondweed, marsh seedbox (*Ludwigia palustris*).	2.2	0
Palustrine – emergent wetland	Marsh or wet meadow areas. Dominant species include common rush (*Juncus effusus*), reed canarygrass (*Phalaris arundinacea*), panicled bulrush (*Scirpus microcarpus*), northern bugleweed (*Lycopus uniflorus*), field horsetail (*Equisetum arvense*), musk flower (*Mimulus moschatus*), rose spirea (*Spiraea douglasii*), Sitka willow (*Salix sitchensis*).	5.4	7
Palustrine – scrub-shrub wetland	Shrub areas near beaver ponds and on old beaver dams. Sitka willow, slough sedge (*Carex obnupta*), common rush, fowl mannagrass (*Glyceria striata*).	1.9	2
Palustrine – forested wetland	Red alder (*Alnus rubra*) forest. Dominant species include red alder, salmonberry (*Rubus spectabilis*), red elderberry (*Sambucus racemosa*), vine maple (*Acer circinatum),* youth on age (*Tolmiea menziesii*), common ladyfern (*Athyrium filix-femina*), American skunk cabbage (*Lysichiton americanus*), creeping buttercup (*Ranunculus repens*).	9.4	9
Riverine – unconsolidated bottom	Lake Creek; flowing water with cobbly, sand, or mud bottom.	0.5	0

Vegetation type	Vegetation description	Acres mapped	Soil Test Pits
Riparian alder forests	Alder forests adjacent to wetlands; non-wetland riparian areas, floodplains, or stream terraces. 6 of 7 plots had wetland vegetation (but not soils indicators). Dominant species include red alder, bigleaf maple (*Acer macrophyllum*), salmonberry, vine maple, red elderberry, California blackberry (*Rubus ursinus*), youth on age, sword fern (*Polystichum munitum*), threeleaf woodsorrel (*Oxalis trilliifolia*), creeping buttercup.	NA	7

Shallower water in Hult Reservoir is either of the unconsolidated bottom types with stonewort on the sediments, or aquatic beds with floating and submerged plants. Deep waters over 6.6 feet are not considered wetlands due to the usual depth at which photosynthesis no longer occurs (Environmental Laboratory 1987, FGDC 2013, USACE 2010).

Emergent vegetation occurred in three subtypes. Many areas with shallow, stable perennial water were common rush dominant. A similar type had panicled bulrush (*Scirpus microcarpus*) as the dominant species. Stands of reed canarygrass were associated with hydrological disturbance or water table fluctuation; reed canarygrass is an invasive species that can form monospecific stands under wet, open canopy conditions that can lead to a loss of native species (Barnes 1999). Small stands of cattail (*Typha latifolia*) were found around water edges.

Vegetation within alder forest is often similar in wetland versus non-wetland locations, but the alder forest wetlands usually host American skunk cabbage (*Lysichiton americanus*) or common ladyfern (*Athyrium filix-femina*) among the dominant species. While some alder stands are found in non-wetland sites, there were often small patches of wetland-obligate vegetation found to be associated with streams and low spots. Alder stands not found in wetland locations have drier site species such as vine maple (*Acer circinatum*), bigleaf maple (*Acer macrophyllum*), sword fern (*Polystichum munitum*), threeleaf woodsorrel (*Oxalis trilliifolia*), and California blackberry (*Rubus ursinus*) present.

Environmental Consequences

Vegetation types from the 2017 survey (current conditions) were overlaid with hydrological wetland conditions under the scenario of a failed or drained dam, and under the action alternatives. Vegetation changes were interpreted using the assumptions above. Direct and indirect effects include a reduction in the wetland types associated with standing water with the dam failure or removal alternatives. There is also some expected loss of forested and scrub-shrub wetland where drainage converts the site to non-wetland riparian alder forest or willow stands. Residual wetland areas within former areas of open vegetation, including the bed of the reservoir, are expected to convert to an emergent wetland with reed canarygrass dominant. Table 3-18 shows the acres of wetland vegetation types by alternative.

Table 3-18. *Acreage by Wetland Vegetation Type Under the Alternatives*

Vegetation types[1]	Affected Environment	Alt. 1.1 (Dam Failure) and Alt. 1.2 (Drain Reservoir)	Alt. 2: Build New Dam	Alt. 3: Add Little Log Pond Mitigation				Alt. 4: Remove Hult Reservoir Mitigation			
				None	Aquatic/ Wetland[2]	Hult Marsh[3]	All	None	Aquatic/ Wetland[2]	Hult Marsh[3]	All
Unconsolidated bottom	15.1	0.0	14.5	2.8	2.8	2.8	2.8	0.0	0.0	0.0	0.0
Aquatic bed	8.5	0.0	8.5	0.0	0.0	2.7	2.7	0.0	0.0	2.7	2.7
Emergent wetland, mostly native species	5.4	0.0	5.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scrub-shrub wetland	1.9	1.3	1.9	1.3	1.5	1.3	1.5	1.3	1.5	1.3	1.5
Forested wetland	9.4	4.3	9.4	4.3	5.4	4.3	5.4	4.3	5.4	4.3	5.4

Vegetation types[1]	Affected Environment	Alt. 1.1 (Dam Failure) and Alt. 1.2 (Drain Reservoir)	Alt. 2: Build New Dam	Alt. 3: Add Little Log Pond Mitigation				Alt. 4: Remove Hult Reservoir Mitigation			
				None	Aquatic/ Wetland[2]	Hult Marsh[3]	All	None	Aquatic/ Wetland[2]	Hult Marsh[3]	All
Emergent wetland, reed canarygrass dominant[4]	0.0	18.4	0	17.2	26.3	16	23.6	17.2	26.3	16	23.6

1. Vegetation types listed here may refer to wetland types, but only in the context of wetland-obligate vegetation. For a summary of changes to wetland acreage under each alternative, refer to Table 3-16.
2. See Issue 9 for details about aquatic/wetland mitigation.
3. See Issues 11 and 13 for details about this special status plant and wildlife species mitigation.
4. While reed canarygrass can be treated if it is deemed a nuisance to the viability of other vegetation and the integrity of streambanks, most treatments are not effective, efficient, or sustainable.

Direct Effects

Alternative 1: No Action Alternative (Continue Current Management)

Following dam failure or drainage of the reservoir, the area would have a noticeable loss of the most uncommon and valuable wetland vegetation types, including lacustrine unconsolidated bottom, aquatic bed, and emergent wetlands with native species dominant. These vegetation types are minimal on lands within the Siuslaw Field Office jurisdiction. The aquatic bed vegetation type is home to the Bureau sensitive plants at Hult Reservoir (humped bladderwort and northern bog clubmoss; see Issue 11).

The drainage of forested wetland vegetation types (decreasing from 9.4 to 4.3 acres) and scrub-shrub wetland vegetation types may bring about a shift in understory species composition; this is especially likely where the site shifts from alder forest or willow stands. The current obligate wetland species, including slough sedge (*Carex obnupta*), fowl mannagrass (*Glyceria striata*), and American skunk cabbage would be likely to diminish.[86]

Scrub-shrub wetland vegetation types may develop in riparian areas where willows are planted. Most of the area would be expected to convert to emergent wetland with reed canarygrass dominant. Restoration is possible but difficult where monospecific stands of reed canarygrass form (Miller et al. 2008).

Alternative 2: Remove the Existing Dam and Build a New Dam to Maintain Hult Reservoir

Draining the reservoir under Alternative 2 would impact wetland plants. Reservoir drainage in the fall of 2020 showed extensive browning and damage to wetland plants, and drainage over a longer period would kill many of these plants, such as pond-lily and pondweed. Regrowth could be slow, particularly if residual seed of various species is not available and viable. Alternative 2 includes a small loss of lacustrine unconsolidated bottom acres relative to the current condition due to the spillway canal being infilled or converted to a fish passage chute with the construction of the new dam.

Alternative 3: Remove Hult Reservoir; Add Little Log Pond

Alternative 3 would remove the existing dam, drain the reservoir, and create a 5-acre pond downstream for recreation use. Alternative 3 would have very similar effects to Alternative 1, with a complete loss of native species emergent wetland, partial loss of forested wetland (from 9.4 to 4.3 acres), and a conversion of 17.2 acres to reed canarygrass dominant. Little Log Pond would likely create a small amount of unconsolidated bottom (2.8 acres).

[86] Wetland ratings for species are from Lichvar et al. (2016).

Hult Marsh mitigation (see Issue 11) would build a weir or low embankment to contain water at existing levels in the northwest section (backwater area) of the Hult Reservoir Restoration Area. This backwater area has some concavity, including a dip that contained a small pool of water during the 2020 reservoir lowering. These structures would keep the water approximately 3–6 feet higher so that a larger pool would remain (Hult Marsh, see Figure 3-15), and the existing log habitats would remain saturated.

Implementing this alternative with only the aquatic/wetland mitigation (see Issue 9) would create large open spaces, which would result in the largest extent of reed canarygrass. To counteract this, forest restoration would be used to preclude or suppress the formation of reed canarygrass monospecific stands. Restoration would focus on planting a mix of red alder, western redcedar, black cottonwood, and Sitka willow, ideally before reed canarygrass stands form. All of these species are currently present in the project area. Red alder or black cottonwood growth appears to be particularly successful in similar restoration projects (Miller et al. 2008, Miller 2018). Western redcedar, while valuable for other reasons, has shown relatively poor success in survival, growth, and shading out of reed canarygrass, as described in Miller (2018) and seen in the Hult Reservoir vicinity.

Alternative 4: Preferred Alternative (Remove Hult Reservoir)

Effects under Alternative 4 would be similar to Alternative 3 but with no remaining acres of unconsolidated bottom habitat.

Indirect Effects

An indirect effect of Alternatives 1, 3, or 4 would be an increase in degraded wetlands with reed canarygrass and an increase in the wetland restoration workload in the area of the upper Lake Creek watershed. The potential increase in wetlands with reed canarygrass dominant varies under the action alternatives from 16 acres with special status species mitigation (Hult Marsh) only, to 26.3 acres with aquatic/wetland mitigation measures alone. This increase would be in addition to several acres of reed canarygrass on BLM-administered lands in the Pucker Creek and Swartz Creek areas and many acres on private land in the vicinity. Monospecific stands of reed canarygrass have low biodiversity (Barnes 1999, Kilbride and Paveglio 1999, Jenkins et al. 2008) and tend to create channelized streams in the vicinity of Hult Reservoir.

Cumulative Effects

Cumulative effects include the large extent of degraded wetland vegetation types and formation of monospecific stands of reed canarygrass in open meadows on private land in the upper Lake Creek watershed. These infestations are visible from the highways in the area. On BLM land, there are projects within 1 to 3 miles of Hult Reservoir to convert reed canarygrass meadows to forest, with plantings at Pucker Creek and Swartz Creek. The intention was to eventually shade out the reed canarygrass and allow a native riparian forest understory to develop. In the Pucker Creek area, western redcedar was planted in approximately 2005, but many trees died. Other trees have relatively narrow crowns, providing only moderate shade and allowing reed canarygrass to thrive between them. Plantings at Swartz Creek occurred in 2021 and include a mix of tree and shrub species; the success of this effort is yet to be determined. Alternatives 3 and 4 have the potential to add to the degradation of wetland vegetation in the upper Lake Creek watershed where alternatives would lead to reed canarygrass monospecific stands and add to the restoration workload in the watershed.

Issue 11: How would implementation of the alternatives affect humped bladderwort and northern bog clubmoss at the reservoir?

Bureau Sensitive Species Policy (BLM Manual 6840 Special Status Species Management) considers sensitive species to be those species "requiring special management consideration to promote their conservation and reduce the likelihood and need for future listing under the ESA [Endangered Species Act]" (USDI 2008b). Two Bureau sensitive plants, humped bladderwort (*Utricularia gibba*) and northern bog clubmoss (*Lycopodiella inundata*) occur in Hult Reservoir.

Humped bladderwort occurs in 21 populations in Oregon, including at Hult Reservoir, in the Cascades (Foster Lake and Santiam Pass), along the coast (from near Florence to Bandon), and in the Willamette Valley (from near Oregon City to Veneta). Northern bog clubmoss is found in 41 populations, including Hult Reservoir, in the Cascades (from near Mount Hood to Diamond Peak and Klamath Marsh), and along the coast (from near Waldport to Bandon). However, several of the populations are considered historical by the Oregon Biodiversity Information Center (ORBIC) (i.e., they were last seen many years ago and may not have survived). One site of humped bladderwort is historical and was last seen in 1969. For northern bog clubmoss, 12 sites are considered historical, and were last seen from 1914 to 1987 (see Table 3-19).

Throughout Oregon, humped bladderwort occurs in similar habitats as at Hult Reservoir. Coast and Coast Range habitats include small acidic (i.e., low pH) lakes in the coastal dunes and permanently water-filled ditches with beds of native aquatic plants. West Cascades habitats are ponds. Willamette Valley habitats are aquatic, such as wetland mud, emergent marsh habitat maintaining some standing water throughout the year, ponds, and sloughs.

Northern bog clubmoss in Oregon generally occurs in the coastal dunes and in the Cascades. Coastal habitats are generally deflation plains (where dune sand has blown away down to the water table), wetlands between low dunes, seasonally flooded sandy openings, open saturated areas along a river, sphagnum moss bogs, and lake shores in sand. Substrates include bare brown loamy soil, sand, and peat. Cascades habitats are wet or damp meadows; grassy lakeshores; depressions or swales; wet meadows with scattered lodgepole pine; sphagnum mounds; moist, boggy ground with sphagnum; boggy streams near lakes; alpine fens on low sphagnum hummocks; and peat mounds near ponds. The Hult Reservoir population has a unique habitat for Oregon, being the only one citing growth on wet logs.

Table 3-19. *Oregon Populations of Special Status Plant Species Found in the Project Area*

Species	*Historical populations*	*Populations with threats*	*Other populations*	*Total populations*
Humped bladderwort (*Utricularia gibba*)	1	7	13	21
Northern bog clubmoss (*Lycopodiella inundata*)	12	15	14	41

The Bureau sensitive species are included on ORBIC List 2 (ORBIC 2023). List 2 species are considered threatened or endangered in Oregon but secure elsewhere. Globally, humped bladderwort is found in many tropical regions and northward to Canada, Spain, and Japan. Northern bog clubmoss is found in the higher latitudes of the Northern Hemisphere, occurring south in western North America to California. ORBIC participates in the NatureServe international system for ranking rare, threatened, and endangered species. The ranks for humped bladderwort are G5 (globally secure) and S1 (critically imperiled, at high risk of extinction due to extreme rarity in the state). Northern bog clubmoss ranks are G5 and S2 (imperiled, at high risk of extinction in the state due to very restricted range, very few populations, steep declines, or other factors). Neither species has been petitioned for listing as threatened or endangered (NatureServe 2023).

Many Oregon populations of the species face threats by either current or potential factors. Threats to five populations of humped bladderwort in the area of Fern Ridge Reservoir include invasive species, particularly reed canarygrass (*Phalaris arundinacea*), and fluctuating water levels. Other populations are threatened by invasive species, lake drainage, copper sulfate treatments for algae, introduced herbivorous fish, motorboat use, fishing, aquatic vegetation control, and dumping. Threats to populations of northern bog clubmoss along the coast include trampling by equestrians, shrub encroachment (including gorse, huckleberry, and salal), development construction, erosion from high winter river levels, cranberry industry expansion, roadside maintenance, and off-road vehicle use. Northern bog clubmoss populations in the Cascades cite are threatened by lodgepole pine encroachment, elk damage (digging up the ground with antlers, trampling and wallowing), ATV use, run-off from nearby logging, and a cattle allotment. Only 13 populations of humped bladderwort and 14 populations of northern bog clubmoss are neither considered historical nor have threats cited for them.

Despite extensive surveys, the BLM has not found any federally threatened or endangered plants or other Bureau sensitive plants, lichens, or bryophytes (mosses, liverworts, or hornworts) in the project area.[87] Surveys in summer 2023 included 434 acres of surrounding riparian and uplands, including 211 acres that were not surveyed before, and the areas where surveys are outdated. The reservoir and wetlands were last surveyed in 2015.

Comments received during the May 2022 draft Chapters 1 and 2 public comment period revealed concern regarding how the alternatives would affect a rare clubmoss and a native lily at the reservoir if the water is lowered or removed. The BLM is addressing this concern by evaluating the rare (Bureau sensitive) plants at the reservoir. Analysis of this issue is necessary to determine the significance of the impacts. The BLM is unaware of a native or rare species in the lily family (*Liliacae*) at the reservoir; impacts to pond-lilies (in the *Nymphaeaceae* family) are addressed in Issue 10.

Analytical Process

Assumptions

The BLM projects impacts to Bureau sensitive plants by considering their current habitat and habitat needs and changes to the habitat with the alternatives.

The two Bureau sensitive plants in the project area would be unable to withstand loss of water over a full summer or permanent water loss. Although temporarily lowering the water level during the wet season would put these plants at risk, when the BLM drained the reservoir to fix the toe drain, the plants survived because this repair occurred during the rainy season. Assumptions are based on observations of habitat (both occupied and unoccupied by the species) and effects of reservoir water-lowering events in the past.

- Humped bladderwort (*Utricularia gibba*) is an aquatic carnivorous plant and has no roots (Baldwin et al. 2012). In Hult Reservoir, humped bladderwort grows in the water column and as surface mats, but it is elsewhere reported as beached on mud (Baldwin et al. 2012). Loss of the water and drying of the substrate would eradicate the plants from the area.
- Northern bog clubmoss (*Lycopodiella inundata)* occurs in moss mats on old floating and beached logs in the same area of Hult Reservoir as humped bladderwort. The logs are saturated and also support sphagnum mosses. Sphagnum mosses are well-known indicators of bog and similar habitats, generally with perennially wet substrate, little hydrologic disturbance, and soft, low-nutrient waters (Gignac and Vitt 1990). Drying of this log substrate would lead to local elimination of these plants.
- These wetland obligate (Lichvar et al. 2016) Bureau sensitive plants would not withstand loss of water over a full summer or permanent water loss.

[87] The 2016 RMP does not require that the BLM surveys for Bureau sensitive fungi. However, the District does manage and protect sites with Bureau sensitive fungi when they are detected.

- Alternatives would either lead to the area populations dying out or surviving. Scenarios in which water is temporarily lowered are a potential risk to the species. These plants would be at risk of dying out in the area if Hult Reservoir were temporarily drained. However, the plants have previously survived low water levels during the rainy season, when reservoir levels were lowered to perform maintenance in October 1990 and again in the fall of 2020. There may have been some loss of individual plants during these events, but the populations survived. The substrates were not completely dried, and some standing water remained in low spots during the temporary water lowering in 2020, although many wetland plants were damaged.

Summary of Analytical Methods

The geographic scale includes the locations of Bureau sensitive plant populations at Hult Reservoir. For direct effects under the action alternatives, the temporal scale includes the time frame of active dam work, estimated at 1 to 4 years. The temporal scale for indirect effects is 10 years, to allow for the stabilization of habitats. For Alternative 1, the short-term time frame would be the period before and immediately following dam failure or BLM draining the reservoir to prevent imminent dam failure, and long term would be the 10 years following dam failure or reservoir drainage. Habitats may change due to continued drainage, erosion, and vegetation growth within the Hult Reservoir Restoration Area.

Impact indicators include viability of the populations (of the two species in Hult Reservoir), including a qualitative description of the risk to the populations. Any trend toward listing is described, such as elimination of the populations at Hult Reservoir relative to the number and status of other populations of those species in Oregon. ORBIC is the repository for data on rare species in Oregon and conducts analyses and updates on species' conservation status. The ORBIC updates affect the determination of Bureau sensitive species status. ORBIC considers "element occurrences" of species, referred to here as populations.

Affected Environment

There is a single population of each of the two Bureau sensitive species in Hult Reservoir. Humped bladderwort occurs suspended in shallow water in aquatic beds (areas of submersed and floating plants), mostly at the northwest backwater section of the reservoir, but also in areas along the east-central edge of the reservoir. Northern bog clubmoss occurs in moss mats on wet logs, floating, or beached in the backwater section of the reservoir.

Environmental Consequences

Direct and Indirect Effects

Alternative 1: No Action Alternative (Continue Current Management)

Under the No Action Alternative, the populations of Bureau sensitive plants at Hult Reservoir would be expected to survive indefinitely as long as the dam is present and functional. In the case of dam failure or permanent dewatering due to impending failure, the Bureau sensitive plants would no longer be present in the area. If the reservoir remains, persistence of these plants is expected, as these populations have been known at Hult Reservoir since 1988. However, potential risks are present. Previously, the species were known from the east-central portion of the reservoir where there is a secondary area of aquatic bed (floating and submerged vegetation). Northern bog clubmoss disappeared from the east portion, probably due to loss of the logs. The logs may have sunk or floated to the spillway, where they would have been removed. Humped bladderwort also appeared to become rarer in the east portion. However, the northwest end of the reservoir contains larger, robust, and stable populations of the two species, and logs are unlikely to be lost. The northwest end also contains parrotfeather (*Myriophyllum aquaticum*), a non-native invasive aquatic plant species. Parrotfeather could potentially out-compete humped bladderwort. The parrotfeather was manually removed in 2021 and 2022, but it is difficult to eradicate.

If the reservoir level were temporarily lowered due to maintenance issues, the populations may survive if the water is lowered during the rainy season, as has occurred in the past. If the water is lowered for a longer period, especially during the dry season, the plants would be at risk of drying up and dying out altogether. As is reported for some other Pacific Northwest populations (Ceska and Bell 1973), humped bladderwort has not been flowering at Hult Reservoir, and seed production is unlikely. Northern bog clubmoss produces spores regularly at Hult Reservoir, but reestablishment from spores would be unlikely with prolonged water loss, due to limited spore longevity and the need for spores to occur in exact microhabitat locations.

In the case of dam failure (Alternative 1.1) or permanent dewatering due to impending failure (Alternative 1.2), the effects would be the same as for the action alternatives. This means that one population of each species, respectively, would be lost out of the 21 populations of humped bladderwort and 41 populations of northern bog clubmoss statewide.

Alternative 2: Remove the Existing Dam and Build a New Dam to Maintain Hult Reservoir

Under Alternative 2, a new dam would be built at Hult Reservoir. This would require draining the reservoir for construction for a prolonged period of time (up to 3 years), which would likely lead to these two plants dying out in the area.

Potential Mitigation for Alternative 2

The BLM proposes the following mitigation to reduce adverse impacts to aquatic special status plants under Alternative 2:

- Maintain warm-water habitat in the large open wetland at the north end of the reservoir (Hult Marsh, see Figure 3-15). This construction can be a temporary cofferdam while Hult Pond Dam is rebuilt.

There is some risk that this mitigation would not be successful if habitat conditions are not conducive to continued survival of the species. For example, water flow rates through the area may not be high enough to keep the remnant pool filled, the weir may not successfully hold back water, or other habitat changes may occur based on water chemistry or vegetation growth. Even with this mitigation, the remaining humped bladderwort along the east-central side of the reservoir would no longer be present.

Alternatives 3: Remove Hult Reservoir; Add Little Log Pond and 4: Preferred Alternative (Remove Hult Reservoir)

Alternative 3 and 4 include removal of Hult Pond Dam, which would lead to the two Bureau sensitive plant populations dying out at that location. There may be remnant seasonal ponds in some areas, and Alternative 3 includes the construction of a smaller reservoir (Little Log Pond). However, the Bureau sensitive plants are unlikely to survive in these areas. In addition to the direct effects of lowering the reservoir water level, ongoing indirect effects (continued drainage, erosion, and vegetation growth within the Hult Reservoir Restoration Area) are likely to remove suitable habitat. Created potential habitat, such as the smaller pond (Little Log Pond) downstream of the current reservoir, is unlikely to be suitable for the Bureau sensitive species because the existing habitat appears specialized and difficult to replicate. For example, the species are only located in a portion of Hult Reservoir but not in the smaller beaver ponds just upstream.

Northern bog clubmoss has a habitat of old, rotted, and saturated logs and only occurs in particular microhabitats on these logs. The backwater area in the northwest portion of Hult Reservoir, where humped bladderwort is mostly found, has low-energy hydrology and probably low-nutrient soft water, in part due to the presence of the logs; submerged wood can trap nutrients and keep aquatic nutrient levels low.

Humped bladderwort, like many carnivorous plants, is expected to favor relatively low-nutrient habitats and is known to produce traps in response to low phosphorous in particular (Ibarra-Laclette 2013). The presence of sphagnum moss on the logs in this backwater area also indicates habitats with perennially wet substrate, little hydrologic disturbance, and soft, low-nutrient waters. Sphagnum mosses are uncommon within the Siuslaw Field Office jurisdiction. Little Log Pond would have a relatively high flow-through rate and would lack the copious old logs found in the current Hult Reservoir backwater area.

Alternatives 3 and 4 would lead to the Bureau sensitive plants at Hult Reservoir dying out at that location. This means that one population of each species, respectively, would be lost out of the 21 populations of humped bladderwort and 41 populations of northern bog clubmoss statewide.

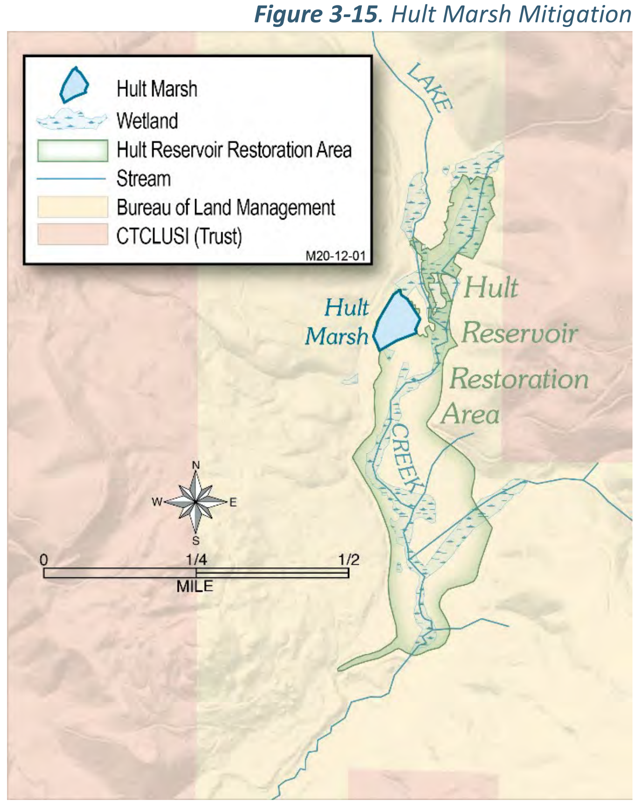
Potential Mitigation for Alternatives 3 and 4

The BLM proposes the following mitigation to reduce adverse impacts to aquatic special status plants under Alternatives 3 and 4:

- Maintain warm-water habitat in the large open wetland at the north end of the reservoir (Hult Marsh; see Figure 3-15).
    - Utilize deconstructed fill material from the dam to control and contain water for special status plant species and wildlife management (e.g., large beaver dam analog, low embankment). Maintain approximately 3 to 6 feet of permanent water.

There is some risk that this mitigation would not be successful if habitat conditions are not conducive to continued survival of the species. For example, water flow rates through the area may not be high enough to keep the remnant pool filled, the weir may not successfully hold back water, or other habitat changes may occur based on water chemistry or vegetation growth. Even with this mitigation, the remaining humped bladderwort along the east-central side of the reservoir would no longer be present.

***Figure 3-15**. Hult Marsh Mitigation*



Summary of the Impacts of the Alternatives

Table 3-20 shows the effects under each alternative.

Table 3-20. *Summary of the Effects of the Alternatives (Special Status Plants)*

Alternative	Effect
Affected Environment/Alt. 1: No Action Alternative (within 8 years)	Population surviving; risk if temporary lowering occurs
Alt. 1.1 (Dam Failure) and Alt. 1.2 (Drain Reservoir)	Population no longer present
Alt. 2: Build a New Dam (drain reservoir)	Population no longer present
Alt. 3: Add Little Log Pond; and Alt. 4: Remove Hult Reservoir	Population no longer present
Alt. 3: Add Little Log Pond; and Alt. 4: Remove Hult Reservoir with potential mitigation (Hult Marsh)	Populations possibly surviving in part

Cumulative Effects

The BLM is not aware of additional projects other than at Hult Reservoir that would impact populations of the Bureau sensitive species humped bladderwort and northern bog clubmoss in Oregon. However, many of the known populations are either historic or have threats cited (Table 3-19).

Issue 12: How would implementation of the alternatives affect the introduction and spread of invasive plants?

The 2016 RMP (USDI 2016a:80) directs the BLM to "implement measures to prevent, detect, and rapidly control new invasive species infestations" and to use various "treatments to manage invasive species infestations." The 2016 RMP direction on invasive species management is aligned with Executive Order 13112 (Feb. 8, 1999), which also states that Federal agencies "shall identify actions that may affect the status of invasive species, and not authorize actions that are likely to cause or promote the introduction or spread of invasive species unless the benefits of such actions clearly outweigh the potential harm caused by invasive species, and that all feasible and prudent measures to minimize risk of harm be taken in conjunction with the actions."

During the January 2022 scoping period, the BLM received comments from the public and the Environmental Protection Agency that expressed concern over possible invasion of non-native plant species, recommended that the Hult EIS include management direction in accordance with Executive Order 13112, and requested a discussion of measures that would be implemented to reduce the likelihood of introduction and spread of invasive species within the planning area. Analysis of this issue is necessary to determine the significance of the impacts.

Analytical Process

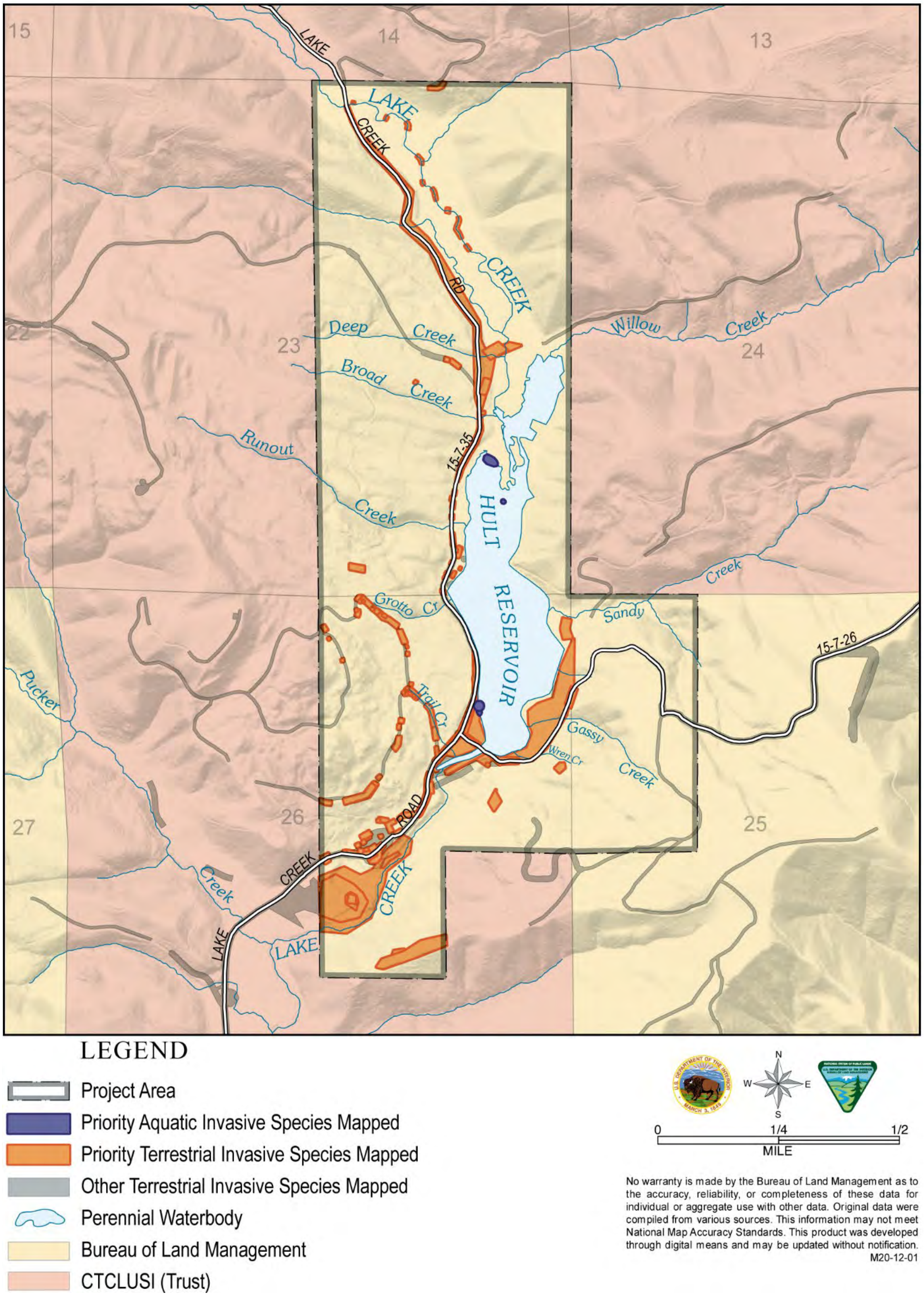
Assumptions

The following assumptions are necessary for the BLM to assess how the alternatives would impact invasive plant[88] introduction and spread (see Table 3-22 for more information about invasive plant species and infestations):

- Construction activities and associated increased foot and vehicle traffic will result in soil disturbance and the spread of plant materials in the project area.
- Invasive plants already present in and around the project area will colonize disturbed areas.

[88] Invasive plants are non-native aggressive plants with either the potential to cause significant damage to native ecosystems, cause significant economic losses, or both. Noxious weeds are a subset of invasive plants that are State-, or federally listed as injurious to public health, agriculture, recreation, wildlife, or any public or private property. Thus, the term "invasive plants" includes noxious weeds (USDI 2010:xix). (However, the invasive plants described in this section are all noxious weeds so the terms can be used interchangeably.)

***Figure 3-16**. Invasive Plants in the Project Area*



- Reed canarygrass (*Phalaris arundinacea*) spreads rapidly from both vegetative (via rhizomes) and sexual (seed germination) reproduction to form dense, monospecific stands in low-lying areas with exposed soils (Barnes 1999). Reed canarygrass usually occurs in wetlands but can also grow in upland areas (Reed 1988, Lichvar et al. 2012).
- Parrotfeather (*Myriophyllum aquaticum*) is dioecious (having male and female plants), and only pistillate (female) flowers are known in North America. Reproduction will occur vegetatively through fragmentation rather than seed production (Aiken 1981).
- Reed canarygrass, false brome (*Brachypodium sylvaticum*), invasive blackberries (*Rubus* spp.), and parrotfeather are the highest priority invasive plants currently located in the project area because of the aggressive nature of their infestations and difficulties with effective and economical treatment.
- A few B-Listed noxious weeds (ODA 2022) present in the project area will not be prioritized for treatment by the BLM because they are widespread and abundant across the State and may already be subject to biological control methods conducted through the Oregon Department of Agriculture (e.g., St. Johnswort (*Hypericum perforatum*), tansy ragwort (*Jacobaea vulgaris*), bull thistle (*Cirsium vulgare*), and Canada thistle (*Cirsium arvense*)).
- The BLM will use gross acreage of invasive plants in the project area for analysis purposes because there is not sufficient data to calculate net acreage for all documented invasive plant infestations.
- Mapped invasive plant infestations are an accurate representation of the invasive plants currently present in the project area. However, some invasive plants are present that have not been documented. Mapping efforts did not include reed canarygrass, except during limited roadside surveys in 2003.
- BLM staff and neighboring partners (State, CTCLUSI, private landowners, etc.) will be able to conduct invasive plant treatments on only a portion of existing and future infestations due to limitations of available funding and other resources needed to perform treatments.

Summary of Analytical Methods

The geographic scale for this analysis is the immediate project vicinity, which is defined as the 609-acre project area (see Figure 2-1), 3 miles surrounding the project area (to account for spread along roads and waterways in the watershed), and downstream Lake Creek to Triangle Lake.

The temporal scale for this analysis is 10 years. This accounts for restoration and other follow-up work that would take place after initial project implementation (or, under Alternative 1, dam failure or BLM draining the reservoir to prevent imminent dam failure). The BLM will use the current District invasive plants implementation program for the next decade. However, forecasting invasive plant introduction and spread past 10 years is difficult considering the many variables at play; projecting out more than one decade would be speculative.

The analysis will also include an additional short-term scale of 2 to 5 years (the duration of project implementation: dam, road, bridge, and trail construction, etc.).

The impact indicator is the risk rating of invasive plant invasion and spread (see Table 3-21), compared across alternatives for terrestrial invasive plants. Acres of standing water are compared across alternatives to indicate the amount of viable habitat that will be available for aquatic invasive plants under each alternative.

The Field Office weeds specialist will use the BLM 9015 Integrated Weed Management Manual (USDI 1992) to compare the risk rating of invasive plant introduction and spread across the alternatives presented in this EIS. The 9015 Manual guides weeds specialists to calculate a risk rating, with associated recommended actions for a given project and/or alternative. The risk rating is calculated using the following steps (see Appendix 1 in USDI 1992):

1. Identify the likelihood and consequence of adverse effects (with ratings of 0–10)
2. Multiply the level of likelihood by the consequences
3. Use the value from step 2 to determine the Risk Rating and recommended Action

Table 3-21 displays the risk assessment steps, ratings, and associated site conditions and action steps. As written in the BLM 9015 Manual, the numerical values associated with the likelihood (factor 1) and consequence (factor 2) of adverse effects from invasive plants are set at 0, 1, 5, or 10. For this analysis, the weeds specialist selected values from the range of 0–10 to reflect and highlight the nuances of this complex project, with accompanying rationale.

Botanical survey data from the Geographic Biotic Observations (GeoBOB) database was pulled on September 28, 2022. Invasive plant infestation data for this analysis was also pulled on September 28, 2022, from the National Invasive Species Information Management System (NISIMS) and Vegetation Management Action Portal (VMAP) databases.[89] Additionally, WeedMapper (Oregon Department of Agriculture) data for invasive plant infestation points on non-BLM land surrounding the project area was pulled on October 13, 2022.

Table 3-21*. Risk Assessment Factors and Rating From BLM Manual 9015: Integrated Weed Management*

Rating	***Value***	***Description/Action***
Factor 1: Likelihood of noxious weed species spreading to project area		
None	0	Noxious weed species not located within or adjacent to the project area. Project activity is not likely to result in the establishment of noxious weed species in the project area.
Low	1	Noxious weed species present in areas adjacent to but not within the project area. Project activities can be implemented and prevent the spread of noxious weeds into the project area.
Moderate	2–5*	Noxious weed species located immediately adjacent to or within the project area. Project activities are likely to result in some areas becoming infested with noxious weed species, even when preventative management actions are followed. Control measures are essential to prevent the spread of noxious weeds within the project area.
High	6–10*	Heavy infestations of noxious weeds are located within or immediately adjacent to the project area. Project activities, even with preventative management actions, are likely to result in the establishment and spread of noxious weeds on disturbed sites throughout much of the project area.
Factor 2: Consequence of noxious weed establishment in project area		
Low to nonexistent	1	None. No effects expected.
Moderate	2–5*	Possible adverse effects on-site and possible expansion of infestation within project area. Effects on native plant community are likely but limited.
High	6–10*	Obvious adverse effects within the project area and probable expansion of noxious weed infestations to areas outside the project area. Adverse effects on native plant community are probable.
Risk rating and action: Multiply value from factor 1 (likelihood) by factor 2 (consequence)		
None	0	Proceed as planned.
Low	1–10	Proceed as planned. Initiate control treatment on noxious weed populations that get established in the area.
Moderate	11–25*	Develop preventative management measures for the proposed project to reduce the risk of introduction or spread of noxious weeds into the area. Preventative management measures should include modifying the project to include seeding the area to occupy disturbed sites with desirable species. Monitor area for at least 3 consecutive years and provide for control of newly established populations of noxious weeds and follow-up treatment for previously treated infestations.
High	26–100*	Project must be modified to reduce risk level through preventative management measures, including seeding with desirable species to occupy disturbed sites and controlling existing infestations of noxious weed prior to project activity. Project must provide at least 5 consecutive years of monitoring. Projects must also provide for control of newly established populations of noxious weeds and follow-up treatment for previously treated infestations.

*These values are not reflected as ranges in the BLM 9015 Manual. They are set at 5 for moderate and 10 for high in factors 1 and 2, the moderate overall risk rating is set at a value of 25, and high overall risk is valued 5–100. For this analysis, a range is used.

[89] The NISMS database was retired in 2019 and replaced by VMAP. Invasive plants data collected after 2018 is stored in VMAP.

Affected Environment

Invasive plants in or near the project area are shown in Figure 3-16. Reed canarygrass is one of the invasive plants of highest concern in the project area. Control measures are costly and have had limited effectiveness thus far. Reed canarygrass has formed monospecific stands that are incised and undercut in the Lake Creek watershed (see Figure 3-17 for an example). Control of reed canarygrass can require repeated mechanical and chemical control measures (Kilbride and Paveglio 1999). Around the project area, reed canarygrass appears to be somewhat contained by dense shade and perennial flooding. As such, a local watershed council planted native trees and shrubs in several areas (at Swartz Creek and Pucker Creek) with the goal of shading out the reed canarygrass. Even if eventually effective, it can take several decades for native trees to provide sufficient shade to inhibit reed canarygrass growth.

***Figure 3-17**. Monospecific Reed Canarygrass Stand with Thick Sod Layer and Undercut, Unstable Streambanks*[1]

1. Swartz Creek, located near Hult Reservoir.

Parrotfeather is another priority invasive plant in the project area. The parrotfeather infestation in Hult Reservoir initially started at the boat dock, but over the years, it spread upstream and eventually established a larger infestation in the northwest backwater section of the reservoir. In the summers of 2021 and 2022, a BLM partner manually treated parrotfeather in Hult Reservoir by hand pulling from boats. The density of parrotfeather in the 2022 growing season was comparable to the density in 2021, despite the treatment measures taken. Manual treatment of parrotfeather runs the risk of causing the plant to break and fragment, which can exacerbate vegetative reproduction and hinder control efforts.

Other priority invasive plant species in the project area are Himalayan and cutleaf blackberry, false brome, Scotch broom, English ivy, Japanese knotweed, meadow knapweed, and Robert's and shiny geranium. These species have been identified as high-priority invasive plants for treatment by BLM botanists, the Siuslaw Watershed Council, CTCLUSI, and the BLM N126 LSR Landscape Plan (USDI 2021a), which overlaps the project area. Invasive blackberries and false brome are of particular concern due to their ability to grow in sun or shade, spread rapidly, and displace native plants. See Table 3-22 for total gross acres of known infestations of priority invasive plant species in the project area, as well as the habitats where these invasive plants typically grow.

Table 3-22. *Priority Invasive Plant Species in Project Area*

Priority invasive plant species	Scientific name	NRCS[1] species code	Mapped gross acres[2]	Common/typical habitat
Reed canarygrass	*Phalaris arundinacea*	PHAR3	2.6	Roadsides, ditches, marshes, wet meadows
Parrotfeather	*Myriophyllum aquaticum*	MYAQ2	0.3	Aquatic, pond
English ivy	*Hedera helix*	HEHE	0.5	Forest, riparian, roadsides, near residential areas, old home sites
Japanese knotweed	*Polygonum cuspidatum*	POCU6	0.4	Riparian, waste areas, forest edges
False brome	*Brachypodium sylvaticum*	BRSY	0.9	Widespread; roadsides, forest, woodland, riparian, shady areas
Meadow knapweed	*Centaurea debeauxii spp. Thuillieri*	CEDE5	4.2	Widespread on pastures, roadsides, fields, meadows, forest openings, waste areas
Scotch broom	*Cytisus scoparius*	CYSC4	2.6	Open forest, roadside, woodland, grassland, clearings
Himalayan blackberry	*Rubus armeniacus*	RUAR9	10.8	Widespread in open forest, roadsides, wet areas
Cutleaf blackberry	*Rubus laciniatus*	RULA	2.3	Open forest, roadsides, wet areas
Shiny geranium	*Geranium lucidum*	GELU	0.1	Roadsides, forest
Robert's geranium	*Geranium robertianum*	GERO	27.7	Roadsides, forest

1. NRCS: National Resources Conservation Service (an agency of the U.S. Department of Agriculture).
2. False brome, meadow knapweed, Scotch broom, Himalayan and cutleaf blackberry, and Robert's geranium were mapped during a 2023 botany survey of the Hult project area. All other weed acres were calculated from data collected over several years for unrelated projects and are an estimate of current totals.

Other invasive plants in the project area include Canada and bull thistle, purple foxglove, St. Johnswort, tansy ragwort, and bittersweet nightshade (*Solanum dulcamara*). These invasive plant species are not typically prioritized for treatments in the Siuslaw Field Office because most are regionally abundant and tend to have relatively low impacts, and some are subject to biological control through the Oregon Department of Agriculture (ODA 2022).

Invasive plant infestation data from various sources (e.g., Consortium of Pacific Northwest Herbaria, Federal and State agencies, NGOs) is available in WeedMapper (part of the VMAP database system). The larger 3-mile area surrounding the project area contains a similar assemblage of terrestrial and aquatic invasive plants. Additionally, parrotfeather, water primrose (*Ludwigia grandiflora ssp. Hexapetala*), and South American waterweed (*Egeria densa*) are documented and have been recently observed downstream of Hult Reservoir (in Triangle Lake and by Lake Creek Falls.)

The relative risk of invasive plant invasion and spread across Western Oregon watersheds was analyzed in the *Proposed Resource Management Plan and Final Environmental Impact Statement for Resource Management Plans for Western Oregon* as a function of timber harvest activities, new road construction, and public motor vehicle use (USDI 2016b:435–438). Actual risk of invasive plant invasion and spread varies by site and depends on the specific projects taking place. Under the current management of the dam, the invasive plants risk rating is moderate because invasive plants are already present in the project area and may spread due to recreation activities at the reservoir, vehicle traffic, nearby logging activity, etc. See the *Summary of the Impacts of the Alternatives* section for a comparison of invasive plants risk ratings between the various alternatives.

Environmental Consequences

Direct and Indirect Effects

Alternative 1: No Action (Continue Current Management)

Under the No Action Alternative, the BLM would continue to manage the dam in the current manner. Current invasive plant infestations in the project area would continue to spread through vehicle traffic, recreation activities, and natural dispersal via animals, wind, and water. The BLM would continue the current District invasive plant management program and treat priority invasive plant infestations as resources allowed. Some invasive plant infestations would be reduced through BLM's invasive plant treatments. At a future date, the dam would reach a point of imminent failure and either it would fail (Alternative 1.1), or the reservoir would be drained to prevent a dam failure (Alternative 1.2).

Alternative 1.1: Dam Failure

Under Alternative 1.1, the currently maintained dam would eventually fail and breach. Dam failure would cause severe flooding and disturbance. The Hult Reservoir footprint would be exposed as the water flooded the downstream areas around Lake Creek. The exposed reservoir footprint would be prime habitat for colonizing invasive species already present in the project area, such as reed canarygrass, false brome, and Himalayan and cutleaf blackberry. Floodplain areas downstream of the reservoir would be subject to flooding, erosion, and introduction of plant materials carried in floodwaters. Terrestrial and aquatic invasive plants present in the project area could establish in new sites along Lake Creek and could add to the aquatic invasive plants present in Triangle Lake.

Alternative 1.2: Drain Reservoir

Under Alternative 1.2, the BLM would drain Hult Reservoir when dam failure was imminent. The reservoir footprint would be exposed, and terrestrial invasive plants would likely colonize the area as in Alternative 1.1. Disturbance to riparian areas along Lake Creek downstream of the reservoir would be less severe than in the case of rapid flooding in Alternative 1.1. Most of the parrotfeather in Hult Reservoir would dry out and die when the reservoir was drained. Some could potentially survive and be transported downstream, but the parrotfeather likely already spreads downstream during periods of high water in the winter, and it is already documented downstream of Hult Reservoir.

Alternative 2: Remove the Existing Dam and Build a New Dam to Maintain Hult Reservoir

Under this alternative, the BLM would decommission the existing dam and build a new one. Soil disturbance caused during construction and other project implementation activities would create favorable conditions for invasive plant introduction and spread. Heavy equipment, other vehicles, and foot traffic during project implementation would provide additional means for invasive plant introduction and spread. The exchange of materials (moving old dam materials offsite and bringing new materials onsite) would pose additional risk of invasive plant introduction in the project site as well as offsite where the old dam materials are deposited. Construction activities would take place during the summer when the water level is at its lowest, which is also the growing season for priority invasive plants like reed canarygrass, false brome, and invasive blackberries. Project design features to monitor and treat invasive plants before and after project implementation would help offset the risk of invasive plant spread.

During construction of the new dam Under Alternative 2, the BLM would drain the reservoir. The exposed reservoir bed would be suitable habitat for terrestrial invasive plants like reed canarygrass and false brome during construction. Some parrotfeather fragments could travel downstream with water drained from the reservoir, but remaining fragments on the exposed reservoir bed would dry out and likely die.

Once the new dam was in place and the reservoir refilled, newly established reed canarygrass and other invasive plants would be inundated and likely die. Invasive plant seeds and other plant materials could survive and inadvertently be transferred downstream or spread via other dispersal mechanisms.

Alternatives 3: Remove Hult Reservoir; Add Little Log Pond and 4: Preferred Alternative (Remove Hult Reservoir)

Under Alternatives 3 and 4, the BLM would remove Hult Pond Dam and Reservoir, and Lake Creek would reestablish in the reservoir footprint. Terrestrial invasive plants would spread into the exposed Hult Reservoir Restoration Area once the water was drained. However, the restoration project design features described in Chapter 2 of this document, such as native seeding and planting, would help reduce the impacts of terrestrial invasive plant spread in the project area. Reed canarygrass would likely be the most dominant invasive plant due to its abundance in areas both up and downstream of Hult Reservoir. False brome, invasive blackberries, and other terrestrial invasive plants would also likely invade the exposed reservoir footprint. The BLM would need to use continued monitoring and adaptive management to control invasive plants to a level that still allowed for healthy ecosystem functioning, a thriving native plant community, and suitable habitat for native wildlife.

Most of the parrotfeather and other aquatic invasive plants would not survive once the reservoir was drained, as they would dry out and no longer be viable for vegetative reproduction. However, some plant materials could be transported downstream and survive in areas of slow or standing water, including Triangle Lake. Aquatic invasive plants are already present in Triangle Lake and along Lake Creek, so downstream movement of some parrotfeather fragments from the reservoir may not drastically change the habitat quality in those waterbodies. Additionally, regular monitoring and adaptive management would be necessary to prevent parrotfeather and other aquatic invasive plants from spreading into Hult Marsh (a potential mitigation measure to support Bureau sensitive plants and wildlife).

Under Alternative 3, the BLM would create Little Log Pond by building a new, smaller dam downstream of the current Hult Pond Dam. Risk of terrestrial invasive plant invasion and spread would be slightly higher under Alternative 3 than Alternative 4 because of the traffic and construction activities associated with establishing Little Log Pond and building the new dam and bridge. Increased risk of invasive plant spread is also associated with some project design features of Alternative 3 and 4, including installing in-stream structures, building a multi-use trail, building a camp host site, adding a day-use area, and creating an improved roadway for fire engines and water tenders. Additionally, Little Log Pond would be used for recreation, which could also promote the introduction and spread of invasive plant materials through additional foot and vehicle traffic, boating, illegal dumping of aquariums, and ongoing maintenance of the sandy beach area. Fragments of the parrotfeather currently in Hult Reservoir could colonize the newly created Little Log Pond.

Summary of the Impacts of the Alternatives

Terrestrial invasive plant invasion and spread risk

Alternative 1.1 has the highest risk rating for terrestrial invasive plant invasion and spread, with a total relative value of 100 (see Table 3-23). The *likelihood* of noxious weeds spreading (factor 1 in the risk analysis) into the project area is high (value 10) because there are heavy infestations of reed canarygrass and other invasive plants in and adjacent to the project area, and dam failure would create disturbed habitat highly susceptible to spread and establishment of invasive plants. The *consequence* of noxious weed establishment in the project area (factor 2 in the risk analysis) is also high (value 10) because the footprint of the reservoir and other areas disturbed by flooding would be heavily infested with invasive plants. Impacts to the native riparian plant community would be significant, particularly without targeted measures already prepared (as would be the case for the action alternatives).

Alternative 1.2 also has a high risk rating, but with a total value of 81–100. The *likelihood* of noxious weed spread is still high, but with a value of 9–10 because draining the reservoir could cause less disturbance than rapid flooding. The *consequence* of noxious weed establishment is high (value 9–10) because effects on the native plant community would be significant in the project area, although they may not have as large a spatial extent as in Alternative 1.1.

The risk ratings for Alternatives 3 and 4 are also high, with a value range of 63–81 for Alternative 3 and 56–72 for Alternative 4. The *likelihood* of noxious weeds spreading into the project area is high because the reservoir would be drained, leaving the footprint exposed and available for colonization by reed canarygrass and other priority invasive plants. Alternative 3 would have a slightly higher likelihood (value 9) compared to Alternative 4 (value 8) because the construction and maintenance of the smaller dam and Little Log Pond and associated recreation areas would provide additional opportunities for invasive plant introduction and spread. The *consequence* of noxious weed establishment in the project area is also high, with a value range of 7–9 for both Alternatives 3 and 4; the potential for adverse effects on the native plant community would be high but would depend on the effectiveness and success of project design features for restoration and invasive plant control.

The noxious weed risk rating for Alternative 2 is moderate because the reservoir would be drained during dam construction. This would provide an opportunity for terrestrial invasive plants to spread into the Hult Reservoir Restoration Area and possibly be transported downstream or along roads during and after dam construction.

Table 3-23. *Risk of Terrestrial Invasive Plant Invasion and Spread in the Project Area*

Alternative	Likelihood of invasive plants spreading to project area	Likelihood value*	Consequence of invasive plant establishment	Consequence value*	Risk value (0–100)	Risk rating
Affected Environment (Current Management)	Moderate	5	Moderate	5	25	Moderate
Alt. 1.1: No Action, Dam Failure	High	10	High	10	100	High
Alt. 1.2: No Action, Drain Reservoir	High	9–10	High	9–10	81–100	High
Alt. 2: Build New Dam	Moderate	5	Moderate	5	25	Moderate
Alt. 3: Add Little Log Pond	High	9	High	7–9	63–81	High
Alt. 4: Remove Hult Reservoir	High	8	High	7–9	56–72	High

*See text for rationale on likelihood and consequence values assigned.

Available aquatic invasive plant habitat compared across alternatives

Varying amounts of habitat (standing water) for parrotfeather and other aquatic invasive plants would be present in the project area under each alternative (Table 3-24). The BLM defines standing water as any depth of surface water that persists year-round. The affected environment (current area of Hult Reservoir) contains more standing water (53.9 acres) than would be present under any of the action alternatives.

Table 3-24. *Available Aquatic Invasive Plant Habitat (Acres of Standing Water), by Alternative*

Alternative	Affected Environment	Alts. 1.1 and 1.2: No Action	Alt. 2: Build New Dam[1]	Alt. 3: Add Little Log Pond		Alt. 4: Remove Hult Reservoir	
				With aquatic/wetland mitigation	With Hult Marsh[2] mitigation	With aquatic/wetland mitigation	With Hult Marsh mitigation
Standing water (acres)	53.9	0.0	53.3	4.7	7.4	0.0	2.7

1. Standing water area would be reduced slightly under Alternative 2 by the removal of the existing spillway and its replacement with a roughened channel for fish passage.
2. For special status plants and wildlife

Of the action alternatives, building a new dam (Alternative 2) would provide the most habitat for aquatic invasive plants, with 53.3 acres of standing water—slightly less than the current area of Hult Reservoir. Indirect effects are possible, but the risk of aquatic invasive plant spread would be low because most of the parrotfeather would die when Hult Reservoir was drained during dam construction. However, once the reservoir was refilled, the habitat would again be available for reestablishment by parrotfeather and other aquatic invasive plants.

Under Alternatives 1, 3, and 4, most of the parrotfeather and other aquatic invasive plants would die when the reservoir was drained, or the dam failed (Alternative 1.1). No new aquatic invasive plant habitat would be established in the project area under the No Action Alternative (1.1 or 1.2), but disturbance and flooding resulting from a dam failure (Alternative 1.1) could result in the spread of aquatic invasive plants outside the project area. Under Alternative 4, the newly established Lake Creek would undergo ecological restoration. However, standing water and potential aquatic invasive plant habitat would exist only if botany mitigations were applied (creating 2.7-acre Hult Marsh for sensitive plants and wildlife species). In Alternative 3, Little Log Pond would provide 4.7 acres of new habitat for possible aquatic invasive plant invasion, plus the 2.7-acre marsh if botany mitigation was implemented.

Cumulative Effects

Cumulative effects could include increased weed invasion and spread due to traffic and construction around the Hult project area combined with nearby upcoming timber sale activity. On the other hand, BLM timber sales typically include weed treatments and mitigation that could offset some of the weed introduction and spread between projects. There are seven proposed commercial thins within three miles of the Hult project area on the Siuslaw Field Office sale plan between 2022 and 2030. The sale plan is subject to change based on shifting priorities and it would be speculative to project farther than out than 2030.

CTCLUSI is in the progress of writing a forest management plan that may also address implementing projects on neighboring Tribal land that could increase traffic, weed introduction, or weed treatments near the project area. At the same time, there may be opportunities for BLM and CTCLUSI staff members to collaborate on weed treatments.

Recreation activities at and around Hult Reservoir and Triangle Lake could also influence the amount of weed spread during project implementation, but these recreation sites likely would have a similar amount of visitation during project implementation as they typically have during other times.

Issue 13: How would implementation of the alternatives affect persistence of the western pond turtle?

The northwestern pond turtle (*Actinemys marmorata*) is one of two separate species of western pond turtles. (The other is the southwestern pond turtle, *Actinemys pallida*, found in southern California and Baja California.) The northwestern pond turtle ranges from Puget Sound, Washington, south to the San Francisco Bay Area and the southern end of the Central Valley of California (Bury and Germano 2008, Barela and Olson 2014). In the northern portion of its range (Willamette Valley and north), *A. marmorata* primarily occurs west of the Cascades and east of the Coast Range and Olympic Mountains in pockets that have oak woodland and open areas (such as the Willamette Valley and the Puget Lowlands) (Germano et al. 2022:110).

The United States Fish and Wildlife Service (USFWS) has proposed the western pond turtle for listing as threatened under *the Endangered Species Act*. A decision is expected by late 2024 (USDI 2023b). USFWS identified three key factors as most influential in driving the current and future condition: human impacts, predation by bullfrogs, and drought (USDI 2023b). Although the best available biological information is needed for this EIS assessment, much of the life-history for the western pond turtle is unknown in the northern portion of its range, where Hult Reservoir is located.

The BLM currently manages the turtle as a Bureau sensitive species. Bureau Sensitive Species Policy (BLM Manual 6840 Special Status Species Management) considers sensitive species to be those “requiring special management consideration to promote their conservation and reduce the likelihood and need for future listing under the *Endangered Species Act*” (USDI 2008b).

The BLM is a member of the Western Pond Turtle Range-wide Conservation Coalition (RCC), which has developed a range-wide management strategy for the western pond turtle (RCC 2020). The purpose of this interagency strategy is to ensure the long-term viability in the wild of western pond turtles and to maintain self-sustaining populations of the two species (*A. marmorata* and *A. pallida*)] (RCC 2020:2). Conservation strategies include to “investigate genetic variability of the western pond turtle throughout its range” and to “avoid and minimize direct and indirect adverse effects to western pond turtles and their habitat” (RCC 2020:16, 18).

The BLM received comments from the public during the January 2022 scoping period and the May 2022 public comment period on draft Chapters 1 and 2 expressing concern about the impact of the alternatives on western turtles and their habitat within the project area. Analysis of this issue is necessary to determine the significance of the impacts.

Analytical Process

Incomplete or Unavailable Information

The Council on Environmental Quality (CEQ) regulations provide direction on how to proceed with the preparation of an EIS when information is incomplete or unavailable. As described at 40 CFR 1502.21I:

> If the information relevant to reasonably foreseeable significant adverse impacts cannot be obtained because the overall costs of obtaining it are exorbitant or the means to obtain it are not known, the agency shall include within the environmental impact statement:
> 1) a statement that such information is incomplete or unavailable;
> 2) a statement of the relevance of the incomplete or unavailable information to evaluating reasonably foreseeable significant adverse impacts on the human environment;
> 3) a summary of existing credible scientific evidence which is relevant to evaluating the reasonably foreseeable significant adverse impacts on the human environment; and
> 4) the agency’s evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community.

As described below, little information is known about northwestern pond turtle populations in the Oregon Coast Range. This issue and analysis, in its entirety, addresses the above CEQ-provided direction.

Oregon Populations of Northwestern Pond Turtles

In 2017, Washington, Oregon, and California received a Federal Competitive State Wildlife Grant to address conservation actions that would fill knowledge gaps on the northwestern pond turtle. In Oregon, the grant included an objective of data compilation, analysis, and standardized occupancy surveys during the 2018, 2019, and 2020 field seasons (Ringo and Bliss-Ketchum 2021:4). In Oregon, 330 surveys were completed that looked at 270 historic sites (where turtles had previously occupied the area) and 60 modeled sites (areas where turtles were not previously known but where “good” habitat was designated based on the ORBIC western pond turtle habitat model) (Ringo and Bliss-Ketchum 2021:12–22). A total of 1,042 pond turtles were observed in these surveys, including 4 hatchlings and 144 juveniles (Ringo and Bliss-Ketchum 2021:22).

Survey sites were evenly split between lentic (still freshwater) and lotic (rapidly moving freshwater) sites. The estimated percentages of occupied locations in lentic sites were 48.5 percent and 61.6 percent in the modeled and historic sites data sets, respectively. Similarly, for lotic locations, occupied locations were 44 percent and 59.8 percent in the modeled and historic sites data sets, respectively. (Ringo and Bliss-Ketchum 2021:35). However, the models developed from these surveys could not distinguish sustainable populations from “zombie populations”—populations where adults are present but there is no active recruitment (i.e., addition of new individuals to that population) (Ringo and Bliss-Ketchum 2021:35).

Oregon Coast Range Populations of Western Pond Turtles

Little is known about western pond turtles in the Oregon Coast Range. As described above, in Oregon, the turtles are primarily found east of the Coast Range. There have been few observations recorded across the Oregon Coast Range. Range-wide surveys in these areas are nearly 30 years old (RCC 2020:11), and their effectiveness at finding and adequately surveying suitable habitat is not known. In the 2018–2020 historic and modeled sites surveys, 10 surveys completed in the Oregon Coast Range west of the Willamette Valley[90] detected western pond turtles at only one site (Ringo and Bliss-Ketchum 2021:21).

Hult Reservoir has the largest known population of western pond turtles in the northern portion of the Oregon Coast Range; it is one of two known breeding populations in the area. However, the relative importance of the population of western pond turtles at Hult Reservoir to the overall persistence of this species is unknown.

Assumptions

Western pond turtles use permanent and seasonal aquatic habitats, including rivers, sloughs, lakes, reservoirs, ponds, and irrigation canals (RCC 2020:7).

- Turtles can be found in fast-moving water habitats, but also need slack-water pools, underwater cover, and structures in or beside the water for basking (DOD 2020:6). Increased amount of potential relative solar radiation was associated with increased probability of pond occupancy (Horn and Gervais 2018:1). Solar exposure and surrounding wetland features were predictive of occupancy and abundance within the context of watershed scales (Horn and Gervais 2018:14). “The need to gain body heat from the environment may be the driving factor behind the association of western pond turtles with ponds with greater relative solar radiation.… If western pond turtles have relatively easy access to ponds or other wetlands, they may use those over river sites, particularly if nearby ponds are warming faster than the flowing waters of rivers and streams … In our study region [Umpqua River watershed], data collected incidentally to this study revealed that ponds and reservoirs with turtles had a mean temperature of 18.8 °C [66 °F] vs. 10.8 °C [51 °F] for ponds and reservoirs that did not support turtles (R. B. Horn, unpublished data).” (Horn and Gervais 2018:15–16). Mean temperatures were the result of data collected between roughly mid-April to October 1 (Horn and Gervais, 2018:5).

[90] Hult Reservoir was not included in these surveys.

- Suitable turtle aquatic habitat offers some areas of quieter, slowly flowing or static water. Turtles need both shallow water and deeper water areas to meet requirements of various life stages (ODFW 2015:30). Shallow water (less than 6 inches) with submerged and emergent aquatic vegetation contributes to ideal habitat conditions for hatchling turtles and provides foraging habitat, while deeper areas (4 – 6 feet) are needed by larger turtles year around (ODFW 2015:29).
- Basking is a critical life function of Oregon's turtles. Western pond turtles spend a considerable amount of time basking and are more abundant in habitats with basking sites (Bury and Germano 2008). They use a variety of sites for basking, such as rocks, sand, mud, downed logs, submerged branches of near-shore vegetation, and emergent or submerged aquatic vegetation. Turtles may use various-sized pieces of large wood left on-site in both upland and aquatic areas in conjunction with overwintering and summer dormancy sites.

Western pond turtles move onto land for nesting, overwintering, dispersal, and summer dormancy.

- Nesting habitat is vital for reproduction and is considered one of the main limiting factors for Oregon's native turtles (ODFW 2015:27). Nesting typically occurs within 200 meters of aquatic habitat in areas with compact, well-drained soil, sparse vegetation, and good solar exposure (Rosenberg and Swift 2013). Western pond turtle nesting may occur in small open areas along trails, levees, roadbeds, fields, grasslands, stream banks, and within utility rights-of-way (ODFW 2015, cited in RCC 2020).
- Larger nesting areas attract more females, have higher nest densities, and reduce overall predation (ODFW 2015:10). A dynamic penetration test conducted on Hult Reservoir in 2015 during the Hult Log Storage Pond Dam Liquefaction Study and Recommendations Report provided an indication of the relative density of granular deposits, dam profile, and dam structure. The study found layers of clayey sand (loose-very loose), silty sand (very loose), silty clayey sand with wood (loose), and silty sand (compact). Soil at turtle nest sites vary, but typically include a high clay content, sandy loam, and gravelly cobble (ODFW 2015:21). Fill material from the dam contains the appropriate soil type to create nesting habitat.
- Hatchlings generally emerge in spring. As observed by Rosenberg and Swift (2013): "Hatchlings typically remained within 2 meters of nests for as long as 59 days after initial emergence. During migration from their nests to aquatic habitat, hatchlings embedded themselves in soil for up to 22 days at stop-over sites. Movements between successive stop-over sites averaged 27 meters. Although the number of days turtles remained within 2 meters of their nest following emergence varied widely among and within nests, hatchlings entered aquatic habitat relatively synchronously. Hatchlings entered aquatic habitat on average 49 days after initial emergence and traveled an average of 89 meters from their nest site. Hatchlings detected in water were always within 1 meter of shore and in areas with dense submerged vegetation and woody debris."
- Turtles overwinter during cold months and go into summer dormancy (aestivation) in response to hot and dry periods. Overwintering sites include shrubby and forested areas, the bottom of muddy ponds and other aquatic habitats, and undercut banks along streams. Western pond turtles overwinter on land at sites up to 500 meters (1640 feet) from the water (Reese and Welsh 1997 cited in RCC 2020), but the majority of individuals overwinter at sites up to 200 meters from water (Pilliod et al. 2013). Overwintering sites tend to have a deep layer of duff or leaf litter under trees or shrubs, and some western pond turtles return to the same site each year (Holte 1988, Holland 1994, Bury et al. 2012a, all cited in RCC 2020).

Invasive plant species, especially reed canarygrass, makes nesting habitat unsuitable or difficult for gravid females to access by forming dense mats that are essentially an impenetrable barrier. The reed canarygrass fibrous roots can also trap turtle hatchlings (ODFW 2015:59)

- Invasive plant control would follow the BLM 9015 weeds manual which directs a high-risk invasive plant species project to "[p]rovide at least 5 consecutive years of monitoring … also provide for control of newly established populations of noxious weeds and follow-up treatment for previously treated infestations (USDI 1992:17)."
- The Integrated Plant Management and Habitat Restoration EA (IPM EA), or the most recent version, would be utilized during invasive weed control.

Invasive and non-native predators (e.g., bullfrogs, largemouth bass, etc.) in western pond turtle habitat influence the species by increasing predation pressure on hatchlings and young juveniles. Increased predation beyond the natural levels under which western pond turtles evolved results in reduced survival and reproduction, affecting population recruitment and abundance, which in turn, lessens overall resiliency (USDI 2023b).

- Largemouth bass predate on hatchling western pond turtle. Non-native game fish in the reservoir are unlikely to be found in the mainstem Lake Creek due to colder water and seasonal high flows. They are not currently present outside of Hult Reservoir and Triangle Lake. If the reservoir is lowered and returned to a run-of-the-river system for more than one season and over the winter, the change in flows and water temperature will completely eliminate non-native fish in the reservoir footprint (pers. comm., John Spangler, ODFW, Nov. 8, 2022). Largemouth bass would be unlikely to tolerate the cold winter flows (See Issue 15).
- American bullfrogs (*Rana catesbeiana*) predate on hatchling western pond turtles. Bullfrogs are likely to remain in the Hult project area without an aggressive eradication effort (Doubledee et al. 2003)

Recreational activities such as hiking, biking, fishing, boating, and off-highway vehicles, and the associated disturbance within or adjacent to aquatic and nest habitats are an important concern for western pond turtles. Turtles and their habitats can be affected by the overuse of an area by people engaged in recreational activities.

- Western pond turtles will rapidly flee from their basking sites into water when disturbed by the sight or sound of people. They are sensitive to human disturbance even at relatively long distances (≥ 100 m, ≥ 328 ft), but will spend more time basking if nearby human activities are obscured (DOD 2020:8, 11). Turtles are attracted to fish bait, especially live worms, and are sometimes found with fishhooks embedded in their mouths or even swallowed entirely (ODFW 2015:65).
- Road mortality is a threat, particularly in recreational areas. Providing safe connectivity between aquatic and upland habitats increasingly becomes a concern as the landscapes continue to fragment. The lack of connectivity at a site can render the site unsuitable for maintaining a viable turtle population (ODFW 2015:83). New barriers such as fences and public trails between western pond turtle aquatic and terrestrial habitats should be avoided.

Western pond turtle abundance is positively correlated to the presence of beaver activity (ODFW 2015:64).

- Beaver damming and foraging habits naturally provide turtles with an abundance of basking material and beaver ponds provide a rich source of food for turtles as they attract frogs, fish, and insects. They also provide deep and shallow water which turtles require. Trees and shrubs felled by beavers also provide turtles with important hiding cover. Beaver damming and tree felling activity creates and maintains suitable aquatic habitat for foraging, hiding cover, summer dormancy, and overwintering. Pond turtles are known to use beaver burrows and lodges as refuge (ODFW 2015:64).

The BLM would obtain wildlife capture, holding, transport, and relocation permits from the Oregon Department of Fish and Wildlife or contact the local U.S. Fish and Wildlife Service or Oregon Department of Fish and Wildlife biologists for directions before handling western pond turtles.

Summary of Analytical Methods

The geographic scale of this analysis (i.e., the geographic extent of the effects of our alternatives) is the water at Hult Reservoir and the surrounding 500 meters of land, which includes the aquatic and terrestrial habitat of the western pond turtle populations at Hult Reservoir. For direct effects under the action alternatives, the temporal scale includes the short-term time frame of active dam work and the removal of high-quality western pond turtle habitat, estimated at 1 to 4 years. The temporal scale for long-term effects is 40 years to allow for the stabilization of habitat, including vegetation, riparian areas, wetlands, and lentic systems (see Issue 9: Wetlands). The analysis will address the likelihood that the breeding population of western pond turtles in the project area will continue to survive.

As described above, a goal of the Western Pond Turtle Range-wide Conservation Coalition is to "investigate genetic variability of the western pond turtle throughout its range" (RCC 2020:16). The importance of the genetic diversity at Hult Reservoir is unknown; the BLM also doesn't know whether Hult Reservoir populations interact with other western pond turtle populations. Thus, any effects analysis at this level would be speculative. Because of these unknowns, potential mitigation to help maintain genetic diversity under action alternatives that would negatively impact the Hult Reservoir turtle population is included here. Mitigation measures, along with the proposed botany and aquatic mitigation measures, would meet the eight essential elements critical for turtle survival and success, which are: sunlight, nesting habitat, aquatic habitat, basking structures, habitat for overwintering and summer dormancy, close proximity to aquatic and terrestrial habitat components, and safe movement corridors between aquatic and terrestrial habitats (ODFW 2015:20).

Affected Environment

Hult Reservoir has a western pond turtle population with a full range of age classes (adults, juveniles, and hatchlings), which means it has a successful breeding population. The Hult Reservoir area appears to be high-quality habitat for pond turtles because it has high solar exposure, a large body of slow water, a large area of open wetland, and open nesting habitat. The locations of nests are unknown but, based on recent detections of juveniles and hatchlings, are likely near the northern end of the reservoir and near the dam.

Environmental Consequences

Direct and Indirect Effects

Alternative 1: No Action (Continue Current Management)

Prior to dam failure or dam breach, Hult Reservoir would continue to have a healthy breeding population of western pond turtles. Dam failure or dam breach and the subsequent loss of the reservoir would reduce (in the short term) and possibly eliminate (in the long term) the project area's ability to support a breeding population of western pond turtles.

Alternative 2: Remove the Existing Dam and Build a New Dam to Maintain Hult Reservoir

In the short term under Alternative 2 (where Hult Reservoir would be drained to some extent for 3 years during dam construction), it is expected that most of the existing western pond turtle population would be eliminated due to the loss of warm-water habitat and migration and predation as individual turtles search for suitable habitat. However, once the reservoir is refilled, the breeding population would rebound and, in the long term, Hult Reservoir would continue to have a healthy population of western pond turtles.

Potential Mitigation (Alternative 2)

The following mitigation may help maintain the genetic diversity of Hult Reservoir western pond turtles under Alternative 2:

- Capture pond turtles before and during the dewatering the reservoir and temporarily move them to another off-site location with suitable habitat.

Alternative 3: Remove Hult Reservoir; Add Little Log Pond and Alternative 4: Preferred Alternative (Remove Hult Reservoir)

Under Alternatives 3 and 4, the loss of Hult Reservoir would reduce and possibly eliminate the project area's ability to support a breeding population of western pond turtles.

Under Alternative 3, The development of the Little Log Pond recreation site is not likely to adversely affect western pond turtle nesting habitat because the site proposed for development is a closed canopy forest of conifer and deciduous trees with little solar exposure reaching the ground. The nearest open canopy area is a parking lot more than 40 meters to the west of the proposed pond location, which is highly disturbed due to vehicular traffic.

Potential Mitigation for Alternatives 3 and 4

The following mitigation measures would be expected to reduce adverse impacts to aquatic special status plants and western pond turtles under Alternatives 3 and 4:

- Maintain warm-water habitat in the large open wetland at the north end of the reservoir (Hult Marsh, see Figure 3-15 in Issue 11 (*Special Status Aquatic Plants*)).
    - Utilize deconstructed fill material from the dam to control and contain water for special status plant species and wildlife management (e.g., large beaver dam analog, low embankment). Maintain approximately 3 to 6 feet of permanent water.
- Design and construct up to five artificial ponds that maintain permanent water with deep (greater than 6 feet) and shallow (less than 3 feet) aquatic habitat. Construct the ponds near other aquatic features for connectivity between habitats and long-term population benefits.
    - Provide approximately 4 acres of ponds within the Hult Reservoir Restoration Area.

To reduce adverse impacts to the Hult Reservoir population of western pond turtles under Alternatives 3 and 4:

- Create warm-water habitat in the reconnected alluvial features, including design of channel and pool morphology (see mitigation measures proposed for wetlands).
    - To promote beaver activity, cut the pilot channel tributaries' stream width within a range of 1 to 8 meters, with a stream gradient of 0.5 to 5 percent (preferred gradient of 3 percent) and a valley width greater than two times the active channel width (USDI 2018b).
- Maintain and promote soft, muddy areas in ponds, wetlands, and other waterbodies known to support turtles (ODFW 2015:30) by planting shrubs and deciduous trees along aquatic habitat that will provide ample leaf litter and cool, moist spots for turtles during prolonged periods of heat. Maintain approximately 30 meters of vegetated buffer[91] (e.g., aquatic vegetation, shrubs, grasses, reeds, deciduous trees) around and adjacent to ponds, wetlands, and other waterbodies (USDI 2018b).
    - Promote beaver habitat in restoration activities by planting at least 225 shrubs and deciduous trees per acre within 30 meters of the aquatic habitat. Preferred species include willow, cottonwood, maple, alder, red osier dogwood, sedges, grasses, and aquatic vegetation (USDI 2018b).

[91] A buffer is a protective zone or area adjacent to or surrounding an important habitat feature such as a stream, wetland, or known wildlife breeding/nest site (ODFW 2015:19)

Figure 3-18: *An Excavator Moves Nesting Material into Place*

Photo Credit: Calapooia Watershed Council

- Maintain and protect turtle nesting habitat and movement corridors from actions that would otherwise make the habitat unsuitable or subject nesting females, developing eggs, or emerging young to increased levels of predation, human-caused mortality, and illegal collection (ODFW 2015:22). Do not disrupt or destroy western pond turtle nesting habitat. Avoid disruption during nesting season[92] when working within movement corridors and when working within 100 meters of nesting habitat. Exceptions include actions that are linked to habitat restoration efforts that would benefit or improve turtle habitat and actions that are directly related to meeting the purpose and need (e.g., reservoir construction, deconstruction, maintenance, or enhancement).
  - Maintain open areas (i.e., areas without overstory) within 100 to 200 meters of ponds and pool areas for nesting in the Hult Reservoir Restoration Area.
  - Buffer western pond turtle nesting habitat by 100 meters from all recreational development to reduce disruption.
  - Utilize deconstructed fill material to create and maintain up to five nesting mounds for western pond turtles measuring at least 20 feet by 20 feet (6 meters by 6 meters) and ranging from 12 inches to 36 inches deep that receive full solar exposure, preferably south facing (ODFW 2015:25).
  - Maintain clear visual and travel paths between waterbodies and occupied or potential nesting sites and remove obstructions to movement in aquatic corridors including the removal of vegetation that can obstruct turtle movement.
- Strategically place instream structure (see mitigation measures proposed for aquatics) of various-sized downed wood to provide needed habitat features for turtles, other wildlife, and fish. Instream wood structure would provide habitat and basking structures and maintain flood flow capacity (ODFW 2015:31).
- To minimize sight and sound disruption around new and existing recreational trails, create and maintain buffers at least 500 feet (150 meters) by planting native vegetation around key turtle[93] areas between habitats and trails (ODFW 2015:55).
- When dewatering a waterbody known or suspected to harbor turtles, leave the drained waterbody undisturbed and free of any wildlife exclusion fencing for at least 5 days (120 hours) before continuing project activities to allow any turtles present to leave on their own when human presence/activity is low. During these 5 days, a wildlife biologist would be on-site as needed during regular work hours to locate and move any turtles away from the construction zone.
- Post signs for anglers with instructions on what to do if they hook a turtle or instructions to immediately transport the turtle to the closest ODFW-licensed wildlife rehabilitation facility that can accept turtles (ODFW 2015:65).
- To avoid and minimize negative impacts to turtles during the construction, operation, and maintenance phases of the project, refer to the best management practices in Appendix B (*Oregon Department of Fish and Wildlife's Native Turtle Best Management Practices*)

With the adoption of all or some of the above mitigation, the project area would be expected to have habitat that could support a breeding population of western pond turtles.

The following mitigation may help maintain the genetic diversity of Hult Reservoir western pond turtles:

- Capture pond turtles before and during the dewatering the reservoir and move them to another off-site location with suitable habitat (such as Hult Marsh).

[92] Early May to mid-September.
[93] Key turtle areas include nesting habitat; basking sites; wildlife managed ponds, pools, and wetlands.

Alternative 3: Remove Hult Reservoir; Add Little Log Pond

Little Log Pond would add 5 acres of warm-water habitat but would not replace the 50-plus acres of current habitat eliminated by the removal of the dam. In addition, the 1- to 2-year period where neither Hult Reservoir nor Little Log Pond exists would make it unlikely that turtles would migrate to the new pond, and even so, the pond may not be suitable habitat due to disturbance from recreationalists and the addition of a non-motorized trail.

Mitigation for Alternative 3

In addition to the potential mitigation described above for both Alternatives 3 and 4, the following measures are proposed to reduce effects to western pond turtle populations.

To reduce adverse impacts to the Hult Reservoir population of western pond turtles under Alternative 3:

- Build Little Log Pond before and during the dewatering of the reservoir.

Cumulative Effects

There are 260 acres within 500 meters of Hult Reservoir that are addressed in the 2020 to 2030 Siuslaw Field Office sale plan (BLM N126 LSR Landscape Plan; USDI 2021a). Proposed commercial thinnings done in these areas would include a 200-meter buffer from suitable aquatic western pond turtle habitat to mitigate potential impacts to nesting pond turtles. Because of these buffers, the BLM does not expect the projects to cumulatively impact nesting pond turtles at Hult Reservoir (under Alternative 2) or the Hult Reservoir Restoration Area (under Alternatives 3 and 4). While turtles may overwinter at sites up to 500 meters from the water, they are more likely to overwinter in a waterbody or in areas with solar exposure, not in dense canopies where commercial thinnings would occur. Because of this, the BLM does not expect the projects to cumulatively impact overwintering pond turtles.

Issue 14: How would implementation of the alternatives affect fish passage and habitat for native fish?

Special status species include Federally listed threatened species like Oregon Coast coho salmon and species managed as Bureau sensitive by the BLM. Bureau Sensitive Species Policy (BLM Manual 6840 Special Status Species Management) considers sensitive species to be those species “requiring special management consideration to promote their conservation and reduce the likelihood and need for future listing under the ESA” (USDI 2008b). Within the affected area of the alternatives, there are three Bureau sensitive fish species in and downstream from Hult Reservoir: Oregon Coast coho salmon (*Oncorhynchus kisutchI*) (see Figure 3-19), Oregon Coast steelhead trout (*Oncorhynchus mykiss*) (see Figure 3-20), and Pacific lamprey (*Entosphenus tridentatus*). Other native fish documented in the reservoir include resident coastal cutthroat trout (*Oncorhynchus clarkii clarkii*) (see Figure 3-20), sculpin (*Cottus sp.*), and western brook lamprey (*Lampetra richardsoni*) (ODFW 2018) (see Table 3-25). Critical habitat for Oregon Coast coho has been designated and totals about 6,650 miles across the evolutionarily significant unit.[94] The critical habitat upstream of Hult represents 0.015 percent of the total critical habitat.

[94] An evolutionarily significant unit is a group that is recognized within a species for conservation purposes. The National Marine Fisheries Service defines an evolutionarily significant unit as a salmon population that is reproductively isolated from other populations and that represents important evolutionary and genetic differences within the species. This evolutionarily significant unit extends from Cape Blano to the mouth of the Columbia River.

***Table 3-25**. Native Fish Known to Occur in Hult Reservoir and Project Area*

Species	Common name	Bureau or Federal status
Cottus sp.	Sculpin	None
Entosphenus tridentatus	Pacific lamprey	Bureau sensitive
Lampetra richardsoni	Western Brook Lamprey	None
Oncorhychus clarkii clarkii	Coastal cutthroat trout	None
Oncorhychus kisutch	Oregon Coast coho salmon	Federally threatened
Oncorhychus mykiss	Oregon Coast steelhead trout	Bureau sensitive

The BLM received comments during the January 2022 scoping period and the May 2022 public comment period for draft Chapters 1 and 2 that expressed concern about the impact of the alternatives to special status fish and fish in general. More specifically:

- What effect would the alternatives have on salmon that spawn in the reservoir?
- How would removal of the reservoir impact the fish that live there?
- How would construction and dismantling a dam impact fish in the project area?
- Which alternative would provide the most benefit to coho reestablishment?
- How would special status fish be impacted or benefitted by the alternatives?
- In light of climate change, how will coho have access to cold headwaters and tributaries?
- How does the loss of an established lake ecosystem impact fish?

Analysis of this issue is necessary to determine the significance of the impacts. The impact of the alternatives to non-native game fish can be found in Issue 15, *How would implementation of the alternatives affect non-native game fish like largemouth bass, bluegill, and bullhead in Hult Reservoir?*

Analytical Process

Assumptions

The current Hult Pond Dam fish ladder does not allow for passage of Pacific lamprey and coho salmon (ODFW 2018). Concrete fish ladders that have rough surfaces and 90-degree corners and edges are not conducive for lamprey passage (Clemens et al. 2017). Steelhead trout can occasionally pass through the dam's ladder.

Fish passage under Alternatives 2 and 3 would include a constructed fish passage facility (referred to as a "natural-like fishway") that would pass upstream migrating coho salmon and steelhead trout along with Pacific lamprey. The fishway would be designed in accordance with Oregon Department of Fish and Wildlife and National Marine Fisheries Service guidelines for fish passage (NMFS 2022, OAR 2022).

Pacific lamprey are currently found downstream approximately one mile below Hult Pond Dam, near the mouth of Pucker Creek (Cory Sipher, BLM fish biologist, unpublished data, 2022). Absent an upstream migration barrier, Pacific lamprey would be expected to recolonize over time and occupy the upper limits of Lake Creek with a distribution similar to that of steelhead trout.

There is currently a mapped coho salmon distribution, although the BLM is unsure of the accuracy of that data given no historical distribution above Lake Creek Falls. The BLM assumes that coho salmon will be able to access and utilize the currently designated 4.5 miles of critical habitat in Lake Creek above Hult Reservoir, which comprises 8.1 percent of all critical Habitat in the geographic scale and 0.6 percent of all critical habitat in the Siuslaw basin. In 2017, the Oregon Department of Fish and Wildlife estimated that up to 8 miles of habitat would be accessible by coho salmon upstream of the reservoir (ODFW 2018). Steelhead trout have access to approximately 11 miles, and resident cutthroat trout access potentially 18 miles of habitat in Lake Creek and its tributaries.

***Figure 3-19**. Coho Salmon Presence and Habitat in the Hult Reservoir Vicinity*

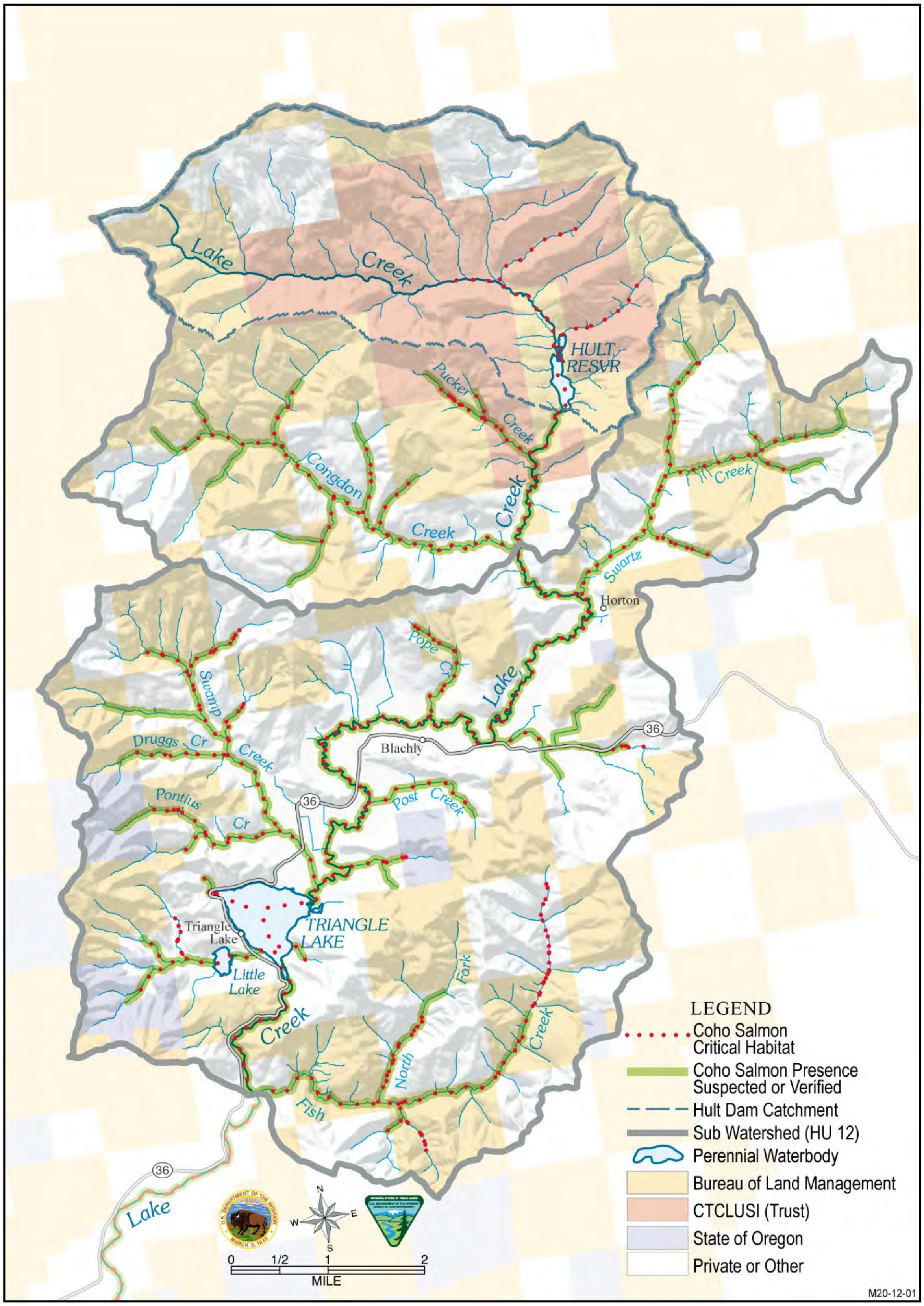
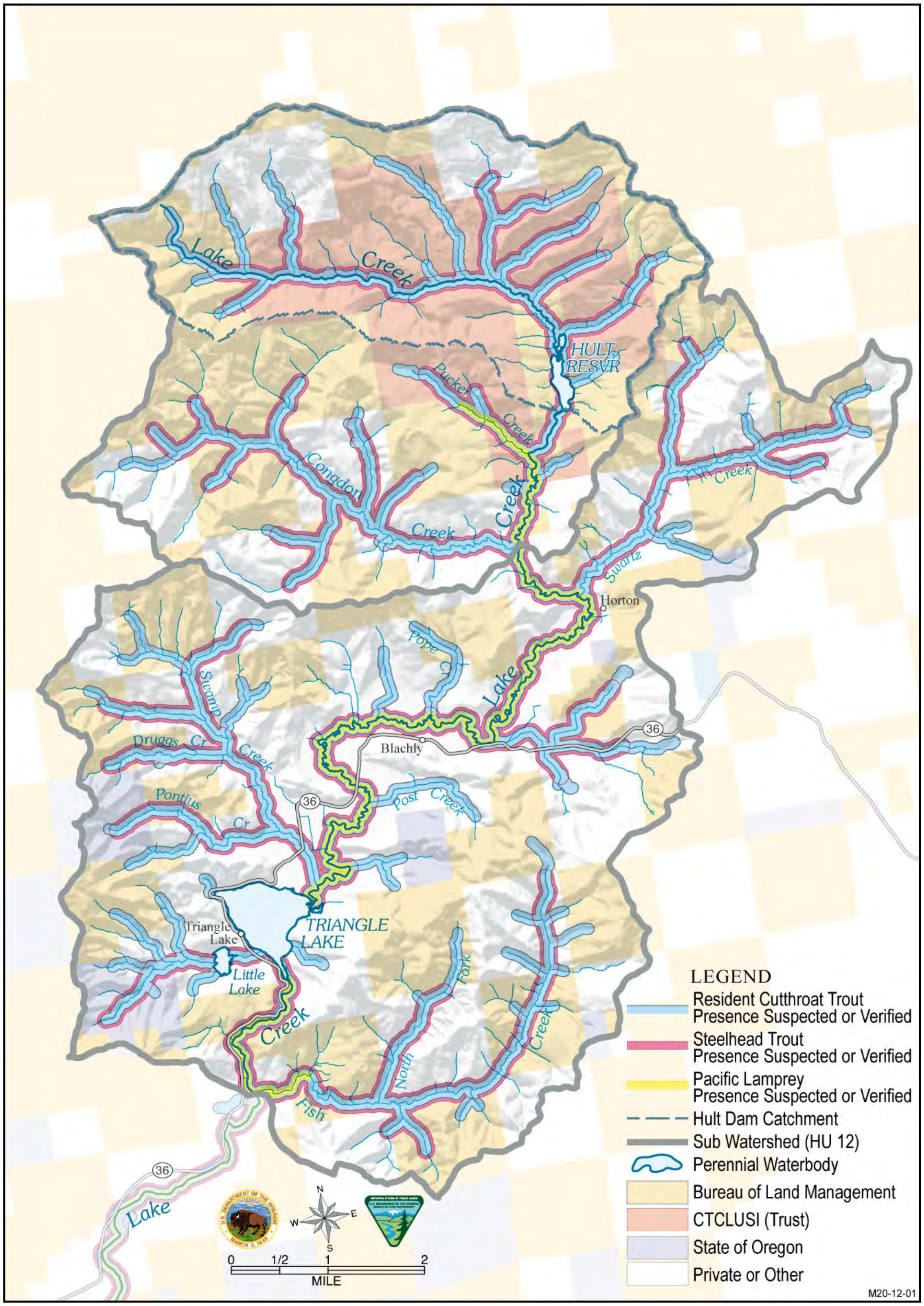


***Figure 3-20**. Bureau Sensitive Fish and Cutthroat Trout Presence in the Hult Reservoir Vicinity*



Native salmonids have diverse life cycles; however, the habitat requirements for adults and juveniles, respectively, are similar enough that the effects can be considered common to all salmonids. Coho salmon, because they are the only federally listed salmonid in the Hult Reservoir vicinity and are currently restricted in upstream movement by the fish ladder, are used as a surrogate for all salmonids. Pacific lamprey and western brook lamprey have juvenile rearing requirements that are dissimilar to salmonids and are described separately as appropriate.

As required by consultation with the National Marine Fisheries Service, the BLM would complete work area isolation and fish salvage for in-water construction activities (NMFS 2013:14). The BLM would acquire a scientific take permit from ODFW which would require the salvage of both native and non-native fish from the disturbed area. Prior to dewatering, the BLM would install block nets to prevent fish moving into the project area and use nets and electrofishing[95] to remove and relocate as many fish from the area as possible. Non-native fish would be moved downstream into Triangle Lake while native fish would be returned to suitable stream habitat within the project vicinity. Block nets may be installed on the upper portion of Lake Creek where it enters Hult Pond to prevent fish from returning to the dewatered reservoir during project construction. This would further reduce the effect to juvenile coho. In-water permits also require minimizing turbidity exposure for fish downstream. As with other similar projects, the BLM will monitor turbidity levels downstream and modify or stop work if standards are not being met.

In-water work in the Siuslaw watershed is seasonally restricted by the Oregon Department of Fish and Wildlife to the period between July 1 to September 15. In some cases, Oregon Department of Fish and Wildlife will grant extensions to that window depending on flow forecasts and presence of anadromous fish. The purpose is to reduce exposure of spawning adults and buried eggs to sediment and fine silt generated from instream work.

Summary of Analytical Methods

The geographic scale of analysis for long-term and cumulative effects will be Lake Creek from its headwaters downstream to the confluence of Fish Creek just below Triangle Lake. This corresponds to the subwatershed (HUC 12) boundary and includes major tributaries to Lake Creek where adult returning fish could potentially spawn and where juvenile fish could migrate to rear. In the short term, spawning habitat for coho salmon and steelhead that would be affected by dam removal or reconstruction would be limited to the Hult Pond Dam Restoration Area and up to a mile downstream.

While this is outside of the project area, migrating coho salmon may stray into tributaries downstream of Hult Reservoir (e.g., Congdon Creek, Swartz Creek) and juveniles from upper Lake Creek may utilize mainstem Lake Creek and tributaries (e.g., Fish Creek) down to Triangle Lake and below.

For Hult Reservoir and Lake Creek immediately downstream for about one mile where spawning habitat exists, the short-term temporal scale will consider direct effects from the start of project implementation (or for Alternative 1, immediately following dam failure or the BLM draining the reservoir to prevent imminent dam failure) through the following winter when the first passage of coho salmon may occur. Flushing of fine sediment from the reservoir bed should take place over the course of the first winter, and sorting of fine sediment in downstream stream reaches will take place by spring of the following year (see Appendix A, issue A-15, *How would implementation of the alternatives impact the hydrology of the basin?*).

In the short-term, within the first year of established fish passage for adults, juvenile coho may be detectable upstream from the first run of coho. The long-term scale will include a 6-year window that includes 3 or 4 years of project implementation (or, in the case of Alternative 1, following the dam failure or reservoir draining) and restoration of the Lake Creek channel system and dam site, plus a 3-year life cycle of coho salmon to assess the

[95] Electrofishing is a technique used for capturing fish, usually for fish surveys or salvage. A device is used to generate an electrical current in the surrounding water that attracts fish and temporarily stuns them so they can be collected using nets.

success of removal in producing a returning run of coho salmon. This is the earliest that a returning run of coho produced upstream from Hult Reservoir would be detectable.

Action alternatives will be compared by the miles of newly accessible habitat along with the quality of a spawning and rearing habitat available for coho salmon. Some alternatives add habitat by providing fish passage and others remove habitat. While habitat for other native resident and anadromous species is present in Lake Creek, currently coho salmon are most limited by the lack of sufficient fish passage. They are also a federally listed species and are the most appropriate to compare the amount of additional fish habitat accessible between the alternatives.

Habitat for salmonids in Lake Creek and its tributaries for each of the alternatives can be ranked as Good, Fair, or Poor according to the following definitions:

- Good - Not limited by spawning or rearing habitat. Well-sorted gravel for spawning is present, and slow water and off-channel habitat for rearing is available and not limiting.
- Fair - Habitat for spawning or rearing is limited. Gravel for spawning is present but not well sorted or has high amounts of fine sediment. Habitat for rearing is present, but low dissolved oxygen or elevated temperature are limiting factors, or off-channel habitat is limited or inaccessible.
- Poor - Habitat is either lacking or absent entirely. No available spawning habitat due to lack of gravel or excess fine sediment. Rearing habitat is lacking or unavailable, or water quality is a limiting factor due to high temperatures or low dissolved oxygen.

Affected Environment

Oregon Coast coho salmon are found in Lake Creek, with their current distribution ending at the Hult Pond Dam fish ladder. Historically, coho salmon were not present in the upper Lake Creek basin: Their upstream distribution likely ended at the bedrock slides just below Triangle Lake, approximately 14 miles downstream from Hult Pond Dam, where steelhead were only able to pass the Lower Lake Creek falls at very high flows. In 1989, the BLM installed a fish ladder at the rockslides consisting of a series of three rock-weir and concrete step-pool ladders to pass anadromous fish and access over 110 miles of habitat the upper Lake Creek basin. The BLM currently performs maintenance on that ladder on an annual basis to provide anadromous fish passage.

Coho salmon were listed as threatened in 1998 (63 FR 42587); that listing was updated in 2014 (79 FR 20802). Critical habitat for Oregon Coast coho salmon was designated in 2008 and included about 4.5 miles of Lake Creek upstream from Hult Reservoir (see Figure 3-19).

Oregon Coast steelhead trout and Pacific lamprey are Bureau sensitive species (USDA and USDI 2021) and are found in the project area. Steelhead trout can occasionally pass through the dam's ladder and spawn in reaches upstream from Hult Reservoir. Juvenile steelhead trout may rear in the reservoir during winter and spring; however, they return to the stream during summer and fall when the reservoir becomes too warm (see Figure 3-20). The BLM has no record of rainbow trout stocked into the reservoir, and it is likely that juvenile rainbow trout found in Lake Creek above Hult reservoir are the progeny of the occasional steelhead trout that passes the ladder.

Pacific lamprey have been anecdotally noted as far downstream in the watershed as Lake Creek Falls and Triangle Lake. More recently, they were detected using environmental DNA (eDNA) about 1 mile downstream from the Hult Pond Dam fish ladder (eDNA tests were also conducted upstream of Hult Reservoir but Pacific lamprey were not detected). It is unknown whether they can pass the fish ladder, but the BLM assumes they cannot because sharp edges within the concrete ladder are difficult for them to attach to. Spawning and rearing habitat for the resident brook lamprey does exist upstream from the reservoir (see Figure 3-20).

Other resident native fish in the project area include coastal cutthroat trout. There are approximately 18 miles of fish-bearing or potential fish-bearing streams in Lake Creek and its tributaries upstream from Hult Reservoir. Like steelhead, cutthroat may rear in Hult Reservoir during the winter and spring but likely move into tributaries during the warmer months to avoid warm water and non-native predators (e.g., largemouth bass) in Hult Reservoir.

The concrete fish ladder currently at Hult Reservoir is deemed to be ineffective at passing salmon and steelhead. When sufficient water flows through the ladder, some steelhead trout can pass and access reaches upstream of Hult Reservoir. Coho salmon rarely pass the ladder. Over the last decade of spawning surveys conducted by the Siuslaw Watershed Council, only once was a single coho salmon observed in Lake Creek above Hult. The Oregon Department of Fish and Wildlife conducted multiple fish surveys in the reservoir using boat electrofishing and did not observe or capture any coho salmon. They also concluded in that report (ODFW 2018) that coho salmon cannot pass the ladder.

Hult Reservoir provides some rearing habitat for resident salmonids during winter and spring. Lake Creek upstream from Hult Reservoir is a gravel-dominated stream and would be considered good spawning and rearing habitat for salmonids. Surveys completed by the Oregon Department of Fish and Wildlife (2017) determined that cutthroat trout are in the reservoir in spring. However, by late fall they move upstream into Lake Creek and tributaries to avoid warm water and predation by largemouth bass (*Micropterus salmoides*) in the reservoir. During the summer months, the combination of warm water temperatures and low dissolved oxygen reduce the reservoir's habitability to salmonids (see Appendix A, Issue A-18).

In 2012, the Oregon Department of Fish and Wildlife completed aquatic habitat inventories in several reaches upstream of Lake Creek. Using that information and baseline habitat quality rankings developed for steelhead trout (ODFW 2010) as a surrogate for coho salmon habitat, spawning habitat and rearing habitat above Hult Reservoir are considered good.

Environmental Consequences

Direct and Indirect Effects

Alternative 1: No Action Alternative (Continue Current Management)

Under the No Action Alternative, the existing dam and fish ladder would remain unchanged, and the BLM would monitor and maintain the status of both. The fish ladder would continue to block upstream passage for coho salmon and limit access for steelhead as well as for all juvenile salmon, steelhead, and lamprey. No adult coho salmon would be able to access spawning habitat and cold-water refuge in upper Lake Creek basin, and there would be no additional occupied habitat in Lake Creek.

Hult Reservoir would remain and provide some winter rearing habitat for juvenile resident salmonids. However, the presence of non-native game fish, like largemouth bass, that prey upon juvenile fish would limit productivity. Hult Reservoir is utilized by resident cutthroat for a portion of the year, though it is generally too warm during the summer for salmonids and is oxygen depleted at depth (ODFW 2018).

Stream temperature downstream from the dam would continue to be elevated from upstream conditions, owing to the release of surface water down the ladder and spillway. During the summer when inflow to the reservoir is at its lowest, only warm surface water is released downstream via the fish ladder. This creates unfavorable water temperatures for juvenile fish downstream from the dam and would generally take up to a quarter mile to return to ambient temperature similar to upstream in Lake Creek.

Alternative 1.1: Dam Failure

If the dam should fail, a large flush of water and sediment would be flushed downstream approximately 14 miles to Triangle Lake and the surrounding Lake Creek floodplain. This sediment would be transported and deposited downstream in Lake Creek and into Triangle Lake. Some of the fine sediment would be trapped in gravel substrates in the reach immediately downstream from Hult Reservoir, adversely affecting about 1 mile of spawning habitat for coho and steelhead.

The dam, in whole or in part, would be washed away and the natural stream would be reestablished through the reservoir footprint. Over the short term, this would deliver a large amount of finer sediment downstream affecting 0.25 miles of potential spawning habitat by covering substrate with finer material. Fine sediment (defined as less than 2 mm diameter) is held back by the dam. If this happens during late winter after spawning downstream has already occurred, a large proportion of redds [96] and fish eggs would be covered with sediment, resulting in high mortality of steelhead and salmon that spawned below the dam.

Over the long term, there would be an improvement in the access to habitat upstream of Hult Pond Dam. Sediment deposited over the short term would be washed and sorted downstream by seasonal flows, and spawning habitat would be available downstream in Lake Creek through the footprint of the reservoir and upstream. Absent the lake and its non-native game fish, there would be fewer predators on juvenile fish. Rearing habitat in the new stream channel would be an improvement over the open water of Hult Reservoir with its warm surface temperature and low dissolved oxygen.

Alternative 1.2: Drain Reservoir

Under the No Action Alternative, should the dam present an imminent threat of failure, the BLM would likely drain the reservoir using the culvert at the bottom of the dam to relieve pressure on the dam face. When flows allowed, the dam would be breached to allow for open flow through the dam and reservoir.

This would prevent a catastrophic failure that would allow a large flush of water and substrate downstream. Draining the reservoir in this manner would also dewater flow from the fish ladder and raceway system and would not allow any anadromous fish passage through the ladder into upper Lake Creek; the outlet pipe in the dam would not allow fish passage.

Draining the reservoir would expose juvenile brook lamprey rearing in fine sediments near the head of the dam. Given the emergency nature of the reservoir draining, there would be little time to conduct appropriate management practices or salvage operations. The BLM would attempt to salvage and recover as many as possible. However, there would be some loss of juveniles as they are exposed out of water or caught by predators.

Flushing of sediment during an emergency draining would take place over about one week and would result in elevated turbidity and sediment movement downstream. If draining takes place during the winter, when flows and background turbidity are already elevated, there would be some disruption of spawning activity for coho salmon and steelhead immediately downstream. Fine sediment would be deposited over redds and buried eggs and reduce overall spawning success and emergence of juveniles.

If the draining and breach of Hult Reservoir occurs during summer or fall, there would similarly be a turbidity plume and sediment movement downstream. Juvenile coho salmon and steelhead downstream would likely be disrupted and move into tributaries (Pucker Creek) or into margin habitat during elevated turbidity.

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[96] A salmon redd is a depression created by the upstroke of the female salmon's body and tail, sucking up the river bottom gravel and using the river current to drift it downstream. The female salmon digs a number of redds, depositing a few hundred eggs in each during the one or two days she is spawning.

The long-term effect would be an improvement in access to habitat upstream of Hult R along with additional spawning and rearing habitat in the reservoir footprint itself. Rearing habitat in the newly formed stream channel would be of higher quality compared to that of the reservoir due to the improved water quality and lack of non-native game fish to prey on juveniles.

Alternative 2: Remove the Existing Dam and Build a New Dam to Maintain Hult Reservoir

Under Alternative 2, the existing dam would be removed, and a new dam built slightly downstream, along with a fish passage facility. A roughened chute system has been designed and would be sufficient to pass adult and juvenile salmon and steelhead, lamprey, and other native fish. Adults would be able to pass upstream during the higher winter flows, and juveniles would be able to pass upstream and downstream, as the chute is intended to mimic a steep channel riffle with a maximum overall slope of about 5 percent (NMFS 2022). Juveniles would be able to access cold-water refugia in Lake Creek above the current location of the dam. A total of about 8 miles of additional coho salmon habitat upstream from Hult Reservoir would be accessible (ODFW 2018).

Building the new dam may take two to three construction seasons, or up to 3 years. This work would require draining the reservoir, although it may be partially refilled before dam completion depending on the phases of construction. Lowering the reservoir elevation would remove flow through the spillway and fish ladder and would concentrate flow through a bypass reach near the base of the current dam. In the short term, this would prevent any steelhead from accessing the ladder and habitat in Lake Creek upstream.

During construction of the fish passage riffle, it may be necessary to use explosives to remove bedrock outcrops or reduce the size of boulders in order to make removal by heavy equipment possible. Effects from blasting can result from rapid changes in hydrostatic pressure and are a function of the charge size and distance to affected fish (NMFS 2018). There would be some short-term trauma and subsequent mortality for nearby fish associated with blasting within the channel. However, the BLM would minimize the amount of explosives needed and only do so in the in-water work period, when disturbance and effects to adult salmonids and incubating eggs would be limited. The BLM would conduct blasting only in dewatered channels where fish have been removed through salvage, which would reduce the risk of injury as compared to in-water charges.

The BLM expects that the dam is currently holding back fine sediment in the reservoir footprint that may be mobilized during dam construction and removal. Heavy equipment would be used to dismantle and remove material from the existing dam and construct the new dam, which would likely create ground disturbance that would generate sediment during subsequent runoff events. To the extent practicable, water would be diverted around the work site and equipment would work in dry conditions. However, loose sediment would be mobilized and distributed downstream when the site is rewatered or may be flushed downstream during the first winter floods. This may deposit fine sediment in the first several hundred meters downstream, reducing the quality of spawning gravel over the short term. In the short term, it may also reduce the presence of benthic macroinvertebrates that serve as forage for juvenile and resident fish, and invertebrate species may shift to those more tolerant of disturbance (Belmore et al. 2019). (For more information, see Appendix A, Issue A-20: *How would implementation of the alternatives impact sediment transport?*)

While the dam is being deconstructed, water would be diverted around the site, minimizing turbidity downstream. As the site is rewatered, there would be an expected short-duration spike in turbidity. During the removal of the Hemlock Dam on Trout Creek, Washington, a peak turbidity (a surrogate for suspended sediment) of 670 nephelometric turbidity units (NTUs) [97] was measured downstream during rewatering but returned to a background of 16 NTU within 24 hours (Claeson and Coffin 2015). This would likely result in fish moving to margins or into tributaries during the pulse, but they would return to Lake Creek once turbidity returned to background.

[97] NTUs are the standard unit used by the Environmental Protection Agency for reporting turbidity.

Once the new dam is complete and the reservoir refilled, it would provide some rearing habitat for salmonids, although, similar to Alternative 1, temperature and dissolved oxygen would continue to be limiting factors for salmonids in the reservoir. Coho salmon may rear in the upper portion of the reservoir during the cooler winter months but would likely spend most time in the mainstem and tributaries to Lake Creek upstream.

While the reservoir elevation is lowered, western brook lamprey juveniles that rear in sediment in the upper part of Hult Reservoir would potentially be dewatered. Western brook lamprey juveniles hatch from gravel beds upstream in Lake Creek, and a portion move downstream to take advantage of the finer sediment accumulation in the upper reaches of Hult Reservoir. The BLM would attempt to minimize loss of juveniles through fish salvage or sprinkler systems to retain wet sediment. However, there would be loss of the majority of juveniles that currently are found in the reservoir sediments. The following mitigation measure would reduce adverse impacts to western brook lamprey juveniles during fish salvage operations under Alternatives 2 (as well as Alternatives 3 and 4):

- Lower the reservoir level at a rate that allows western brook lamprey juveniles to move into saturated sediment as the water level drops; utilize sprinkler systems where possible to retain wet substrate; and conduct an intensive salvage operation to capture and move as many juveniles as possible.

Alternative 3: Remove Hult Reservoir; Add Little Log Pond

Under this alternative, the dam and fish ladder in its entirety would be removed and the stream channel restored, providing fish complete access to Lake Creek. Where Hult Pond Dam currently intersects Lake Creek, grade control structures may be used to maintain the elevation of the stream bed upstream and prevent potential for headcutting (erosion). Adult and juvenile salmonids would have year-round access to 0.8 miles of newly formed perennial and fish-bearing channel in the reservoir floodplain that, in addition to upstream reaches, would total 8.7 miles of habitat for coho salmon. Application of aquatic/wetland mitigation measures (described in Issue 9) that include new side-channel formation and placement of large wood to trap and retain water across the floodplain would generate an additional 2.6 miles of floodplain habitat bringing the total to 10.5 miles of habitat for coho salmon and other resident native fish.

Removal of Hult Reservoir would eliminate a source of warm water and overall reduced water quality that is a limiting factor for native fish downstream. Addition of Little Log Pond is not expected to add to poor water quality downstream because of its smaller footprint and the expectation of overall better water quality (see Appendix A, Issue A-18: *How would implementation of the alternatives impact water quality and storm water discharges especially during removal of the existing dam (and construction of a new dam)?*).

To continue to provide visitors with access to water-dependent and water-influenced recreation opportunities, the BLM would create Little Log Pond, a smaller permanent impoundment downstream of the current dam location. This would consist of a small dam with outflow control at its base. The dam would inundate approximately 0.2 miles of Lake Creek, including the mainstem and off-channel floodplain habitat, to create a 5-acre pond in the location of the historic lower Hult log pond. This new pond would be approximately 18 feet at its deepest point.

Year-round fish passage at Little Log Pond would be provided by a constructed naturelike fishway approximately 0.1 miles long located at the southern end of the inundated floodplain. This would provide upstream and downstream access for native fish at a range of flows. The flow through the fishway would be regulated by adjusting the outflow at the dam site.

While coho salmon would be able to access additional habitat upstream in Hult Reservoir, there would be a loss of about 0.2 miles of spawning and rearing habitat in Lake Creek as Little Log Pond is refilled. The portion of stream that would be converted to open water currently consists of some spawning habitat but is primarily a narrow and steeper migratory corridor to the upper Lake Creek basin. The stream channel is confined, with little existing off-channel rearing habitat for salmonids. While inundation of this short reach would, in the short and long term, decrease the availability of spawning habitat by 0.2 miles (compared to the current condition), an additional 5 acres of potential year-round rearing habitat would be created over the long term in the off-channel ponded area.

Proposed aquatic/wetland mitigation measures (see Issue 9) under this alternative would include a suite of instream restoration features in the reservoir bed and stream channel upstream and downstream of the dam. Up to 400 logs would be placed in the Hult Reservoir Restoration Area to create spawning and rearing habitat for salmon. Structures would be placed in natural locations near tributary junctions and bends in the channel that would provide for stable log jams. Where necessary, logs may be buried to create anchor points for additional large wood. Any placed structures would be designed to maintain fish passage throughout the Lake Creek system at all flows. Logs would be sized approximately 1.5 times the channel width according to Oregon Department of Fish and Wildlife guidelines and trees with root wads attached would be utilized to further stabilize placements. The following proposed measure would mitigate for the inundation and loss of stream habitat for juveniles and adult spawning:

- Place logs and trees with whole root wads around portions of the perimeter of Little Log Pond to provide shelter and rearing habitat for juvenile salmonids

A mitigation measure to protect western pond turtles (see Issue 13) calls for building Little Log Pond before lowering and removing Hult Pond Dam. While this would be protective of pond turtles and allow for movement into new ponded habitat, it would also allow non-native game fish currently in Hult Reservoir to become established downstream in Little Log Pond. This would reduce the value of the new pond for rearing habitat for juvenile salmonids because of predation by largemouth bass.

Alternative 4: Preferred Alternative (Remove Hult Reservoir)

Under Alternative 4, short-term effects to native fish populations would be most similar to Alternative 2, where the reservoir would be drained during the construction of the new dam. The reservoir would be drained and the dam breached, allowing complete fish passage and restoration of the historic stream channel. A total of 0.8 miles of newly formed stream channel would be created from the additional mainstem, side-channels, and tributaries within in the Hult Reservoir Restoration Area. Adult and juvenile coho salmon, as well as steelhead and resident cutthroat trout, would be able to access upper Lake Creek unimpeded across a range of natural flows. Coho would have access to 4.5 miles of designated critical habitat and a total of 8 miles of suitable spawning and rearing habitat. The additional mileage of new accessible habitat under this alternative totals 8.8 miles.

Similar to Alternative 3, removal of Hult Reservoir would eliminate a source of warm water and overall reduced water quality that are limiting factors for native fish downstream. Water quality of the new stream channel would more closely resemble nearby streams and tributaries and would be more productive for native fish.

The stream channel would be allowed to develop naturally over the first winter season, allowing accumulated fine sediment to be moved downstream to Lake Creek. Large wood structures would be placed in tributaries at major junctions to stabilize and prevent head-cutting into tributaries. During the next 2 to 5 years, the BLM would place up to 300 pieces of large wood to trap and retain gravel for spawning habitat and create complex pool habitat utilized for rearing juveniles.

The new stream channel in the reservoir footprint would be devoid of sources of large wood for several decades until larger hardwood and conifers develop. To mitigate this absence of source wood, the BLM would place up to 1,500 pieces of large wood across the Hult Reservoir Restoration Area and stream channel to create instream habitat and interact with higher flows providing refuge habitat for rearing salmonids. Under mitigation measures, the total amount of channel in the former reservoir would increase by 2.6 miles and a cumulative amount totaling 10.6 miles would be available to coho salmon in the former reservoir footprint.

Draining Hult Reservoir would, in the short term, reduce rearing habitat for some native fish like western brook lamprey. As the reservoir is lowered, rearing habitat for western brook lamprey would be exposed, resulting in the loss of some individuals. In the long term, there would continue to be habitat for lamprey above the footprint of Hult Reservoir, and the restoration of the stream channel would likely provide additional rearing habitat that would offset any reduction. The BLM would mitigate the loss of brook lamprey by modifying the rate at which the reservoir level is lowered to allow juveniles to move into deeper water, utilizing sprinkler systems to retain wet substrate, and conducting an intensive salvage operation to capture and move as many juveniles as possible.

Summary of the Impacts of the Alternatives

Under the No Action Alternative, there would be a continued blockage for upstream migrating coho salmon with the potential for long-term improvement in access to habitat for salmonids if the dam fails or is breached by the BLM. Under Alternatives 2 and 3, passage of salmon, steelhead, and Pacific lamprey would be provided through a naturelike fishway. This would provide upstream passage of adults during spawning periods as well as downstream movement of juveniles and smolts. Resident cutthroat trout would be able to freely move up or downstream through the fishway. Alternative 4 would provide passage by removing the dam and fish ladder altogether and would require the least amount of design and maintenance.

Table 3-26 below summarizes the gain and loss of accessible stream habitat for coho salmon by alternative. Alternative 4 would provide the maximum coho salmon habitat, with about 10.6 miles upstream under maximum mitigation measures. Alternative 3 would generate a smaller pond that would inundate and affect about 0.2 miles of habitat but would still provide access to about 10.5 miles of habitat in the reservoir footprint and upstream. Alternative 2 would provide access to about 8.1 miles of habitat through improved fish passage while retaining the reservoir footprint.

Under the No Action Alternative, Hult Reservoir and Lake Creek would continue to have water quality concerns (high temperature and low dissolved oxygen) that would limit its utility as rearing habitat for juvenile resident cutthroat and steelhead. Under Alternative 3, water quality for juvenile salmon and steelhead rearing would be improved as compared to Alternative 2. The smaller, shallower impoundment would provide better temperature conditions and overall better water quality for salmonids as well as reduce or remove non-native fish that may prey on juvenile fish. Alternative 4 would eliminate the reservoir and its water quality concerns entirely.

Table 3-26*. Miles of Coho Salmon Stream Habitat Accessed or Restored, by Alternative*[1]

<table>
<tr><th rowspan="2" colspan="2">Alternative</th><th colspan="2">Habitat upstream</th><th colspan="2">Hult Reservoir and Little Log Pond footprint</th><th colspan="2">Downstream habitat</th><th rowspan="2">Competition /predation by non-native game fish</th></tr>
<tr><th>Habitat gained without mitigation (Long term)</th><th>Habitat gained with mitigation measures (Long term)</th><th>Habitat quality for salmonids within reservoir footprint</th><th>Habitat change with mitigation</th><th>Water quality downstream (temp. and O_2)</th><th>Habitat (large woody debris and substrate)</th></tr>
<tr><td colspan="2">Alt. 1: No Action Alternative</td><td>NA</td><td>NA</td><td>Poor</td><td>Poor</td><td>Poor</td><td>Poor</td><td>Yes</td></tr>
<tr><td colspan="2">Alts. 1.1 and 1.2 (dam failure or breach)</td><td>8.8 miles</td><td>NA</td><td>Fair</td><td>NA</td><td>Good</td><td>Poor</td><td>No</td></tr>
<tr><td colspan="2">Alt. 2: Build New Dam</td><td>8.1 miles</td><td>8.1 miles</td><td>Poor</td><td>Poor</td><td>Poor</td><td>Poor</td><td>No</td></tr>
<tr><td rowspan="2">Alt. 3: Add Little Log Pond</td><td>Restoration Area</td><td rowspan="2">8.7 miles</td><td rowspan="2">10.5 miles</td><td>Fair</td><td>Good</td><td>Fair</td><td>Fair</td><td>No</td></tr>
<tr><td>Little Log Pond</td><td>Poor</td><td>Fair</td><td>Fair</td><td>Fair</td><td>No</td></tr>
<tr><td colspan="2">Alt. 4: Remove Hult Reservoir</td><td>8.8 miles</td><td>10.6 miles</td><td>Fair</td><td>Good</td><td>Good</td><td>Fair</td><td>No</td></tr>
</table>

1. See the *Summary of Analytical Methods* section for good/fair/poor definitions.

Cumulative Effects

The BLM would continue to maintain fish passage at the lower Lake Creek Falls fish ladder. Based on recent telemetry studies conducted in partnership with the USGS, coho are able to successfully pass the ladder (Fischer et al. 2022), but that passage may be improved through modification of some of the weirs to allow for movement at a higher range of flows (pers. comm., Nick Scheidt, BLM fish biologist)

The Siuslaw Coho Partnership, which consists of Federal, State, and private stakeholders, was recently awarded a Focused Investment Partnership (FIP) grant from the Oregon Watershed Enhancement Board (OWEB) that will provide a steady stream of funding for restoration in the Siuslaw watershed over the next 5 years. Included in the scope of work is fish passage improvement and fish habitat improvement in Lake Creek and tributaries on BLM, Forest Service, and private lands in the watershed.

The BLM, in concert with other State and private partners in the watershed, is planning to continue fish habitat and passage improvements in the Lake Creek watershed. Projects that are currently in planning phases and that are expected to be implemented over the next 10 years include Swartz Creek culvert and instream restoration, Nelson Creek instream restoration, North Fork Fish Creek instream restoration and culvert replacement, Leibo Canyon and Pontius Creek riparian planting, Unnamed tributary to Greenleaf Creek culvert replacement, and Unnamed tributary to Fish Creek culvert replacement. These projects will add an additional 3.25 miles of coho salmon and steelhead passage and improve an additional 8 miles of spawning and rearing habitat through the placement of large wood.

As part of the N126 timber sale planning area, the BLM has planned a total of 14 sales encompassing 4,531 acres within the geographic scale of the analysis. The N126 LSR Landscape Plan Environmental Assessment programmatically analyzed actions that restore late-successional (old-growth) complex stands and ensure functional wood is available to adjacent stream within the Late-Successional Reserve (LSR) and Riparian Reserve Land Use Allocations (USDI 2021a).

There is some potential for sediment delivery from the use of forest roads during winter operations. However, application of project-specific design features and best management practices would minimize the direct effects to listed fish and their habitat. Any small amount of sediment that does reach streams would likely not adversely affect spawning habitat in Fish Creek or Lake Creek itself. Timber harvest outside of riparian reserves and in the upland are unlikely to have any direct effect to adjacent streams. These sales would not have any effects that would adversely affect fish habitat in Lake Creek above those described for each action alternative. Thinning in the riparian reserve would likely include some tree tipping as directed by the 2016 RMP (USDI 2016a). This would result in an increase in large wood contribution and would lead to an improvement in the trapping and retention of spawning gravel suitable for salmonids.

Issue 15: How would implementation of the alternatives affect non-native game fish like largemouth bass, bluegill, and bullhead in Hult Reservoir?

In 2017, the BLM contracted with ODFW to conduct fish surveys on Hult Reservoir to determine species presence and assemblage in the reservoir. The survey was conducted through a variety of means, including electrofishing by boat and stationary Oneida net traps. Non-native fish captured included largemouth bass (*Micropterus salmoides*), brown bullhead (*Ameiurus sp.*), and bluegill (*Lepomis macrochirus*).

The Oregon Department of Fish and Wildlife’s 2018 report to the BLM, which is summarized and incorporated here by reference, reviewed the history of fish species and stocking in Hult Reservoir. Hult Reservoir was stocked with warm-water game fish, including largemouth bass, crappie, and blue gill in 1976 after the reservoir had been drained for maintenance. The reservoir was subsequently electrofished in 1992, and largemouth bass and crappie (*Pomoxis sp.*), along with various native salmonids, were captured (ODFW 2018).

The BLM received comments during the January 2022 scoping period and the May 2022 public comment period for draft Chapters 1 and 2 that expressed concerns regarding the impact of the alternatives to non-native game fish in general and more specifically:

- What is the impact on game fish in the reservoir including largemouth bass and bluegill?
- What will happen to the fish and wildlife in the reservoir when it is drained?
- Concern about loss of an established and functioning lake ecosystem
- Loss of non-native game fishing opportunities

Analysis of this issue is necessary to determine the significance of the impacts. An analysis of the impact of the alternatives to fish passage and habitat for native fish can be found in Issue 14.

Analytical Process

Assumptions

Currently, non-native game fish in the reservoir are unlikely to be found in the mainstem Lake Creek due to colder water and seasonal high flows. They are not currently present outside of Hult Reservoir and Triangle Lake. Largemouth bass spawn in spring in silty and muddy conditions found in the shallow margins of lakes or slower streams. Their feeding activity is also reduced at temperatures lower than 41 degrees Fahrenheit (USDI 2023c). Non-native game fish will persist in Hult Reservoir if it is lowered only during the summer and refilled in the fall. Murphy et al. (2019) found that largemouth bass remained in Fall Creek Reservoir after a short-term lowering to its base channel and refill. If the reservoir is lowered and returned to a run-of-the-river system for more than one season and over the winter, the change in flows and water temperature will completely eliminate non-native fish in the reservoir footprint (pers. comm., John Spangler, ODFW, Nov. 8, 2022). Largemouth bass would be unlikely to tolerate the cold winter flows.

Summary of Analytical Methods

Short-term effects will be considered to take place within the first year of work on the dam (or for Alternative 1, the first year following dam failure or the BLM draining the reservoir to prevent imminent dam failure). Long-term effects would take place be over a 5- to 10-year period in which species populations may or may not become reestablished in Hult Reservoir.

The geographic scale for the analysis includes Hult Reservoir and Lake Creek below the dam 14 miles downstream to Triangle Lake, where non-native game fish are already established. Non-native fish may exit Hult Pond Dam through the ladder, spillway, or the low-level outlet but would likely be flushed downstream to Triangle Lake and would not remain year-round in Lake Creek.

Alternatives will be compared by the overall change in acres of ponded habitat with non-native game fish.

Affected Environment

Hult Reservoir currently provides year-round habitat for non-native game fish, including largemouth bass, bluegill, and bullhead. Also found in the reservoir are native cutthroat trout (*Oncorhynchus clarkii clarkii*), rainbow trout

(*Oncorhynchus mykiss*), and some other resident fish species (ODFW 2018). The reservoir, however, does not provide good summer rearing habitat for salmonids due to high surface water temperatures, low dissolved oxygen, and a robust predator population of largemouth bass.

Environmental Consequences

Direct and Indirect Effects[98]

Alternative 1: No Action Alternative (Continue Current Management)

Under Alternative 1, non-native game fish populations in Hult Reservoir would remain unchanged over the short term. The BLM would continue to monitor and maintain the dam in a condition that would allow the reservoir to be kept at its current elevation year-round, providing stable habitat for fish, including non-native largemouth bass, bluegill, and bullhead.

Management of the reservoir may include lowering for maintenance. In this case, there would likely be some mortality or predation on non-native game fish that are trapped and concentrated in smaller pools. Fish would likely be able to survive this short disturbance, and the effects on non-native game fish would be negligible once the reservoir is refilled.

Alternative 1.1: Dam Failure

Under this scenario, the dam could fail catastrophically during a high winter weather event the BLM cannot anticipate. As flows crest, the spillway, road, and dam face could be damaged to the point that the dam itself fails, creating a surge in downstream flows.

After the initial failure and when safety allows, the BLM would breach the remaining dam, resulting in a free-flowing stream through the reservoir footprint. In the short term, this would result in elimination of the non-native fish in the reservoir. Fish would either succumb to low stream temperatures, be caught by predators, or be washed downstream into Lake Creek and then to Triangle Lake.

Over the long-term, 54 acres of ponded habitat required for the population of largemouth bass would be lost.

Alternative 1.2: Drain Reservoir

Due to the aging dam’s condition, the BLM assumes that in the next 8 years the dam will deteriorate or require maintenance to the point that the BLM would need to lower the reservoir elevation to prevent a catastrophic failure. In that case, the Hult Reservoir would be drained in its entirety and a naturelike stream channel allowed to develop. The dam would be breached to provide the free flow of water without further operation or maintenance by the BLM.

Under this scenario, there would be limited time to respond, as this would most likely occur during high flow in the winter making fish salvage difficult and impractical. Non-native fish in the reservoir would likely be washed downstream during winter flows and would ultimately take up residence in Triangle Lake 14 miles downstream. Given the colder stream temperature in the winter, it would be unlikely for non-native fish to persist year-round in Lake Creek. In the short and long term, there would be a loss of the 54-acre ponded habitat for non-native game fish.

[98] As described in the introduction to Chapter 3, some issues analyze only direct and indirect effects because there are no other foreseeable actions that would contribute to cumulative effects for that issue.

Alternative 2: Remove the Existing Dam and Build a New Dam to Maintain Hult Reservoir

Under Alternative 2, the BLM would deconstruct the existing dam and build a new dam to maintain a roughly 54-acre ponded waterbody. The BLM would also construct fish passage riffle for passage of coho salmon, steelhead, lamprey, and other native fish. This would take place during the construction of the new dam and would not have any effect on non-native game fish.

The reservoir would be drained down to the historic stream channel for the construction of the new dam. The dewatering would take place for up to 3 years, allowing ample time for construction of the new dam and roughened fish passage chute. Over the short term, this would result in the reduction of the area of ponded habitat. There may be some small areas of ponded water that some non-native game fish could reside in during the summer. However, if the reservoir is dewatered over the winter, the combination of flows and lower stream temperature would result in the mortality or loss of any remaining non-native game fish in the reservoir.

By the time the dam is constructed over approximately three in-water work seasons and the reservoir subsequently refilled, there would be no remaining non-native game fish to repopulate the newly formed reservoir. The total acreage of the reservoir would be approximately the same (54 acres), but over the long term, there would be no established populations of non-native game fish.

The BLM would attempt to salvage as many native and non-native fish as possible from the reservoir as the water is lowered and the reservoir ultimately removed. (Non-native game fish would be moved down to Triangle Lake. As described in Issue 14, native fish would be moved upstream of the reservoir.) Removing the dam may allow some bass that are not able to be salvaged to enter Lake Creek but would not add any additional warm-water game fish into the system as they are already found downstream in Triangle Lake and potentially in Lake Creek just above Triangle Lake during warmer summer months.

Alternative 3: Remove Hult Reservoir; Add Little Log Pond

Under Alternative 3, the BLM would deconstruct Hult Pond Dam, drain the reservoir, install a smaller dam downstream on Lake Creek, and create a 5-acre pond near the location of the old millpond (Little Log Pond). The short-term effects to non-native game fish would be similar to Alternative 2. As the reservoir is drained, non-native game fish would be concentrated in small remaining pools in the floodplain. Over the course of the summer, some fish would remain; however, many would be lost to mortality or predation. Subsequent high winter flows would push remaining fish downstream to Lake Creek and ultimately Triangle Lake.

Creation of Little Log Pond is unlikely to result in habitat for non-native game fish. The smaller size and location of the new pond would make overall water quality (i.e., cooler water temperature) less suitable for largemouth bass, bluegill, and bullhead. Since there would be at least 1 year separating the draining of the reservoir and creation of the smaller pond, there would also be no remaining non-native game fish to repopulate Little Log Pond. Over the long term, there would be a complete loss of non-native game fish from the upper Lake Creek drainage.

Effects of Proposed Turtle Mitigation on Non-Native Fish

Alternative 3 project design features include the removal of the dam and reservoir a year before construction of Little Log Pond to allow fine sediment to be flushed from the Hult Reservoir bed. This would prevent sediment from the reservoir from filling in the new Little Log Pond. A mitigation measure for western pond turtles (Issue 13) would have Little Log Pond built prior to removal of Hult Reservoir to allow turtles to move downstream to available habitat. While this measure is intended to facilitate turtle migration, it would also allow non-native game fish from Hult Reservoir to enter and become established in Little Log Pond. Although an overall smaller pond, it would allow a population of largemouth bass, bluegill, and bullhead to persist in the project area. A population of non-native game fish would continue to predate on out-migrating juvenile coho or resident salmonids that otherwise could utilize the lake for rearing habitat.

Alternative 4: Preferred Alternative (Remove Hult Reservoir)

Under Alternative 4, the BLM would drain the reservoir, remove the dam, and return the stream channel to a natural state. Over the short term, the effects would be similar to Alternative 2. There would be no rewatering or ponded habitat after implementation. Absent a large open waterbody, there would be no habitat for non-native game fish in Lake Creek. Over the short and long term, there would be a net loss of 54 acres of ponded habitat.

During drainage of the reservoir and deconstruction of the dam, there would be an effort to salvage and remove as many non-native game fish as possible through electrofishing, trapping, and netting. As with Alternative 3, non-native game fish would be moved down to Triangle Lake. However, some fish would remain in the reservoir until drained. As the reservoir is drained, fish would be concentrated in the remaining small pools in the new stream channel and would be more easily salvageable. Ultimately, given the abundance of non-native fish in the reservoir, remaining fish that cannot be salvaged would either be washed downstream to Triangle Lake or be lost to predation or mortality.

Summary of Effects

Both Alternative 1 (in the short term) and Alternative 2 result in a 54-acre reservoir that could provide habitat for non-native game fish. Under Alternative 2, the reservoir would remain in the long term; however, a dewatering lasting more than one season would eliminate the non-native game fish in the reservoir. It is unlikely there would be any non-native game fish remaining to repopulate the new lake (see Table 3-27).

Under Alternative 3, there is a net loss of 49 acres of ponded habitat. The original reservoir would be removed but would be replaced by the 5-acre Little Log Pond. The new, smaller pond would be unlikely to support non-native game fish and would likely be inhabited by native cutthroat trout (see Table 3-27).

Under Alternatives 1 in the long term and Alternative 4, there would be a complete loss of 54 acres of ponded habitat. The entire upper reservoir floodplain would be drained and converted to a naturelike stream channel. There would be no ponded habitat for non-native game fish (see Table 3-27).

Table 3-27. *Summary of Impact Indicators and Short- and Long-Term Effects of the Alternatives*

Alternative	Acres of ponded habitat	Short-term effect	Long-term effect
Alt. 1.1 No Action Alternative: Dam Failure	54 acres; no net loss short term; long term complete loss of 54 acres	No loss of habitat for non-native game fish	Habitat is lost from failure and breach of the dam
Alt. 1.2. No Action Alternative: Drain Reservoir	54 acres; no net loss short term; long term complete loss of 54 acres	No loss of habitat for non-native game fish	Habitat is lost from dewatering the reservoir and breach of the dam
Alt. 2: Build a New Dam	54 acres; no net loss	Complete loss of habitat for non-native game fish from draining of the reservoir for more than one season	Pond remains, but non-native game fish eliminated due to reservoir dewatering spanning multiple seasons
Alt. 3: Add Little Log Pond	5 acres of habitat	Complete loss of habitat for non-native game fish from the removal of the upper dam and reservoir	No habitat suitable for non-native game fish in the new 5-acre Little Log Pond
Alt. 4: Remove Hult Reservoir	No large ponded habitat remaining; net loss of 54 acres	Complete loss of habitat for non-native game fish from the removal of the upper dam and reservoir	Complete loss of habitat for non-native game fish from the removal of the upper dam and reservoir

Chapter 4 – Consultation and Coordination

This chapter describes the public involvement, cooperation, and collaboration that has or will occur during the preparation of this EIS. Information about government-to-government relationships with Tribes and consultation with Federal, State, and Tribal agencies can be found in the *Consultation* section. This chapter also includes a list of preparers for this EIS.

Public Involvement

Public participation is an integral part of the NEPA process, and Federal agencies are required to “make diligent efforts to involve the public in preparing and implementing their NEPA procedures” (40 CFR 1506.6(a)). The following describes the various stages of public involvement expected during this EIS process:

- The draft EIS was available for public review and comment from October 20 to December 7, 2023. The BLM prepared the draft following a 30-day public scoping period (December 30, 2021, to January 31, 2022) and a 5-week public review and comment period in May 2022 for a draft of Chapters 1 and 2. As described below, the BLM sought input on the EIS issues, impacts, and alternatives during these comment periods.
- Following the draft EIS public review and comment period, the BLM prepared this final EIS. This final EIS includes specific responses to each substantive public comment received on the draft EIS. The BLM the updated the EIS by incorporating data, analysis, and ideas suggested during public review.
- Following the issuance of this final EIS, a Record of Decision will be prepared and signed to document the selected alternative and accompanying mitigation. The decision-maker for this EIS will be the Northwest Oregon District Manager.
- The BLM may take no action concerning a proposal until the Record of Decision has been issued. The Record of Decision will not be signed until at least 30 days after the final EIS is issued.

Scoping

Scoping is the process by which the BLM solicits internal and external input on the issues, impacts, and potential alternatives that the EIS will address, as well as the extent to which its NEPA analysis will examine those issues and impacts. The BLM used scoping comments, along with other pertinent information, to help develop the purposes, issues, and alternatives in this EIS. Scoping for this project was originally conducted in May 2018. Because of the change in the scope of the EIS and period of time since the initial public notifications, the BLM published a second Notice of Intent to prepare the EIS on December 30, 2022, and conducted a public scoping period from December 30, 2021, to January 31, 2022.

2018 Scoping

Scoping Process Summary

Before formal scoping on this EIS in 2018, the BLM conducted an initial stakeholder assessment that included interviews with local business and property owners, recreation groups, and other community members (Langdon Group 2017). The goal of the assessment was to identify the spectrum of ideas and concerns held by members of the public regarding the management of Hult Reservoir, as well as to determine the public’s level of interest in participating during the EIS process and generate suggestions for future public engagement. In addition, the BLM held a public meeting on March 19, 2018, at the Blachly Grange. The meeting was attended by about 25 members of the public, and the BLM collected some informal comments at that time.

The initial 30-day scoping period began May 1, 2018, with the Federal Register publication of the Notice of Intent to prepare the EIS and concluded on May 31. The BLM mailed a letter announcing the beginning of the scoping period to interested members of the public, landowners, and other stakeholders and organizations. The BLM also held a second public meeting at the dam on June 14, 2018. The BLM then put the project on hold to allow for additional information gathering.

Summary of Information Submitted by the Public During Scoping

The stakeholder assessment reported on public interests and concerns with the current or potential future management of Hult Reservoir. These included interest in continued public access to the reservoir and concerns about non-designated camping, economic impacts to the local community if recreation was restricted, impacts to water quality and water rights, effects on fish, and historic preservation. Public concern about dam safety was low (Langdon Group 2017). The March 2018 public meeting reflected similar interests and concerns.

During the May 2018 scoping period, the BLM received six comment letters: one from the Environmental Protection Agency, one from Oregon Wild, two from members of a recreational fishing group, and two from other members of the public. The letter from the Environmental Protection Agency acknowledged the need to address dam safety and encouraged consideration of issues including aquatic habitat and fish passage, water quality, invasive plants, and historic resources. Comments from Oregon Wild suggested consideration of sub-alternatives and expressed concern about impacts on fish, rare plant species, and riparian habitat. Recreational anglers were interested in preserving the reservoir's functions for fishing and boating. Other members of the public had various concerns regarding impacts on fish passage, site accessibility, use of the reservoir as a water source for firefighting, and recreational fishing, equestrian, and camping use.

2021–2022 Scoping

Scoping Process Summary

Before the formal scoping process, the BLM hosted an open house at the dam on September 16, 2021. The open house was announced with a press release, and local TV station KVAL broadcast a news story and interviews with Siuslaw Field Office Manager Cheryl Adcock. The BLM posted meeting announcements and project fact sheets at the Horton Market and Triangle Lake School. Identified community stakeholders were informed of the meeting and asked to pass this information on to their contacts.

Forty-eight members of the public, including local residents and recreational users, signed in at the meeting. The purpose of this public meeting was to inform the public about the EIS's shift in focus to public safety and dam decommissioning, to collect concerns about the potential actions, and to gather suggestions from the public to inform the alternatives. There was no formal presentation, but BLM staff were available to answer questions and talk with attendees. Informational materials included display boards and a printed fact sheet on the Hult Pond Dam and EIS. Landscape artist renderings depicted potential alternative outcomes, and attendees were invited to note preferences for these and specific recreation components.

The BLM collected feedback from the meeting through comment forms and one-on-one conversations. Informal comments and feedback were documented by team members and added to written comments from the public. Information was provided about additional locations, both in person and online, for submitting comments. The BLM placed drop boxes and comment cards in the Horton Market, the Blachly post office, and the Triangle Lake School.

The formal public scoping period began December 30, 2021, when the Notice of Intent to prepare the EIS was published in the Federal Register and concluded January 31, 2022. In addition, the BLM issued a press release announcing the scoping period. Local news outlets KLCC, KMTR, and KVAL ran stories about the dam and EIS, information about scoping, and where to send comments.

Summary of Information Submitted by the Public During Scoping

Between September and December 2021, the BLM received 26 pre-scoping period submissions in the form of comment cards, emails, and phone calls, in addition to informal comments made in conversations with BLM staff at the public meeting. The substance of the comments and feedback collected during pre-scoping was much the same as comments received during formal scoping period in 2018. Concerns included effects to wildlife and ecosystems, loss of recreation opportunities, loss of water for fire suppression, flooding, impact on the local community and businesses, and lack of information about the analysis of the dam's hazard. Suggestions included repairing or rebuilding the dam, as well as improving camping facilities and supervision.

During the 30-day scoping period, the BLM received 133 submissions from members of the public and organizations in the form of comment cards, letters, emails, and phone calls. Duplicate (identical) submissions were counted only once. An additional letter was received after the end of the 30-day period, and its comments were included as scoping comments. Organizations submitting comment letters were Cascadia Wildlands; the Confederated Tribes of Coos, Lower Umpqua and Siuslaw Indians; the Oregon Department of Forestry; Oregon Wild; and the U.S. Environmental Protection Agency (USEPA). The BLM reviewed scoping and pre-scoping submissions and catalogued 390 substantive comments, which were categorized as addressing EIS issues, alternatives, or data. These were used to inform the list of issues to be addressed in the EIS (see the *Issues* section in Chapter 1), the alternatives to be analyzed (see Chapter 2), and the data to be used in the EIS analysis.

The following is a summary of comment letters and submissions and does not include all specific comments or their topics. Many submissions addressed multiple issues and concerns. In addition to other issues, commenters frequently conveyed the reservoir's significance for them personally.

Most comments about potential actions on the dam favored alternatives that would either maintain the dam in its current state, repair or modify the dam, or remove the existing dam and construct a new dam. Some commenters had questions about the cost of repairing or rebuilding the dam; proposed sources for funding, including private donations, user fees, and congressional monies; or suggested transferring ownership of the dam from the BLM to another agency. Sixteen comments supported removing or decommissioning the dam for reasons including public safety, salmon passage and habitat restoration, and restoration of a naturelike stream channel. Some commenters were neutral concerning the future of the dam and reservoir and commented only on related issues (e.g., that the area has undesirable camping or excessive traffic).

One hundred and four comments concerned recreation at the reservoir and impacts on recreation opportunities, including fishing, boating, swimming, and camping. While most of these comments focused on potential loss of recreation opportunities (most commonly fishing, swimming, and boating), some suggested adding hiking trails, picnic areas, swimming holes, and more camping infrastructure. Commenters noted that the reservoir is unusual in offering water recreation without the presence of motorized boats, creating a more family-friendly setting. Some commenters were concerned about the possible loss of a dispersed camping area. However, many commenters supported development of camping facilities at the site, including designated camping sites, a camp host, and user fees to support maintenance costs.

Ninety-three comments mentioned concerns about impacts on fish, wildlife, and ecosystems. Some were general concerns about impacts to the area's ecosystem and flora and fauna, but many mentioned particular species, including coho salmon, cutthroat trout, bluegill, bass, Pacific lamprey, western pond turtle, Oregon spotted frog, [99] beavers, otters, newts, ducks, geese, and other waterfowl; eagles, owls, and other birds of prey; murrelets, and corvids. While most of these comments voiced concerns about adverse impacts of removing the dam and reservoir, several commenters favored removal of the dam for fish passage and restoration of natural stream function and habitat.

Forty-nine comments addressed the reservoir as a water source for local fire suppression, citing its use as a helipond and pump chance. Some mentioned potential increase in wildfire frequency and severity due to climate change. Commenters stressed that if the reservoir was removed, an alternative dip site and pump chance should be created.

Twenty-one comments were related to flooding, public safety risk posed by the dam, or the analysis of that risk. Some questioned the validity of reports evaluating the dam's hazard level, requested public access to the reports, or wanted additional studies done. Some residents downstream from the reservoir commented that the dam was in no danger of failing, or that if it did fail, flooding would not be significant enough to be a safety hazard. Other residents believed removing the dam would result in more flooding.

Twenty comments concerned water quality, and seven comments mentioned water rights.

Twenty comments discussed social impacts, such as the area's value to the community and families, and nine comments addressed economic impacts, especially loss of revenue for the Horton Market if fewer recreators visited the area. Six comments recognized the area as providing opportunities for low-cost recreation.

Fourteen comments expressed concern about impacts to the dam and reservoir as a historical and cultural site. Some cited the area's Tribal history or the mill's connection to Nils Hult, the Oregon lumber industry, or local communities.

Other concerns included current and future unwanted use and vandalism of the area, impact on climate change, sediment and erosion control, impacts to Tribal lands surrounding the reservoir, invasive plant species, and impacts to area scenic values.

May 2022 Draft Chapters 1 and 2 Public Comment Period

Public Comment Process Summary

The BLM made a preliminary draft of the Hult Reservoir and Dam Safety EIS Chapters 1 and 2 available for public comment between May 2 and June 5, 2022. Chapter 1 covered the dam's history as well as the project's background and its purpose and need. Chapter 2 presented three alternatives (No Action, build a new dam, or remove the dam and reservoir and restore a naturelike stream channel) and the issues proposed for analysis.

This public comment period was not required by regulation, but the BLM chose to add it because of strong community interest in the project. The BLM wanted to allow the public to see revisions to the EIS made in response to scoping comments received in January 2022 and give input on public concerns or suggestions that were not initially included in the preliminary draft.

[99] Hult Reservoir is outside of the current known range of the federally listed Oregon spotted frog: Most known populations are currently located along the Cascade Range in central Oregon (USGS 2017).

Summary of Information Submitted During the Comment Period

The BLM received 51 submissions (emails, letters, or comment cards) during the 30-day comment period. These included 47 submissions from 39 members of the public (some people made multiple submissions). Twenty-three of these submissions were mailed or emailed, and 24 were collected at a BLM open house on May 4, 2022. Two organizations (Cascadia Wildlands and Oregon Wild) and two Federal agencies (USEPA and U.S. Army Corps of Engineers Regulatory Branch) also submitted comments.

A comment is a section of a submission (email, letter, etc.) that addresses a particular subject or subjects. Of the comments recorded, 103 were substantive comments. Substantive comments are those that challenge the EIS's analysis, provide additional information, dispute information accuracy with alternative information, provide information that leads to changes to alternatives, or suggest new alternatives. Substantive comments are addressed in the EIS. Many non-substantive comments received were similar to substantive comments submitted during scoping or pre-scoping but did not include new information or issues that had not been taken into account when writing the draft chapters (for example, general concerns regarding impacts to the ecosystem or wildlife).

The purpose of the comment period was to gather new input to inform the EIS and analysis, not to take a "vote" on which alternative to implement. However, of the public commenters who stated a preference, 21 favored keeping the reservoir in its current form and 5 supported the removal of the dam and reservoir. Five did not state preference for an alternative but described negative impacts of removing the reservoir.

In comments received during pre-scoping, scoping, and public meetings for the EIS since September 2021, many members of the local public communicated to the BLM that the reservoir has strong significance to the nearby community, to themselves, and to their families. While these statements often don't fit within the BLM's criteria for "substantive" comments, the BLM acknowledges this local public perspective. As an issue, this can be difficult to quantify, but one BLM specialist estimated that 90 percent of the attendees at the May 2022 open house expressed the personal and/or community significance of the reservoir as a concern, and this was echoed in many comments received on the draft chapters. This EIS has sought to consider these local values, attitudes, and concerns through its analyses of recreation and socioeconomic issues: Issue 4 (Recreation), Issue 5 (Local Economy), Issue 6 (Quality of Life of Local Residents), and Issue 7 (Environmental Justice Populations).

The following are general topics addressed in the comments and a summary of some of the main questions or concerns raised.

Flooding, Hydrology, Dam Failure, and Public Safety (23 comments)
The BLM received several questions about the data and assumptions that informed the USACE modeling of the dam's inundation zone, dam failure, and flood scenarios in the USACE reports, including the likelihood of a probable maximum flood. Comments also asked the BLM to clarify the difference between a flood event with and without dam failure. Other comments concerned the effects of alternatives on the hydrology of Lake Creek and the impact on downstream residents and Triangle Lake. Some commenters indicated that they did not think the dam posed a risk to their safety or questioned the validity of the BLM centering public safety in the EIS's purpose.

Fish and Fish Habitat (15 comments)
Comments included concerns about the effects of the alternatives on coho salmon and suggestions for mitigation to restore salmon and other riparian habitat. Comments addressed concerns about fish passage, including suggestions to repair or rebuild the existing fish ladder or construct a roughened channel for fish passage; however, other commenters asserted that the existing fish ladder works and is being used by salmon or steelhead.

Recreation (15 comments)
Commenters noted that the reservoir is a valued site for family-friendly water recreation and expressed concerns about loss of water recreation opportunities, including fishing in winter months. Some commenters requested that sufficient water for water recreation be left during new dam construction or in the event of dam decommissioning.

Other comments indicated potential locations for campsites, suggested the BLM lease land to local residents for use as managed campgrounds and asked about camping and day-use statistics.

EIS Process and Alternatives (12 comments)
Some commenters indicated issues that they saw with the EIS process: whether the BLM posted sufficient notice of the scoping period; the perception that the BLM did not allow the U.S. Army Corps of Engineers to complete their analysis of the dam; or that the action alternatives did not allow the deciding official a broad enough range of options. Other comments recommended that the EIS action alternatives include design concepts and their impacts; that proposed mitigation measures should be substantial, enforceable, and achievable; and that the BLM comply with project review requirements and guidelines of other agencies regarding land and water regulations.

Wildlife (7 comments)
Specific new concerns about wildlife included the effects of revegetation mitigation on birds, including marbled murrelet and northern spotted owl, and project impacts on bear habitat and bees. Suggested mitigations included extending turtle habitat and encouraging beaver activity.

Climate Change (5 comments)
Commenters expressed that the EIS should consider the impact of construction on greenhouse gas emissions, the effect that revegetation mitigations would have on carbon sequestration, and whether the alternatives take into account climate change and its effects on precipitation events and severity.

Community/Historical and Cultural (5 comments)
Commenters expressed that the reservoir is a focal point of the community and a part of local history and culture, and that area residents, families, and reservoir users have a personal attachment to or personal history with the reservoir.

Fire (4 comments)
The role of the reservoir as a water source for fire suppression, especially as a helicopter dip site, was brought forth by the public in previously received comments. However, new comments requested statistics documenting the reservoir’s use as a dip site and pointed out that the reservoir is also used as a water source by the local fire department.

Tribal Concerns (4 comments)
Commenters asked the BLM to clarify the boundary locations of CTCLUSI-owned land around the reservoir. Other commenters requested information about the extent of Tribal participation in the EIS and the Tribes’ perspective on the project. Other comments asked that the EIS describe government-to-government consultation with the Tribes and look at how the project alternatives would impact Tribal cultural practices, including traditional gathering.

Costs (3 comments)
Comments and questions concerned the cost of the alternatives and the distribution of funding for building a new dam.

Environmental Justice (2 comments)
Commenters noted that the reservoir is one of the only local areas for water recreation that is accessible to low-income families or recommended that the EIS address the impacts of the alternatives on populations with environmental justice concerns (such as disadvantaged or indigenous populations), the involvement of those populations in the EIS process, and the BLM’s efforts to engage with those populations and address their concerns.

Other Topics
Other comment topics included rare plants at the reservoir (two comments, regarding clubmoss and native lily), education (two comments, regarding interpretive trails and kiosks with ecosystem, riparian, and historical information and a riparian educational program), human health (one comment, regarding the value of the

reservoir to the mental health and wellbeing of users), and waters (three comments, regarding effects on water quantity and Waters of the United States).

October 2023 Draft EIS Public Comments

Public Comment Process Summary

A 45-day public comment period for the draft EIS took place from October 20 to December 7, 2023. The BLM held two public meetings during this time: a virtual seminar conducted via Zoom on November 15, 2023, and an open house at the Triangle Lake Charter School in Blachly on November 17, 2023.

Twenty-three people registered for the online meeting and 17 attended. The interdisciplinary team gave a slide presentation on the EIS, including the project background, purpose and need, alternatives, and potential mitigation measures. Attendees submitted 29 questions using the Zoom Q&A feature; team members responded directly or in writing to those questions as time permitted. Questions concerned topics including recreation, ownership of the dam and surrounding land, fish passage, non-native fish, flooding and changes to waterways, invasive plant treatments, and the BLM process for selecting the preferred alternative.

Twenty-four members of the public signed in at the in-person open house, where BLM resource specialists and management were available to answer questions. Informational panels offered details on various aspects of the project and artist renderings depicting the project area landscape under Alternatives 3 and 4. The BLM solicited written public comments and collected eight comment cards at the meeting along with a petition from local residents and reservoir users.

Summary of Information Submitted in the Draft EIS Comment Period

The BLM received a total of 35 submissions (emails, letters, or comment cards) during the DEIS comment period, including a petition in favor of Alternative 2 (Remove the Existing Dam and Build a New Dam) signed by 60 people. The submissions included letters from two conservation organizations (Cascadia Wildlands and Oregon Wild), one recreation organization (Blue Ribbon Coalition, and one Federal agency (USEPA).

The BLM's responses to substantive comments on the draft EIS are in Appendix G, which also details resulting changes in the final EIS. As described above, substantive comments challenge the EIS's analysis, provide additional information, dispute information accuracy with alternative information, provide information that leads to changes to alternatives, or suggest new alternatives.

Additional Public Outreach

The project's public affairs team prepared a detailed communications plan outlining goals and strategies for public outreach and engagement. In early February 2022, the BLM sent a tri-fold mailer to over 300 households in the reservoir inundation zone that shared information about Hult Pond Dam's risk to public safety, emergency readiness, and the EIS. The team established public quarterly email updates for the project, the first of which was sent February 14, 2022, to a mailing list of nearly 200 addresses; information on how to opt into this list was included in other public communications. Additionally, updates and information about the project were posted on both ePlanning and the BLM's page for the Hult Pond Dam Project, including PDFs of printed materials and frequently asked questions about Hult Reservoir, the EIS, and dam safety.

Cooperators

NEPA provides direction regarding the coordination and cooperation of Federal agencies with other Federal, State, and local agencies and Tribal governments. The Council on Environmental Quality's regulations for implementing NEPA require cooperative relationships between lead and cooperating agencies. Cooperating agency status provides a formal framework for governmental units (including local, State, Federal, and Tribal) to engage in active collaboration with a lead Federal agency to implement the requirements of NEPA. For this EIS, the BLM has worked with partners from many agencies. With all formal cooperating agencies, the BLM has signed a memorandum of understanding, identifying the roles and responsibilities of each party in the planning process. Formal cooperating agencies on this EIS include:

- Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians of Oregon
- Confederated Tribes of Grand Ronde Community of Oregon
- Oregon Department of Fish and Wildlife
- Oregon Department of Forestry – Lane County
- U.S. Army Corps of Engineers – Regulatory Branch

Project Distribution List

The distribution list includes Federal, State, and local entities, Tribes, cooperating agencies, recreational groups, local landowners, and other interested members of the public, including the approximately 150 individuals who contacted the BLM regarding this project during or before the scoping period.

In addition to the cooperators listed above, the BLM contacted:

- Confederated Tribes of Siletz Indians

- U.S. Senators Ron Wyden and Jeff Merkley
- U.S. Representatives Peter DeFazio and Kurt Schrader

- National Marine Fisheries Service
- U.S. Army Corps of Engineers – Engineering Branch
- U.S. Environmental Protection Agency
- U.S. Fish and Wildlife Service

- Oregon Department of Environmental Quality
- Oregon Department of State Lands
- Oregon Heritage/State Historic Preservation Office
- Oregon Water Resources Department: District 02

- Lane County Board of Commissioners

A complete list of people, agencies, and groups contacted is available for review at the BLM Siuslaw Field Office in Springfield.

Consultation

Tribes

Federally recognized Tribes have a unique relationship with the Federal Government in that they are sovereign nations and retain inherent powers of self-government. Consequently, they interact with the United States on a government-to-government level (USDI 2016d). The BLM initially contacted the Tribes by sending a letter to the Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians (CTCLUSI); the Confederated Tribes of Grand Ronde; and the Confederated Tribes of Siletz Indians. The initiation letters described the project and invited the Tribes to enter into government-to-government consultation and be involved with the development of the EIS.

In September 2022, CTCLUSI Tribal Council Chair Brad Kneaper wrote to Siuslaw Field Office Manager Cheryl Adcock raising concerns about impacts of Alternative 3 (Remove Hult Reservoir; Add Little Log Pond) on Tribal land near the project area. Alternative 3 would move the focus of recreation close to the property line between BLM land and Tribal land. Chair Kneaper indicated that the Tribe would request government-to-government consultation if the alternative was included in the EIS. On October 20, 2022, at the Tribe's invitation, Ms. Adcock and EIS Project Manager Christi Denton gave an informational presentation on the EIS and Alternative 3 to the CTCLUSI Leaders Circle.

Following this, the Tribe formally requested government-to-government consultation. Consultation took place February 28, 2023, between the CTCLUSI Tribal Council and BLM management (Northwest Oregon District Manager Dennis Teitzel),[100] with EIS team members attending (Assistant Northwest District Manager Robin Ryan, Ms. Denton, District Tribal Liaison Britt Betenson, and BLM archaeologist Terry Godin). The Tribal Council expressed concerns about the alternatives' environmental and cultural effects and impacts on CTCLUSI land surrounding the reservoir. Additionally, CTCLUSI Chief Doc Slyter voiced strong concerns about potential impact to Tribal sacred sites. The BLM followed up by coordinating with the CTCLUSI Tribal Historic Preservation Office and adding an inadvertent discovery plan to the EIS, along with information about Tribal sacred sites.

CTCLUSI and the Confederated Tribes of Grand Ronde are also cooperators[101] on this EIS (see the *Cooperators* section), and BLM staff has met with members of both Tribes to discuss development of the EIS. In April 2022, the BLM began meeting monthly with CTCLUSI natural and cultural resources staff to update the Tribe on the project, get input, and discuss ongoing concerns.

The Tribes have expressed concerns about potential effects on water quality and water flow into Lake Creek, plant and animal species (especially beaver, western pond turtle, salmon, steelhead, and lamprey), and preservation of the area's cultural value. The Tribes have also indicated interest in restoration activities, including using indigenous fire practices, planting culturally significant plants (e.g., wapato, cedar, huckleberry, camas), and reintroducing and providing passage for Pacific lamprey.

The BLM conveyed lands neighboring Hult Reservoir to CTCLUSI under the 2018 *Western Oregon Tribal Fairness Act* (see Figure 1-1 in Chapter 1). The Tribe is interested in how the alternatives would affect right-of-way access through Tribal land (see *Conformance with Laws, Land Use Plan, and Other Decisions* in Chapter 1 and Issue A-3 in Appendix A) and how they would impact Tribal land upstream and downstream of the project area (see Issue A-5 in Appendix A).

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[100] It should be noted that, for the BLM, formal government-to-government consultation on this EIS requires participation of agency leadership at the level of District Manager or higher and a tribal chair or council. However, CTCLUSI representatives have conveyed that the Tribe also recognizes consultation through coordination as an open-ended process between the BLM and CTCLUSI staff of any level.
[101] The BLM acknowledges that cooperation does not replace or circumvent government-to-government consultation but is an additional method for participation.

As described below, the BLM is also working jointly with the CTCLUSI on consultation under Section 106 of the *National Historic Preservation Act*.

Oregon State Historic Preservation Office and Tribal Historic Preservation Office

Section 106 of the *National Historic Preservation Act* mandates that Federal agencies consider the effects of their actions on historic properties in conjunction with the views of the interested public and any consulting parties, including but not limited to the State Historic Preservation Office (SHPO), local Tribes, and Tribal Historic Preservation Offices. The BLM is currently engaged in completing the Section 106 process as described below.

The Hult Pond Dam and the majority of the surrounding structural remains of the associated mill are located on Federal lands administered by the BLM. Many mill features are also located on Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians lands.

The BLM, in consultation with CTCLUSI and its Tribal Historic Preservation Office, has determined that the dam and mill site are eligible for listing to the National Register of Historic Places. SHPO has concurred with this determination. Removal of the dam, a contributing feature to the historic property's eligibility, would therefore cause an adverse effect to the eligible historic property. This adverse effect must be resolved (in accordance with 36 CFR 800.6) via measures developed in consultation with the State and Tribal Historic Preservation Offices. Related actions, such as the addition of trails or other recreational developments within the site boundary, may cause additional adverse effects that could also require resolution.

In addition, as described in Issue 8, as part of Section 106 compliance, the BLM has completed a thorough cultural resource survey of the project area of potential effect in the late summer and fall of 2023, and assessed the scope of the proposed actions on identified eligible historic resources. The BLM, Oregon State Historic Preservation Office, and Tribal Historic Preservation Office have reached concurrence on the previously recorded dam and mill site's National Register eligibility, independent of the Section 106 survey effort and forthcoming project consultation. The BLM will submit its survey report, detailed Section 106 documentation form and updated determination of eligibility for the historic dam and mill site (the site remains eligible), and a written request for the comments of the State Historic Preservation Office on the finding of effect and a proposed mitigation plan. Completion of all reporting is expected during the winter of 2023–2024. Once all documentation is submitted, the Oregon State Historic Preservation Office will have 30 calendar days from receipt of the written request to respond, though this period could be extended depending on the complexity of proposed projects and measures needed to arrive at a finding of no adverse effect. The BLM will complete consultation before a Record of Decision is signed.

The BLM has created an inadvertent discovery plan (see Appendix D), which will protect unknown cultural sites that may be found during the project implementation. The plan includes consultation with the Oregon State Historic Preservation Office and Tribal Historic Preservation Offices as necessary.

Endangered Species Act and *Magnuson-Stevens Fishery Conservation Act*

The *Endangered Species Act* was passed in 1973 to conserve species of wildlife and plants determined by the Directors of the U.S. Fish and Wildlife Service (USFWS) or the National Marine Fisheries Service to be endangered or threatened with extinction in all or a significant portion of their ranges, and to protect the ecosystems upon which they depend. Among other measures, the *Endangered Species Act* requires all Federal agencies to conserve these species and consult with the USFWS or National Marine Fisheries Service on Federal actions that may affect these federally listed species or their designated critical habitat. [102]

The alternatives have the potential to impact one federally listed anadromous fish species, two federally listed bird species, and one reptile proposed for listing (see Table 4-1).

Table 4-1*. Federally Listed Species That Have the Potential to Be Impacted by Actions Under the Alternatives*

Taxon	Common name	Evolutionarily Significant Unit or Distinct Population Segment	Scientific name	Status
Anadromous fish	Coho salmon	Oregon Coast Evolutionarily Significant Unit	*Oncorhynchus kisutch*	Threatened
Bird	Marbled murrelet		*Brachyramphus marmoratus*	Threatened
	Northern spotted owl		*Strix occidentalis caurina*	Threatened
Reptile	Western pond turtle		*Actinemys marmorata*	Proposed for listing as threatened

Consultation with U.S. Fish and Wildlife Service

Alternatives 2 and 3 could potentially affect dispersal habitat for northern spotted owls if construction removed trees during building of a new Hult Pond Dam or Little Log Pond dam. Alternatives 2 and 3 could potentially disrupt nesting murrelets, although this potential is low: The BLM has completed surveys for potential marbled murrelet and northern spotted owl nest trees and found none within the project area. Blasting proposed in Alternative 2 of this project could adversely affect nesting marbled murrelets or northern spotted owls if nesting occurs within one-quarter mile of blasting. The BLM has completed habitat surveys for northern spotted owl and marbled murrelet and has determined that there are currently no nest sites within one-quarter mile of the project area. Furthermore, the only suitable nesting habitat is low-quality murrelet nesting habitat, which is more than 0.15 miles away from any proposed blasting. (This suitable habitat did not contain murrelets when surveyed in 2002, 2005–2006, and 2020–2021.)

The project area is in the historic home range of the Pacific marten; however, any marten in the area would be transient. Alternative 4 would not affect habitat for marbled murrelets, northern spotted owls, or Pacific marten, and is not likely to disrupt nesting individuals. (Information about these species can be found in Appendix A, Issue A-12.)

The U.S. Fish and Wildlife Service's programmatic 2013 Aquatic Restoration Biological Opinion (ARBO II, USDI et al. 2013) addresses consultation with the USFWS on the effects of Alternative 4: Preferred Alternative (*Remove Hult Reservoir*) on these threatened wildlife species. Northern spotted owl and marbled murrelet are the threatened wildlife species occurring within the project area that are covered by this consultation. As described in ARBO II, dam removal would entail project review by the restoration review team comprising the BLM, U.S. Forest Service, Bureau of Indian Affairs, National Marine Fisheries Service, and USFWS fisheries biologists, hydrologists, geomorphologists, soil scientists, and engineers (USDI et al. 2013:7). For Alternatives 2 (Remove the Existing Dam and Build a New Dam to Maintain Hult Reservoir) and 3 (Remove Hult Reservoir; Add Little Log Pond), which both include new dams, the BLM would need additional consultation with U.S. Fish and Wildlife Service before a Record of Decision could be signed.

Western pond turtles (*Actinemys marmorata*) are currently a Bureau sensitive species. The USFWS has recently proposed the turtle be listed as federally threatened under the Endangered Species Act (USDI 2023b). A decision on that listing is expected by October 2024. If the western pond turtle is federally listed as threatened, the USFWS then has one year to designate the turtle's critical habitat. If the western pond turtle is federally listed as

[102] Areas designated by the U.S. Fish and Wildlife Service under rule-making as being critical to the life functions and needs of a federally listed species, and which then carry special protection and consultation requirements.

threatened, the BLM would initiate consultation with the USFWS by preparing a biological assessment in accordance with Section 7 of the Endangered Species Act of 1973, as amended (ESA), to describe and evaluate the potential effects of the proposed action on the western pond turtle and its critical habitat. The USFWS would then issue a biological opinion based on review of the information provided in the BLM proposed action. The biological opinion would include project design criteria and mitigation measures[103] to protect western pond turtles based on the best available science.

Consultation with National Marine Fisheries Service

Critical habitat for coho salmon and essential fish habitat are designated on Hult Reservoir and in Lake Creek both above and below the reservoir. The *Magnuson-Stevens Fishery Conservation Act* (1976) requires the identification of habitat "essential" to conserve and enhance Federal fishery resources that are commercially fished. Essential fish habitat is defined as those waters and substrate necessary for spawning, breeding, feeding, or growth to maturity (50 CFR 600.10).

The National Marine Fisheries Service's programmatic 2013 Aquatic Restoration Biological Opinion (ARBO II; NMFS 2013) addresses restoration activities on BLM-administered lands in Oregon. Categories of restoration activities addressed by ARBO II include fish passage restoration, dam removal, riparian vegetation planting, and log and boulder placement. Consultation with the National Marine Fisheries Service on the effects of Alternative 4: Preferred Alternative (Remove Hult Reservoir) on coho salmon is addressed by ARBO II. As described in ARBO II, dam removal would entail project review by the restoration review team comprising the BLM, U.S. Forest Service, Bureau of Indian Affairs, National Marine Fisheries Service, and U.S. Fish and Wildlife Service fisheries biologists, hydrologists, geomorphologists, soil scientists, and engineers, as well as NMFS fish passage review (NMFS 2013:6–7).

For Alternatives 2 (Remove the Existing Dam and Build a New Dam to Maintain Hult Reservoir) and 3 (Remove Hult Reservoir; Add Little Log Pond), which both include new dams, the BLM would need additional consultation with National Marine Fisheries Service before a Record of Decision could be signed. The BLM would prepare an operations and maintenance plan as part of the consultation in order to address effects to coho when lowering Hult Reservoir or Little Log Pond to perform maintenance on the dams.

List of Preparers

Lead Team

Siuslaw Field Office Manager (through Feb. 2023)	Cheryl Adcock (Siuslaw Field Office)
Writer-Editor and Records Manager	Lewis Barrett (Denton & Denton Environmental)
Siuslaw Field Office Manager (starting Jan. 2024)	Sarah Bickford (Siuslaw Field Office)
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NEPA Specialist (Aug. to Dec. 2022)	Chelsea Corning (Siuslaw Field Office)
EIS Project Manager and Interdisciplinary Team Lead	Christi Denton (Denton & Denton Environmental)
Acting Siuslaw Field Office Manager (Feb. 2023 to Dec. 2023)	Christopher Finn (Siuslaw Field Office)
Planning and Environmental Specialist (starting Oct. 2023)	Amber Lamet (Siuslaw Field Office)
Planning and Environmental Specialist (Aug. 2022 to Mar. 2023)	Morgan Schneider (Siuslaw Field Office)
Implementation Project Manager/Interdisciplinary Team Engineer	Evan Wernecke (Northwest Oregon District)

Interdisciplinary Team

GIS and Rights-of-Way Specialist	Bernadette Acker (Siuslaw Field Office)
Socioeconomic Specialist	Stewart Allen (Oregon State Office)

[103] Informal conversations between the BLM and the Service on the western pond turtle have led to additional proposed mitigation measures for the species being included in this EIS.

Wildlife Biologist (starting Sep. 2023)	Chelsea Corning (Siuslaw Field Office)
Archaeologist	Terry Godin (Northwest Oregon District)
Botanist	Douglas Goldenberg (Siuslaw Field Office)
Invasive Plant Specialist	Annie Lawrence (Siuslaw Field Office)
Wildlife Biologist (through Aug. 2023)	Randy Miller (Siuslaw Field Office)
Elements Specialist	Jonas Parker (Northwest Oregon District)
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Outdoor Recreation Planner	David Sanders (Northwest Oregon District)
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Dam Operator	Joe Lynch (Siuslaw Field Office)
Conflict Analysis and Dispute Resolution (starting Sept. 2021)	Dianne Olson (The Langdon Group)
Conflict Analysis and Dispute Resolution (through Oct. 2021)	Elizabeth Spaulding (The Langdon Group)
Program Analyst/Planning and Environmental Coordinator (through Oct. 2023)	Jim Regan-Vienop (Oregon State Office)
Cartographer	Gabriel Rousseau (Oregon State Office)

Internal Reviewers

- *Northwest Oregon District*: Britt Betenson (Archaeology), Daniel Eddy (Fire and Fuels), Vicki Peterson (Assistant District Manager, Operations), Dennis Teitzel (District Manager), and Sonja Weber (Wildlife)
- *Oregon State Office*: Carol Aron (Wildlife), Steven Boyer (Engineering), Mike Brown (Natural Resources), David Ballenger (Recreation), Sarah Canham (Botany), Katherine Coddington (Archaeology), Rebecca Hile (Hazmat), Emily Johnson (Fisheries), Stacy Johnson (Invasive Plants), Chris Knauf (Recreation), Greta Krost (Geology), Stephanie Messerle (Fisheries), David Moore (Recreation), LeAnna Phillips (Engineering), Karen Schank (Climate Change), and Nathan Suida (Fire/Fuels)
- *BLM Headquarters*: Tim Barnes (Geology), Dana Cork (Engineering), and Ed Everaert (Engineering)
- *EIS Cooperating Agencies:* Representatives from the Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians; the Confederated Tribes of Grand Ronde; Oregon Department of Fish and Wildlife; Oregon Department of Forestry – Lane County; and the U.S. Army Corps of Engineers – Regulatory Branch

Glossary

Aggradation: Aggradation is infilling of a stream that occurs when the stream is supplied with more sediment than it can carry, and some of the sediment is deposited, building up the stream bed. Contrasts with stream degradation caused by erosion.

Alluvial fans: Fanlike, triangle-shaped deposits of gravel, sand, and rock fragments that form where the output of rivers from canyons or narrow valleys of mountain chains flows into lowland areas or plains.

Anaerobic: Having little or no available oxygen. Soil becomes anaerobic when the oxygen in it is displaced by water, as in a saturated area like a wetland.

Aquatic: Growing, living in, frequenting, or taking place in water; used to indicate habitat, vegetation, or wildlife in water.

Area of Critical Environmental Concern (ACEC): An area within public lands that requires special management attention to protect and prevent irreparable damage to important historic, cultural, or scenic values; fish or wildlife resources; and other natural systems or processes, or to protect life or provide safety from natural hazards.

Bathymetry: Measurements of the depth of a waterbody and its underwater contours. Bathymetric maps are similar to topographic maps and illustrate depth and underwater features. See also *Topography.*

Bedload: Large, dense sediment that typically sits on the bottom of stream channels and is only moved by higher-speed flows.

Breach: An opening through a dam that allows a reservoir to drain.

Bryophyte: A group of non-vascular, seedless plants that includes mosses (*Bryophyta*), hornworts (*Anthocerotophyta*), and liverworts (*Marchantiophyta*).

Bureau sensitive: See ***Sensitive Species***

Carbon dioxide equivalent (CO_2e): A metric used to compare greenhouse gas emissions based on their potential to raise the Earth's temperature. The carbon dioxide equivalent of a greenhouse gas represents the number of metric tons of CO_2 emissions that have the same global warming potential as one metric ton of that gas.

Categorical exclusion: A class of actions that a Federal agency has determined, after review by CEQ, do not individually or cumulatively have a significant effect on the human environment and for which, therefore, neither an environmental assessment nor an environmental impact statement is normally required.

Clean Water Act: The *Clean Water Act* of 1972 was passed to control pollution and maintain water quality in U.S. waters. Under the Act, the Environmental Protection Agency regulates discharges into water, wastewater standards, and water quality standards for surface water.

Cofferdam: A temporary structure enclosing all or part of the construction area to contain water so that construction can proceed in dry conditions.

Conduit: A closed channel to convey water through, under, or around a dam.

Consultation: Exchange of information and interactive discussion; usually refers to consultation mandated by statute or regulation that has prescribed parties, procedures, and timelines (e.g., Consultation under *National*

Environmental Policy Act or Section 7 of the *Endangered Species Act*, or consultation with Tribes under Section 106 of the *National Historic Preservation Act*).

Critical habitat: An area designated by the U.S. Fish and Wildlife Service under rule-making as being critical to the needs of a federally listed species and which then carries special protection and consultation requirements.

Cultural resources: Nonrenewable evidence of human occupation or activity as seen in any area, site, building, structure, artifact, ruin, object, work of art, architecture, or natural feature, which was important in human history at the national, state, or local level.

Damming surface: Any surface of the structure that holds back water.

Deposition: The process of sediment being laid down after being transported by wind, water, ice, or gravity. Also, a deposit of sediment.

Determination of NEPA adequacy: Documentation that a previously completed NEPA analysis (such as an environmental assessment or environmental impact statement) can satisfy NEPA's requirements for a subsequent, new proposed action.

Dike: A subsidiary dam constructed across a low point in a reservoir perimeter.

Earthen dam: A dam constructed of excavated natural materials in which more than 50 percent of the total volume is formed of compacted earth material generally smaller than 3 inches.

Environmental DNA (eDNA): DNA that is released from an organism into the environment. Sources of eDNA include secretions, shed skin and hair, and carcasses.

Electrofishing: A technique used for capturing fish, usually for fish surveys or salvage. A device placed in the water generates an electrical current that attracts fish and temporarily stuns them so they can be collected in a net.

Embankment: A raised structure of earth, rocks, or gravel, usually intended to retain water or carry a roadway.

Endangered species: Any species listed under the *Endangered Species Act* as being in danger of extinction throughout all or a significant portion of its range.

***Endangered Species Act*:** A law passed in 1973 to conserve species of wildlife and plants determined by the Director of the U.S. Fish and Wildlife Service or the National Marine Fisheries Service to be endangered or threatened with extinction in all or a significant portion of its range. Among other measures, the *Endangered Species Act* requires all Federal agencies to conserve these species and consult with the U.S. Fish and Wildlife Service or National Marine Fisheries Service on Federal actions that may affect these species or their designated critical habitat.

Environmental justice population: Racial or ethnic minorities, low-income populations (living at or below 200 percent of the poverty threshold), and Tribal populations.

Evolutionarily significant unit: An evolutionary significant unit is a group that is recognized as distinct within a species for conservation purposes. The National Marine Fisheries Service defines an evolutionary significant unit as a salmon population that is reproductively isolated from other populations and that represents important evolutionary and genetic differences within the species.

***Federal Land Policy and Management Act of 1976*:** Public Law 94-579. Provides the majority of the BLM's legislated authority, direction, policy, and basic management guidance.

Federally listed: Formally listed as a threatened or endangered species under the *Endangered Species Act*. Designations are made by the U.S. Fish and Wildlife Service or National Marine Fisheries Service.

Fish ladder: A structure that allows migrating fish passage over or around an obstacle on a river or other waterway.

Fish passage: Modification or removal of barriers that restrict or impede movement or migration of fish.

Greenhouse gas: Gases in the Earth's atmosphere that raise the temperature by absorbing radiation and trapping heat emitted by the planet. The most common greenhouse gases are carbon and methane.

Habitat: The natural environment of a plant or animal, including all biotic, climatic, and soil conditions, or other environmental influences affecting living conditions; the place where an organism lives.

Headcutting: Progressive erosion caused by stream flow washing away material along a steepened area of a stream bed, deepening and widening the channel.

Hydric: Having an abundance of moisture. Hydric soil has been saturated by standing water or flooding and has developed anaerobic (low oxygen) conditions in its upper layers.

Hydrology: The scientific study of the properties, distribution, and behavior of the Earth's water, especially its movement in relation to land. A hydrologist is a person who practices hydrology.

Hydrophyte/Hydrophytic: Plants that have adapted to growing in low-oxygen (anaerobic) conditions associated with prolonged saturation or flooding in areas such as wetlands. Examples are water lilies, pond weeds, and cattails.

Hyporheic: Denoting the area beneath a river or stream that is saturated by a mixture of groundwater and surface water.

Impounded water: The water held back by a dam.

Interagency Special Status/Sensitive Species Program (ISSSSP): The BLM and Forest Service collaboration to coordinate record keeping and other management of the Bureau special status and Forest Service sensitive species programs. See also *Special status species*.

Invasive plants: Non-native aggressive plants, including noxious weeds, with the potential to cause significant damage to native ecosystems, cause significant economic losses, or both.

Issue: A matter of controversy, dispute, or general concern over resource management activities or land uses.

Lentic: Related to still fresh waters (such as lakes, ponds, or wetlands).

Liquefaction: A state in which soil temporarily loses strength and behaves as a viscous liquid due to the shaking of an earthquake or other stress. Liquefaction is generally restricted to coarse-grained sediments (silts, sands, and gravels) that are sufficiently loose and uncemented so they easily compact during seismic shaking.

Lotic: Related to rapidly flowing fresh waters (such as streams and rivers).

Macroinvertebrate: An animal that lacks a spine and is large enough to be seen without a microscope, such as a snail, insect, or crustacean.

Mainstem: The principal watercourse in a river drainage system, from which named streams or tributaries branch. Water enters the mainstem river through drainage from the area's watershed or water basin.

Mitigation measures: Measures to prevent, reduce, or control adverse impacts of a proposed action. Unlike project design features, mitigation measures are not included as part of the action and must be selected separately for implementation.

Morning glory spillway: A funnel-shaped outlet that draws water down and allows it to bypass and flow past a dam when a reservoir reaches capacity.

***National Environmental Policy Act* (NEPA):** A national policy created in 1969 to ensure Federal agencies consider the environmental impacts of their actions and decisions and carry them out in compliance with regulations set by the Council on Environmental Quality.

Overtopping: The rising of water over the top of a barrier, generally related to flow over the crest of a dam or associated dikes. This can occur when the water held back by a dam exceeds the dam's limit.

Perennial stream: A stream that flows continuously year-round.

Population at risk: The human population downstream from a dam that would be subject to risk from flooding in the event of a potential dam failure.

Potential failure mode: The particular chain of events that could lead to a dam failure. The dam failure does not have to result in a complete release of impounded water.

Primary production: The process in which living organisms such as bacteria, algae, and plants form organic material from inorganic materials in the environment, usually through photosynthesis.

Probable maximum flood: The most severe flood considered reasonably possible at a site as the result of meteorological and hydrologic conditions.

Project design features: Specific measures included in proposed BLM actions to minimize impacts on the human environment and comply with the management direction in Resource Management Plans, including State and Federal laws.

Proposed threatened or endangered species: Plant or animal species proposed by the U.S. Fish and Wildlife Service or National Marine Fisheries Service to be biologically appropriate for listing as threatened or endangered and that is published in the Federal Register. It is not a final designation. Proposed species are, at minimum, managed as Bureau sensitive until a decision is made about Federal listing.

Raptors: Birds of prey, such as owls, hawks, or eagles.

Redd: A spawning nest for fish, usually salmon or trout, which create a depression in a streambed in which to lay eggs, often in shallow, fast-moving riffles.

Regime: The historical pattern of frequency and intensity of events such as wildfires, rainfall, or floods, which may be influenced by other factors.

Resource management plan: Land use plans developed by BLM under the *Federal Land Policy and Management Act*; provides long-term (up to 20 years) direction managing a particular area of land.

Right-of-way: A permit or an easement that authorizes the use of lands for certain specified purposes, such constructing forest access roads, gas pipelines, or power lines.

Riparian area: Those terrestrial areas where characteristic vegetation is influenced by and occurring in close proximity to streams.

Riparian habitat: Areas adjacent to rivers and streams with a high density and productivity of plant and animal species relative to nearby uplands. Riparian vegetation is characterized by hydrophilic plants (plants that have adapted to living in aquatic environments).

Riprap: A layer of loose, angular rocks placed over soil to prevent erosion due to wave or water action. Often used to stabilize channels, shores, and embankment dams.

Sediment: Unweathered geologic materials generally laid down by or within waterbodies; the rocks, sand, mud, silt, and clay at the bottom and along the edge of lakes, streams, and oceans.

Sensitive species (Bureau sensitive): Native species designated by the BLM State Director as Bureau sensitive because they are found on BLM-administered lands for which the BLM has the capability to significantly affect the conservation status of the species through management, and either: 1) There is information that a species has recently undergone, is undergoing, or is predicted to undergo a downward trend such that the viability of the species or a distinct population segment of the species is at risk across all or a significant portion of the species range, or 2) The species depends on ecological refugia or specialized or unique habitats on BLM-administered lands, and there is evidence that such areas are threatened with alteration such that the continued viability of the species in that area would be at risk.

Socioeconomic: Pertaining to or signifying the combination or interaction of social and economic factors.

Soil compaction: The compression of the soil profile from surface pressure, reducing air- or liquid-filled pockets, lowering water-holding capacity, and decreasing plant root penetrability.

Spillway: A structure over or through which flow from a reservoir is discharged. The flow may be controlled by mechanical means such as gates.

Special status species: Federally listed threatened, endangered, proposed, or candidate species, and species managed as Bureau sensitive species by the BLM.

Stream reach (or reach): A section of a stream or river that is uninterrupted and has consistent conditions and characteristics, such as discharge rate, depth, area, and slope.

Substrate: In a body of water, the underlying surface of sediment and rock. For organisms, the substrate is one element of their habitat and may provide food, shelter, reproductive setting, and other resources.

Threatened species: A plant or animal species federally listed as *threatened* under the *Endangered Species Act*, and status defined as likely to become an endangered species throughout all or a significant portion of its range within the foreseeable future.

Topography: The configuration of a surface, usually an area of land, including height, depth, relief, and the position of natural and man-made features.

Tribe: Term used to designate any Native American band, nation, or other organized group or community.

Tyee Formation: An ancient (44 million to 66 million years old), geologic formation in the central western portion of Oregon, composed of heavily layered sedimentary rock.

Water table: The upper limit of the part of the soil or underlying rock material that is wholly saturated with water.

Waters of the United States: The term "waters of the United States" is used to define waters to which the *Clean Water Act* applies. These include U.S. navigable waters, territorial seas, and interstate waters; impoundments of and tributaries to those waters; lakes and ponds; and adjacent wetlands.

Watershed: The region draining into a river, stream, or body of water. When used in this EIS, it refers to a unit with a ten-digit hydrologic unit code.

Wetland: Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation adapted for life in saturated soil. Wetlands include swamps, marshes, bogs, and similar areas. Additionally, wetlands have three parameters: hydrophytic vegetation (plants that grow partly or wholly in water), hydric soils (soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper portion), and hydrologic inundation (e.g., flooding).

Wier: A low barrier built across a river for the purpose of controlling the flow of water, raising the level of the river upstream, or both. Water may flow over or under a weir.

References

Some references can be accessed via the links below or on BLM's ePlanning site (https://eplanning.blm.gov/). The ePlanning site is the BLM's national NEPA register and information about this EIS can be accessed by searching for EISs in Oregon's Siuslaw Field Office. This EIS's ePlanning site can be accessed directly at https://eplanning.blm.gov/eplanning-ui/project/99598/570

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Appendices

Tables

Figures

Appendix A: Issues Considered but Not Presented in Detailed Analysis

The BLM considered several issues it identified during scoping and the May 2022 draft Chapters 1 and 2 public comment period, but these issues are not presented in detailed analysis in this EIS. Issues are not presented in detailed analysis when:

- Analysis of the issue is not necessary to make a reasoned choice between alternatives (i.e., the issue does not relate to how the alternatives respond to the purpose and need);
- There is no potential for significant effects related to the issue; or
- The issue has already been sufficiently analyzed in documents to which this EIS tiers (USDI 2008a:40–42).

Issues presented in detailed analysis are included in Chapter 3.

Issue A-1. How would implementation of the alternatives affect the availability of water for use for aerial wildland fire suppression?

The BLM received comments from the public and the Oregon Department of Forestry during January 2022 scoping and the May 2022 draft Chapters 1 and 2 public comment period expressing concern that removing the reservoir would eliminate it as a water dip site for helicopters and planes in the event of wildfire, thereby impacting wildland fire suppression for the area. This issue was considered but is not presented in detailed analysis because significant effects are not anticipated under the action alternatives.

To consider this issue, the BLM looked at the geographic area within which Hult Reservoir (or Little Log Pond in Alternative 3) could be used as a helicopter[1] dip site, along with fire history, fire frequency and size, fire regime condition classes (FRCC),[2] and nearby water sources. Table A-1 indicates which alternatives would include a helicopter dip site within the project area.

***Table A-1**. Waterbody in the Project Area That Could Be Used as a Helicopter Dip Site in Case of Nearby Wildfire*

Time period	*Affected Environment*	*Alt. 1.1: Dam Failure Alt. 1.2: Drain Reservoir*	*Alt. 2: Build a New Dam*	*Alt. 3: Add Little Log Pond*	*Alt. 4: Remove Hult Reservoir*
During project implementation	Yes	No	No	No	No
Post-implementation			Yes	Yes	

The geographic scale of analysis was based off a roughly 33,000-acre fire response area determined by the Oregon Department of Forestry.[3] The area surrounds the Hult Log Pond 2.5 to 4 miles in every direction, with emphasis given to the northeast and southeast, around Low Pass. Portions of this area's boundary are defined by ridgelines, creeks, and road systems, which serve as strategic locations for holding wildland fires. In the event of a wildfire, these strategic locations would be utilized to contain a fire within this area or, conversely, to prevent a fire from entering it.

There have been 84 recorded wildfires in the area since 1967. Of those 84 fires, 67 burned less than 1 acre, and 4 burned 15 or more acres. The largest fire recorded in the area was the High Pass Fire in 2017, which burned 191

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[1] Fixed-wing aircraft need a larger body of water, such as Triangle Lake or Fern Ridge Reservoir, to ensure a safe descent and ascent during water collection.

[2] A tool used to determine the degree of ecological departure from historical, or reference condition, vegetation, fuels, and disturbance regimes.

[3] The Oregon Department of Forestry manages wildfire response in Western Oregon.

acres; Hult Reservoir was used as a helicopter dip site during this fire. The Oregon Department of Forestry does not keep records of how often Hult Reservoir is used as a water source for ground-based or aerial-based fire suppression but estimated it to be a couple of times in the last decade.

As shown below, landscapes can be delineated into fire regime groups as indicated in Table A-2 (Barrett et al. 2010).

Table A-2. *Fire Regime Condition Classes*

Fire regime group	*Fire frequency*	*Fire severity[1]*	*Severity description*
I	0–35 years	Low/mixed	Generally low-severity fires replacing less than 25% of the dominant overstory vegetation; can include mixed-severity fires that replace up to 75% of the overstory
II	0–35 years	Replacement	High-severity fires replacing greater than 75% of the dominant overstory vegetation
III	35–200 years	Mixed/low	Generally mixed-severity fires; can also include low-severity fires
IV	35–200 years	Replacement	High-severity fires
V	200+ years	Replacement/ any severity	Generally replacement-severity; can include any severity type in this frequency range

1. Fire severity:
Low – A fire that has limited effect on overstory trees (< 30% mortality), understory vegetation, and soils.
Moderate – A fire producing variable, moderate effects on overstory trees, with an average of 30–80% of the vegetation killed, and/or moderate soil exposure.
High – A fire producing a high percent of overstory tree mortality (> 80%) and/or extensive mineral soil exposure.

In the 33,000 acres surrounding Hult, 80 percent of the landscape is classified as FRCC III, and 20 percent is in FRCC IV, which means that fires are expected in the area every 35 to 200 years, and fire severity would generally be low or mixed severity.

Other nearby dip sites are available in the area; Triangle Lake is 5.8 miles to the southwest of Hult Reservoir. In the event a helicopter had to travel further for water, there may be a loss in tactics due to longer travel times that would allow the fire to grow. This fire growth isn't possible to calculate because of all the weather and topographic variables that contribute to fire growth, but the BLM does not expect variance to be significant.

It should also be noted that some stretches of Lake Creek, including Lake Creek through the Hult Reservoir Restoration Area could still be used as a helicopter dip site, depending on the equipment available. For example, a power fill bucket or a tank with snorkel (a Bambi Bucket™, or collapsible bucket) can be filled in as little as 18 inches of water (SEI Industries 2013:9).

Based on the above factors, the BLM does not expect significant effects to result from lack of a helicopter dip site at Hult Reservoir. Hult Reservoir has rarely been used as an aerial water source, large fires in the area are not common, and alternate dip sites are available nearby. For these reasons, this issue is not presented in detailed analysis.

Issue A-2. How would implementation of the alternatives affect the availability of water for ground-based water delivery for local fire departments as well as wildland fire suppression?

The BLM received comments from the public during January 2022 scoping and the May 2022 public comment period for draft Chapters 1 and 2 expressing concern that removing the reservoir would impact ground-based water delivery for fire suppression. This issue was considered but is not presented in detailed analysis because significant effects are not anticipated under the action alternatives. Additionally, differences in effects are not being used to inform the decision because the issue does not respond to the purpose and need for the EIS.

To consider this issue, the BLM looked at the potential for availability of draft sites for fire engines in the area under each alternative within and near the project area.

Fire engines currently use Hult Reservoir as a water source for fighting fire. Under Alternative 2 (Remove the Existing Dam and Build a New Dam), fire engines would continue to draft water out of Hult Reservoir when necessary. Under the action alternatives, a project design feature would be adopted by the BLM:

- Provide a draft site for fire engines off Lake Creek or Little Log Pond. Improve the roadway to allow engines and water tenders with limited maneuverability quick access in and out of the site.

This means that under all alternatives, a draft engine site that provides water for fire suppression would be available within the project area. For this reason, the BLM determined that there was no potential for significant impacts to ground-based water delivery for fire suppression and that this issue did not need to be presented in detailed analysis. As noted in Issue A-1 (Aerial Fire Suppression), the Oregon Department of Forestry does not keep records of how often Hult Reservoir has been used as a water source for ground-based or aerial-based fire suppression but estimated it was used for that purpose a couple of times in the last decade.

Issue A-3. How would implementation of the alternatives impact right-of-way access in the area?

The BLM received comments from the public during the January 2022 scoping period asking how the alternatives would impact right-of-way access at Hult Reservoir. This issue was considered but is not presented in detailed analysis because significant effects are not anticipated under the action alternatives, and differences in effects are not being used to inform the decision because the issue does not respond to the purpose and need for the EIS.

Public access to Hult Reservoir is granted in a memorandum of agreement between the BLM and the Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians (CTCLUSI), established in accordance with the *Western Oregon Tribal Fairness Act*. The Act and the memorandum of agreement state that as long as the BLM maintains a recreation site at Hult Reservoir, CTCLUSI shall allow public vehicular transit across lands managed by CTCLUSI for access to and from the site. If the BLM discontinues maintenance of the recreation site, CTCLUSI would no longer be required to allow public vehicular transit for this purpose. If the BLM selects an alternative that discontinues maintenance of Hult Reservoir, the BLM will work with the CTCLUSI in order to reach a new public access agreement if necessary. Under all alternatives in this EIS, some form of public recreation and maintenance managed by the BLM would continue at the Hult Reservoir site.

Additionally, the BLM has granted two types of private rights-of-way across the project area. The first type is O&C[4] logging road right-of-way permits, of which there are four. These permits grant the right to use certain lands, roads, and rights-of-way for managing and removing timber, forest, and mineral products from lands owned or controlled by the permit holder, as defined by the permits. In the case of the four permits that include Mill Pond Road (No. 15-7-26), which crosses the dam heading east from the intersection with Lake Creek Road, these are perpetual permits. The permits state that the BLM could replace or move the road, as long as these changes do not reduce access for the permit holders. Temporary reduction in access during construction is within the terms of the permit, but the BLM is required to notify the permit holders that access will be changed temporarily.

The second type of right-of-way in the project area is an easement for a telephone line, granted in perpetuity to Pioneer Telephone Cooperative in 1977, prior to the BLM acquiring the land in 1994. That right-of-way grants the right to construct, reconstruct, operate, and maintain a buried telephone line. The length, width, and exact location are not specified, but the line is adjacent to Lake Creek Road (No. 15-7-35) and ends at the old mill site.

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[4] The Oregon and California Railroad Revested Lands, known as the O&C Lands, lie in a checkerboard pattern through 18 counties of western Oregon. The Oregon and California Revested Lands Sustained Yield Management Act of 1937 put the O&C lands under the jurisdiction of the U.S. Department of the Interior. The lands are classified as timberlands to be managed for permanent forest production, with the timber to be sold, cut, and removed in conformity with the principle of sustained yield for the purpose of providing a permanent source of timber supply (43 USC 2601).

Because rights-of-way in the project area are not expected to be impacted under any of the alternatives, the BLM determined that this issue does not have the potential for significance and therefore does not need to be presented in detailed analysis.

Issue A-4. How would the implementation of the alternatives impact undesirable behavior by the public on or near the project area?

The BLM received comments from the public and non-BLM agencies during January 2022 scoping and the May 2022 public comment period on draft Chapters 1 and 2 expressing concern about illegal and dangerous activities at and near Hult Reservoir and their impact on the project area as well as the community of Horton and neighboring CTCLUSI lands. Activities mentioned included illegal dumping of garbage (including cars, hot tubs, and household trash), vandalism, noise, alcohol and drug use, illegal camping on neighboring lands, illegal campfires, off-road driving, and unsafe driving. Lack of cell or phone service at the reservoir was also a concern. This issue was considered but is not presented in detailed analysis because significant environmental effects beyond those addressed in Issue 4 (Recreation) in Chapter 3 are not anticipated under the action alternatives, and differences in effects are not being used to inform the decision because the issue does not respond to the purpose and need for the EIS.

As described by a Lane County Sherriff's deputy who patrols the area:

> "The log storage pond created by Hult Lumber Company has been a staple to the Horton community since the 1930s and is a popular destination for non-motorized watercraft and fishermen. Surrounding part of the pond are unimproved/dispersed campsites which have been fairly established for several generations. Like Lower Lake Creek Falls (Rockslides), it had been a hidden gem for many years until the internet rapidly highlighted its location.
>
> "Since then, deferred maintenance of the location and surrounding BLM/Tribal lands has led to an increase in criminal behavior ('broken window concept'). The area is fairly remote and sparsely populated, which allows anonymity of criminal behavior. Shot-up or stolen traffic signs haven't been replaced, equestrian trails are not maintained, vegetation management is minimal, and an increased amount of trash gets dumped. Frequently, stripped-out vehicles which were stolen from Albany to Eugene are found 'dumped' in the area. During fire season, illegal campfires pose a hazard to the dense, tall timber surrounding the lake, and often folks ignore the posted fire danger signs. Transients are attracted to the area because of its remoteness and often leave behind trash and human excrement on the ground.
>
> "Law enforcement patrols of the area help to curb some of this criminal activity, but law enforcement is responsible for many square miles of BLM lands spread out across Lane County."

During the past 4 years, law enforcement has made nearly a dozen arrests per year on average; these arrests are typically for assaults, traffic crimes, or warrants. Law enforcement typically writes 20–30 citations and issues 30–50 verbal warnings per year, ranging from fire restriction violations to dumping trash to off-road vehicle travel and traffic violations. The level of enforcement is always specific to the individual nature of the offense and the demeanor of the offender. Summer months are typically busier than the winter months (pers. comm. December 20, 2022, Joshua Mars, Lane County Sheriff's Deputy).

Illegal camping, fires, trash dumping, and other unwanted activities have been reported on neighboring CTCLUSI lands. This activity would be expected to increase under Alternative 3 (Remove Hult Reservoir; Add Little Log Pond), as water-based recreation would move from Hult Reservoir to Little Log Pond, which is closer to CTCLUSI lands. However, a project design feature adopted for all action alternatives would build a camp host site with partial hook-ups. An improved camp host site is expected to attract a high-quality host, whose presence is in turn expected to reduce some of the undesirable behavior associated with Hult Reservoir (Alternative 2: Remove the Existing Dam and Build a New Dam), Little Log Pond (Alternative 3: Remove Hult Reservoir; Add Little Log Pond), or any recreation under Alternative 4 (Remove Hult Reservoir).

Camp hosts are proven to improve the appearance and maintenance of recreational sites and reduce the anonymity of criminal behavior. As described on the BLM's website, camp hosts welcome campers, provide information, and perform light maintenance to help keep the campgrounds attractive (USDI 2021b). As described in Issue 4 (in Chapter 3), on-site hosts help keep the BLM informed about conditions while providing visitors with a sense of continual management oversight and help to curtail unwanted uses such as illegal dumping, long-term residing, and uncontrolled partying. Although there has been a camp host site at the reservoir, the lack of potable water, electricity, and internet and phone service has limited the pool of host applicants. The addition of a phone at the reservoir is also expected to increase visitor safety throughout the area.

For these reasons, the BLM determined that there was no potential for significant environmental impacts and that this issue did not need to be presented in detailed analysis. Additional details about recreation and the camp host role can be found in Issue 4 in Chapter 3, and additional details about the neighboring lands can be found in Issue A-5 in this appendix.

Issue A-5. How would the implementation of the alternatives affect neighboring lands?

The BLM received comments from the public during January 2022 scoping and the May 2022 public comment period on draft Chapters 1 and 2 asking how the alternatives would affect neighboring lands, including lands managed by Coos, Lower Umpqua, and Siuslaw Indians (CTCLUSI) upstream and downstream of the . This issue was considered but is not presented in detailed analysis because significant effects are not anticipated under the action alternatives, and differences in effects are not being used to inform the decision because the issue does not respond to the purpose and need for the EIS.

In 2018, the *Western Oregon Tribal Fairness Act* transferred 32,261 acres of lands managed by the BLM to the Bureau of Indian Affairs to be held in trust for the Cow Creek Band of Umpqua Tribe of Indians (17,519 acres) and the CTCLUSI (14,742 acres on seven parcels of land). The largest of these seven parcels of CTCLUSI land is a 4,960-acre area (the Lake Tract) that surrounds almost all [5] of the Hult Reservoir project area, and all road access to the project area crosses CTCLUSI lands. (Public access to Hult Reservoir is permitted under a 2018 memorandum of agreement between the BLM and the Tribe. If the BLM selects an alternative that discontinues maintenance of Hult Reservoir, the BLM will work with the CTCLUSI in order to reach a new public access agreement.) Alternative 3 (Remove Hult Reservoir; Add Little Log Pond) is expected to move recreation closer to CTCLUSI lands.

As described on the CTCLUSI website (https://ctclusi.org/forestry-management), the Lake Tract is managed in accordance with applicable Federal and Tribal law, according to the desires of the Tribal Membership. The Tribe plans to write a forest management plan for the area.

Public use of CTCLUSI lands is at the sole discretion of the Tribe. Members of the public are encouraged to contact CTCLUSI or visit https://www.ctclusi.org for more information on public access, fire and safety closures, and regulations affecting activities on Tribal lands.

Additional information can be found in Chapter 3's Issue 8, which describes effects to archaeological and historic resources and values (i.e., the Hult Mill site, which exists on both BLM and CTCLUSI lands), and Issue A-4, which describes undesirable behavior by the public.

Issue A-6. How would the implementation of the alternatives affect culturally significant species important to local Tribes?

The BLM received comments during the May 2022 draft Chapters 1 and 2 public comment period expressing concern that the action alternatives could impact species important to local Tribes. Species that are culturally

[5] The boundary of the project area is approximately 5 miles. CTCLUSI lands border 4.2 miles of that.

significant to the local Tribes include Pacific lamprey, coho and steelhead salmon, eagles, osprey, beaver, and native plants such as camas and red and black huckleberry (a non-exhaustive list of common cultural plants of importance to Tribes in Western Oregon can be found in the EIS for the *Northwestern and Coastal Oregon Resource Management Plan*, to which this EIS tiers (USDI 2016b:1644–1649)). This issue was considered but is not presented in detailed analysis because significant effects to these species are not anticipated under the action alternatives beyond effects addressed in Chapter 3's Issue 10 (Wetlands Vegetation), Issue 13 (Western Pond Turtles), and Issue 14 (Native Fish), and the local Tribes (i.e., CTCLUSI, the Confederated Tribes of Grand Ronde (CTGR), and the Confederated Tribes of Siletz Indians) have not identified cultural concerns associated with those impacts. Additional information about these species and the potential for the project to impact them can also be found in Issues A-9 (ecosystems), A-10 (Special Status Species), Issues A-11 (Wildlife), and A-12 (Special Status Wildlife) in Appendix A.

Issue A-7. How would implementation of the alternatives impact the physical integrity, accessibility, or use of Tribal sacred sites?

The BLM received comments from the Environmental Protection Agency during January 2022 scoping expressing concern that the alternatives have the potential to impact Tribal sacred sites if they are present. Executive Order 13007 requires Federal land managing agencies to accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners and to avoid adversely impacting the physical integrity, accessibility, or use of Tribal sacred sites.

This issue is not analyzed in detail because no effects to Tribal sacred sites are expected: A literature review and search of BLM and Oregon Heritage/State Historic Preservation Office databases indicate no Tribal sacred sites are present in the project area. Further, the BLM contacted the CTCLUSI, the CTGR, and the Confederated Tribes of Siletz Indians for any firsthand information they may have and be willing to share regarding such sites in the area. Confederated Tribes of Grand Ronde responded that they have no knowledge of such sites in the area. No response about specific sites was received from CTCLUSI or Confederated Tribes of Siletz Indians. The BLM has created an inadvertent discovery plan (see Appendix D) for archaeological resources, which will protect unknown sacred sites that may be found during project implementation.

Issue A-8. How would implementation of the alternatives affect the scenic value of the area?

The BLM received comments from the public during January 2022 scoping expressing concern that removing or replacing the dam could impact scenery around Hult Reservoir. This issue was considered but is not presented in detailed analysis because significant effects are not anticipated under the action alternatives, and differences in effects are not being used to inform the decision because the issue does not respond to the purpose and need for the EIS.

Visual resources consist of the land, water, vegetation, structures, and other features that make up the scenery and physical features visible on a landscape. All Northwest Oregon District BLM-administered lands have been classified under a visual resource management (VRM) class system established by the BLM under the 2016 RMP (USDI 2016a:94–94).

To consider this issue, the BLM looked at the project area and proposed actions under the alternatives and determined that proposed actions would occur mostly within VRM Class IV-designated areas. Lands within VRM Class IV-designated areas allow for strong visual contrasts in line, form, color, and texture, and no specific visual management constraints would apply to management actions. VRM Class IV objectives provide for management activities that require major modification of the existing character of the landscape, meaning that the level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention (USDI 2016a:94). Commercial logging is an example of an allowable management activity in VRM Class IV that may dominate the landscape.

A portion (11 percent) of the project area is within an area designated as VRM Class III. The VRM Class III objective is to partially retain the existing character of the landscape (USDI 2016a:93). A moderate level of change is allowed that may attract attention but should not dominate the view of a casual observer. Areas within the project area designated VRM Class III are limited and include portions of the Hult Reservoir Non-Motorized Trail ERMA. Adjacent lands, both BLM and private, are in various stages of post-harvest growth and contain a variety of human-caused landscape modifications that attract the casual observer's attention but do not dominate the view.

Under Alternatives 1, 2, and 3, there are no proposed actions within this VRM Class III-designated area. Alternative 4 (Remove Hult Reservoir) would include potential mitigation measures that expand or improve the existing multiple-use trail system within the Hult Reservoir Non-Motorized Trail ERMA and/or create a landscape viewing opportunity within this ERMA consisting of a simple day-use facility in a location that provides a panoramic view of the project area. Implementing these mitigation measures and their associated management activities would not exceed VRM Class III objectives.

The VRM Class III area where some minor project-related activities may occur represents a minor percentage of the overall landscape. The proposed activities on these lands are compatible with BLM management direction and would not cause alterations that would dominate the view. For these reasons, the BLM determined that there was no potential for significant impacts and that this issue did not need to be presented in detailed analysis.

Issue A-9. How would implementation of the alternatives affect ecosystems at and around Hult Reservoir?

The BLM received comments during the January 2022 scoping period and the May 2022 public comment period on draft Chapters 1 and 2 expressing concern about the impact of the alternatives on ecosystems in Hult Reservoir and the project area. This issue was considered but is not presented in detailed analysis here because significant effects to the project area's ecosystems and their components are not expected beyond what is analyzed in other parts of this EIS.

Public comments related to ecosystems referred generally to conservation of ecosystems in the project area and plant or animal species that are dependent on them. This discussion will describe the affected ecosystems and overall potential effects from the alternatives, but the specific impacts of those changes are analyzed in other issue sections. Impacts of ecosystem changes to fish, aquatic and terrestrial wildlife, and aquatic and terrestrial and plant communities under the alternatives are analyzed in Chapter 3's Issue 10 (Wetlands Vegetation), Issue 11 (Special Status Plants), Issue 12 (Invasive Plants), Issue 13 (Western Pond Turtles), Issue 14 (Native Fish), and Issue 15 (Game Fish). Information about additional wildlife species can also be found in Issues A-11 (Wildlife) and A-12 (Special Status Wildlife).

Hult Reservoir is a 54-acre reservoir that is fed by and empties into Lake Creek and is an artificial waterbody that resulted from the construction of Hult Pond Dam. The north, east, and southeast edges of the reservoir are covered by 37.1 acres of wetlands. Below the dam's outlet, Lake Creek resumes as a free-flowing stream. The project area encompasses a terrestrial uplands ecosystem surrounding the reservoir and three types of freshwater riparian ecosystems that blend together across the landscape: lentic, i.e., standing or slow-moving water (the reservoir); lotic, or faster-moving water (Lake Creek downstream from the reservoir); and wetlands, the standing water and saturated soil on the periphery of the reservoir.

Most of the alternatives would alter the proportions and/or locations of each of these ecosystems in the project area and have short- to long-term effects on organisms within them. With the exception of Alternative 1, the alternatives also include project design features and potential mitigation measures for ecosystem preservation and/or restoration.

Under Alternative 1, the BLM anticipates that the reservoir would be eventually drained, either due to a dam breach or because a dam breach is imminent, and the BLM would drain the reservoir to avoid an uncontrolled release of water. This would leave the project area with no significant amount of standing water (i.e., no lentic ecosystem). The reservoir would be replaced by an extended lotic ecosystem, where Lake Creek returned to a natural watercourse, and wetlands would increase to approximately 30 acres as residual water from the reservoir saturated the area.

Alternative 2 (Remove the Existing Dam and Build a New Dam), which would decommission and replace the existing dam with a new dam, would have the least potential effects on local ecosystems' configuration and functions. Although the reservoir would be drained during construction, temporarily disrupting the reservoir ecosystem for approximately 3 years, depending on construction phases, the reservoir may be partially refilled before construction is complete. After completion of the dam, the reservoir would be allowed to refill to its present volume. While the BLM expects that a comparable lentic ecosystem would reestablish itself after the reservoir is refilled, draining would remove some aquatic species that may not persist or return without human intervention; in the case of invasive species, this would be considered a beneficial effect.

Under Alternative 3 (Remove Hult Reservoir; Add Little Log Pond), the BLM would remove the dam and create the Little Log Pond downstream from the current dam location. Lake Creek above the dam would reestablish as a naturelike stream channel. A new lentic ecosystem is expected to develop at the new pond, although at a smaller scale than that of the existing reservoir. As with Alternative 2, because the reservoir would be drained, some wildlife species may require human intervention to reestablish a presence in the new pond. The area in the Hult Reservoir Restoration Area would be occupied by an expanded area of wetlands (an increase of and an extension of Upper Lake Creek's lotic ecosystem). These ecosystem changes above the current dam location would be similar to those resulting under Alternative 1; however, Alternative 3's project design features and potential mitigation measures would help preserve aquatic function in wetlands and riverine ecosystem functions that would be left unprotected under Alternative 1.

Alternative 4 (Remove Hult Reservoir) would drain the reservoir and allow Lake Creek to establish a naturelike stream channel through the Hult Reservoir Restoration Area. Effects to ecosystems above the current dam location would be identical to those of Alternative 3.

For more information on these changes, see Issue 9, *How would implementation of the alternatives affect riparian areas, wetlands, and lentic systems?* In Chapter 3. (More information can also be found in Issue A-15, *How would implementation of the alternatives impact the hydrology of the basin?*) Under all alternatives, no significant effects to the uplands terrestrial ecosystem are expected.

Because potential impacts of these changes to area ecosystems are analyzed in other issues in this EIS, the BLM determined that this issue did not need to be presented in detailed analysis.

Issue A-10. How would implementation of the alternatives affect special status species?

The BLM received comments from the public during January 2022 scoping and the May 2022 public comment period on draft Chapters 1 and 2 asking the BLM to analyze impacts of the alternatives on special status species, including Bureau sensitive species. This issue was considered but is not presented in detailed analysis here because significant effects to these species are not expected beyond what is analyzed in other parts of this EIS.

Special status species include species that are considered Bureau sensitive, are federally listed under the *Endangered Species Act*, or are protected under other Federal acts or agency programs. Bureau sensitive species are managed by the BLM to promote their conservation and reduce the likelihood of them becoming federally listed. Federally listed species are those considered by the U.S. Fish and Wildlife Service or the National Marine Fisheries Service to be endangered or threatened with extinction in all or a significant portion of their ranges, listed as Birds of Conservation Concern, or protected by the *Bald and Golden Eagle Protection Act*.

Two Bureau sensitive plants, humped bladderwort (*Utricularia gibba*) and northern bog clubmoss (*Lycopodiella* *inundata*), are found in the wetlands around the reservoir. The impact of the alternatives to these plant species is analyzed in Chapter 3's Issue 11, *How would implementation of the alternatives affect humped bladderwort and northern bog clubmoss at the reservoir?*

One federally listed fish species (Oregon Coast coho salmon (*Oncorhynchus kisutchI*)) and two Bureau sensitive fish species (Oregon Coast steelhead trout (*Oncorhynchus mykiss*) and Pacific lamprey (*Entosphenus tridentatus*)) live in or downstream from Hult Reservoir. Effects of the alternatives to these species are analyzed in Issue 14, *How would implementation of the alternatives affect native fish like coho and lamprey, including fish passage and fish habitat?*

Many special status wildlife species are known or are likely to occur in the project area (see Table A-5 in Issue A-12). With the exception of the western pond turtle, no significant effects to these species or their habitat are expected under the alternatives (see Issue A-12, *How would the alternatives affect special status wildlife?*). Effects to the western pond turtle are analyzed in Issue 13, *How would implementation of the alternatives affect persistence of the western pond turtle?*

The BLM has determined that there is no potential for significant impacts to special status species beyond what is analyzed in these issue sections, and, therefore, this issue did not need to be presented in detailed analysis.

Issue A-11. How would implementation of the alternatives affect wildlife?

The BLM received comments during January 2022 public scoping and the May 2022 draft Chapters 1 and 2 public comment period expressing concern that removing or replacing the dam could impact wildlife in general. Comments also indicated concerns that removing or replacing the dam could impact specific species, including western pond and other turtles; frogs; water snakes; salamanders; newts; otters; beavers; Oregon spotted frogs; birds, including waterfowl, herons, eagles, king fishers, osprey, songbirds, owls, mergansers, wood ducks, bufflehead ducks, coots, geese, cormorant, mallards, and redhead ducks; bears; pollinators (such as bees) and other insects (such as dragonflies and butterflies); and special status wildlife species.

These concerns fall under BLM's goals for wildlife: "It is BLM policy to manage habitat with emphasis on ecosystems to ensure self-sustaining populations and a natural abundance and diversity of wildlife, fish, and plant resources on the public lands" (USDI 1988). A major emphasis of BLM's habitat management is species persistence (i.e., supporting recovery of federally listed wildlife and preventing a trend toward listing of other species (USDI 1988)). Analysis of wildlife-related issues will compare how different alternatives affect these with an emphasis on effects to habitat and how these habitat effects would impact species.

To consider this issue, the BLM considered how effects to habitats would impact specific species of concern and whether these impacts would be important to the BLM's goals for managing habitat for species.

The BLM identified the primary habitat associations for some specific species of concern in Table A-3. Primary associations are those that species need to fulfill their life history requirements. Species may use other habitats that are not a requirement for their survival.

Table A-3. *Primary Habitat Associations for Species of Concern Identified During Scoping*

Species	***Warm water (ponds, lakes, reservoirs)***	***Early successional vegetation (grass, forbs, shrubs, saplings)***	***Complex older successional forest***
Frogs	✓	✓	
Salamanders	✓	✓	
Turtles	✓	✓	
Water snakes	✓	✓	
Waterfowl: Mergansers, wood ducks, bufflehead ducks, coots, geese, cormorant, mallards, redhead ducks	✓	✓	Bufflehead and wood ducks use medium to large trees with cavities for nesting
Heron	✓	✓	✓ (Large trees for nests)
Osprey	✓		✓ (Large trees for nests)
Eagles	✓ (Large bodies of water)	✓	✓ (Large trees for nests)
King fishers	✓		
Bears		✓	✓
Otters	✓ (Warm and cold water)		
Beavers	✓ (Warm and cold water)		
Pollinators (such as bees)		✓	
Dragonflies	✓	✓	
Butterflies		✓	

Effects to species are based on effects to habitats (Bacon et al. 2017). Analysis found that warm-water ponds, lakes, or reservoirs are important to many of these species, and—to some extent—so is early successional habitat near this warm water. Generally, cold-blooded animals, such as insects, amphibians, and reptiles, as well as ground-nesting birds, such as many of these waterfowl species, will be more abundant in the Oregon Coast Range where there is more sun. Warm water is important to many of these species.

The following table shows the amount of habitat affected by each alternative.

Table A-4. *Habitat Changes Under Each Alternative in Areas Currently Covered by Reservoir*

Alternative	***Warm-water acres if dam is removed***	***Warm-water acres 30 years after project implementation***	***Early successional vegetation (grass, forb, shrub, sapling) 30 years after implementation***	***Complex forest 30 years after implementation***
Alt. 1.1: (Dam Failure); and Alt. 1.2: (Drain Reservoir)	0	0	0	54
Alt. 2: Build a New Dam	0	54	0	
Alt. 3: Add Little Log Pond	0	0	Potentially some associated with beaver dams	49
Alt. 4: Remove Hult Reservoir	0	0	Potentially some associated with beaver dams	54

Alternatives that remove the reservoir would adversely affect species that use it as primary habitat. Alternative 2 (Remove the Existing Dam and Build a New Dam) would drain it temporarily, and all other alternatives would permanently remove it. Thus, at the project scale, species of concern that use the reservoir as primary habitat would decline in abundance under Alternatives 1.1, 1.2, 3, and 4.

Mitigation measures that support permanent warm-water habitat and early successional habitat near this warm water would reduce but not eliminate adverse effects from removing the reservoir. Actions that promote beaver ponds, such as planting willow and shrubs, would also benefit warm-water habitats. On the other hand, the design and nature of Little Log Pond would limit its value for wildlife that need warm water.

Hult Reservoir is an artificial waterbody rather than a natural lake or pond. Therefore, BLM's goal for a "natural abundance of wildlife" (USDI 1988) may not apply to this location. Nonetheless, BLM considered species of concern but did not present this issue in detailed analysis because analysis showed that significant effects are not anticipated for above-listed species that are not special status species. The BLM assumes that the abundance of species not identified as special status species is within natural levels. Additionally, the amount of habitat affected (54 acres) is negligible compared to the amount of habitat available on Siuslaw Field Office for the species that do not have special status.

Issue A-12. How would implementation of the alternatives affect special status wildlife species?

The BLM received comments from the public during the January 2022 scoping period and the May 2022 public comment period on draft Chapters 1 and 2 expressing concern that removing or replacing the dam could impact special status wildlife species, which are species of concern because they have known or suspected persistence problems. BLM considered this issue but did not present it in detailed analysis because the BLM does not expect significant effects under the action alternatives for species of concern, except the western pond turtle (see Issue 13: Western Pond Turtle in Chapter 3).

The BLM Special Status Species Management Handbook sets out the agency's objectives and goals regarding special status species:

- "Bureau sensitive species will be managed consistent with species and habitat management objectives in land use and implementation plans to promote their conservation and to minimize the likelihood and need for listing under the ESA" (USDI 2008b).
- "Implementation-level planning should consider all site-specific methods and procedures needed to bring species and their habitats to the condition under which management under the Bureau sensitive species policies would no longer be necessary" (USDI 2008b).

To consider this issue, the BLM looked at acres of special status species habitat in the project area and calculated how that would change under each of the alternatives. A BLM wildlife biologist decided that for all but one species, the western pond turtle, this project would be consistent with BLM's goals for special status species (i.e., not contributing to a trend toward listing) (USDI 2008b).

For these reasons, the BLM determined that there was no potential for significant impacts to special status species and that this issue did not need presented in detailed analysis. A detailed analysis of effects to the western pond turtle is presented in Issue 13, *How would implementation of the alternatives affect persistence of the western pond turtle?*

The BLM looked at habitat associations to determine which species the alternatives could affect. Table A-5 lists the habitat associations for special status species documented or suspected to occur within the Siuslaw Field Office jurisdiction from the updated June 21, 2021, list. This table shows the variety of habitats or habitat elements needed by these species and the importance of grass, forb, shrub, old growth forest, and riparian habitats. Species associations with riparian habitats are also commonly related to other habitat elements, such as grass, forbs, or shrubs near streams. The Interagency Special Status/Sensitive Species Program website (https://www.fs.usda.gov/r6/issssp) contains much of the information included in the following two tables. This site also contains current lists of special status species as well as habitat information for many of these species.

Table A-5 shows that a variety of habitat types are important to the species of concern on this list, and it shows that certain habitats are more important to species persistence. If the abundance and distribution of these habitats is within the historic range of natural variability, the persistence of species would not be at risk, because species are the result of past selection pressures (Krebs 1985:16). The most important habitats to maintain and restore are those that are used by many species of concern. These are habitats that are well below their historic abundance (USDI 2016b), which is usually why these species have persistence problems. Generally, as habitats decline, so do associated species. As indicated in Table A-5, the most important habitats to maintain and restore to support these species are mature and old growth (complex late successional vegetation), grass/forb and shrub (complex early successional vegetation), and riparian areas with complex late or early successional vegetation. Complex habitats contain many habitat elements. For example, the group of federally endangered or federally threatened listings under the Endangered Species Act shows that our rarest species use more than one habitat type. The exception is the very specialized Fender's blue butterfly, which needs one specific plant for reproduction and a variety of other plants in grass/forb habitat for food. Even the marbled murrelet, which fulfills all its life history needs, except nesting, on the ocean, uses more than one habitat type for nesting inland. Table A-6 describes the impacts to Special Status Species under each alternative.

The analysis in Tables A-5 and A-6 reveals that there is little concern for impacts to the persistence of species from this project, because the amount of habitat affected would be minor. However, the alternatives would have varying impacts. Some species would benefit from dewatering the reservoir, and some would not, but these effects would be negligible to species viability for all species evaluated. The exception would be the effects to the western pond turtle, which is strongly associated with the large body of water that is the reservoir and has limited known breeding sites. Benefits to species would come from a small increase in the acres of vegetation that would replace the reservoir in Alternatives 1.1, 1.2, 3, and 4.

More species would benefit from replacing the reservoir with complex early successional vegetation than complex late successional vegetation because complex early is rarer than complex late successional forest on the Siuslaw Field Office. Adverse effects to other species would be caused by dewatering the reservoir, which would reduce the amount of open foraging areas above the reservoir for some bats and birds, although they are mobile enough to forage elsewhere. Dewatering would also reduce the likelihood of use of the project area by water birds, such as the geese that are species of concern. During the winter, waterfowl would probably rest on the smaller reservoir (Little Log Pond) created in Alternative 3 for recreation. However, summer use by wildlife would be reduced on this 5-acre reservoir compared to the current 54-acre reservoir.

For all but the western pond turtle, this project would be consistent with BLM's goals for special status species, which is to not contribute to a trend toward listing (USDI 2008b). For this reason, the BLM determined that there was no potential for significant impacts and that this issue did not need to be presented in detailed analysis.

Issue A-13. How would alternatives affect the Oregon spotted frog?

The BLM received comments during the January 2022 scoping period expressing concern that the alternatives would impact the Oregon spotted frog. Specifically, the comment asked if the BLM planned to capture and relocate the frogs or if they would survive the reservoir's removal. The Oregon spotted frog was listed as Threatened under the *Endangered Species Act* on August 29, 2014 (79 FR 51658). There are no known populations of Oregon spotted frogs in the Oregon Coast Range therefore there is no potential for the alternatives to have significant effects on Oregon spotted frogs. (The historic range did not include Lane County, although there were historic observations to the north, in Benton County (USDI 2014a:51662).)

Table A-5. *Siuslaw Field Office Special Status Species and Their Habitat Associations*
Primary habitat = 1. Secondary habitat = 2.

Special status species documented or suspected in the Siuslaw Field Office jurisdiction **Indicates species that* ***are not likely to occur in the Hult Reservoir project area***	***Grass/forb***	***Shrub***	***Sapling/pole***	***Young forest***	***Mature forest***	***Old growth forest***	***Caves/burrows***	***Cliffs/rims***	***Down wood***	***Snags and cavities***	***Talus***	***Coastal/ocean***	***Riparian/lakes***	***Comments***
Federally listed as endangered														
Fender's blue butterfly* (*Plebejus icarioides fenderi)*	1													Kincaid's lupine in native grasslands
Taylor's checkerspot butterfly* *(Euphydryas editha taylori)*	1	1						2						Coastal bluffs and chapparal, grassland, savanna, and native prairie
Federally listed as threatened														
Marbled murrelet *(Brachyramphus marmoratus)*				2	2	1							2	Very large trees in forest that is > 100' tall and > 40% canopy cover
Northern spotted owl *(Strix occidentalis caurina)*		1			2	1				1			1	Prey are associated with shrubs, cavities, complex older forest, and riparian areas
Streaked horned lark* *(Eremophila alpestris strigata)*	1	2												Grasslands w/bare ground; agricultural fields; Willamette Valley
Pacific marten (Coastal Oregon & California distinct population segment) (*Martes caurina*)		1	2	2	1	1			2	1			2	Important population is in or near the Oregon Dunes; marten in the Siuslaw Field Office jurisdiction are secondary
Bald and Golden Eagle Protection Act														
Bald eagle *(Haliaeetus leucocephalus)*	1				2	2				2			1	Nests in giant trees
Golden eagle *(Aquila chrysaetos)*	1	1	2	2	2	1		1						Nests in large trees, cliffs, rock outcrops. Inhabits shrub-steppe, grassland, open forest, and mixed conifer/deciduous habitats
Bureau sensitive														
Pacific fisher* (West Coast distinct population segment) (*Pekania pennanti)*		1		2	1	1		2	1	1	1		2	Fishers eat snowshoe hares, rabbits, rodents, and birds as well as insects, nuts, and berries
Pacific fringe-tailed myotis (*Myotis thysanodes*)	1	1			2	2	1	1		2			1	Crevices in snags, down wood, buildings, bridges; forage in open areas
Pacific pallid bat* *(Antrozous pallidus)*	1	1	1	2	2	2	1	1		1	2		1	Crevices in snags, down wood, buildings, bridges. Forage in open areas
Townsend's big-eared bat (*Corynorhinus townsendii)*		2	1	2			1						2	Roosts in mines, caves, tree cavities, and building attics; forages in a variety of habitats
Aleutian cackling goose (*Branta hutchinsii leucopareia*)	1												1	Winter resident; coastal grasslands
Bufflehead duck *(Bucephala albeola)*										1			1	Nests in flicker/pileated woodpecker cavities near ponds and small lakes
Dusky Canada goose *(Branta canadensis occidentalis)*	1												1	Winter resident; open grasslands, fields, and prairies
Tricolored blackbird *(Agelaius tricolor)*	1	1											1	Hardstem bulrush, cattail, nettles, willows, and Himalayan blackberries
Black Swift* *(Cypseloides niger)*	2	2	2	2	2	2	1	1					1	Nests sea caves and cliffs on coast, wet cliffs; aerial insectivore
Lewis's woodpecker *(Melanerpes lewis)*	2	1	1		2	2			1	1				Open woodlands, including white oak and ponderosa near grasslands

Special status species documented or suspected in the Siuslaw Field Office jurisdiction ****Indicates species that* ***are not likely to occur in the Hult Reservoir project area***	***Grass/forb***	***Shrub***	***Sapling/pole***	***Young forest***	***Mature forest***	***Old growth forest***	***Caves/burrows***	***Cliffs/rims***	***Down wood***	***Snags and cavities***	***Talus***	***Coastal/ocean***	***Riparian/lakes***	***Comments***
Purple martin *(Progne subis)*	1	1	1							1			1	Early seral with snags, especially snags near water
Grasshopper sparrow* *(Ammodramus savannarum)*	1													Open grasslands, fields, and prairies with bare ground
Oregon vesper sparrow* *(Pooecetes gramineus affinis)*	1	2												Grasslands, fields, prairies, roadsides
Northwestern pond turtle *(Actinemys marmorata)*	1	1							1				1	Slow, warm water; needs open areas for nesting
Painted turtle* *(Chrysemys picta)*	1	1											1	Slow, warm water; needs solar radiation of open areas for nesting
Foothill yellow-legged frog *(Rana boylii)*	2	2											1	Perennial streams with rock substrate
Water flea sp.* (*Dumontia oregonensis)*	1												1	Wetland prairie
Haddock's rhyacophilan caddisfly (*Rhyacophila haddocki)*													1	Cool mountain streams; Mary's Peak area
Siuslaw sand tiger beetle* (*Cicindela hirticollis siuslawensis)*												1	1	Dunes where freshwater enters beach; limited to no vegetation
Pacific walker (*Pomatiopsis californica)*				2	2	2							1	Riparian zones in coastal fog belt; springs and seeps in forest of Oregon Coast
Suckley's cuckoo bumble bee (*Bombus suckleyi*)	1	1												Diverse habitats that provide nectar, pollen, and host bee sites
Western bumble bee (*Bombus occidentalis*)	1	1												General nectar feeders; nest in holes in the ground
Coastal greenish-blue butterfly* (*Plebejus saepiolus littoralis*)	1											1	1	Close association with clovers for eggs and larvae; also near wet areas
Oregon red tree vole *(Arborimus longicaudus)*				2	1	1								Arboreal in Douglas-fir and true fir trees
Birds of Conservation Concern														
Band-tailed pigeon *(Patagioenas fasciata)*		1		2	2	2								Proximity to food source (i.e., fruits) and mineral sites are important habitat features
Chestnut-backed chickadee *(Poecile rufescens)*		1		2	1	1							1	Food: seeds, berries, and fruit pulp; 65% of diet is insects
Evening grosbeak *(Poecile rufescens)*			1	2	1	1							2	Older-age conifers and seed-producing hardwoods such as maple
Mountain quail *(Oreortyx pictus)*		1	2											Remote mountainous areas typically covered with dense shrubs such as chaparral
Olive-sided flycatcher *(Contopus cooperi)*			2		1	1				2				Conifer and hardwood forest; tall, dead trees; hunt in ecological transition zones (ecotones)
Rufous hummingbird (*Selasphorus rufus*)	2	1	1	2	2	2							2	Nectar
Sooty grouse *(Dendragapus fuliginosus)*	1	1			1	2								Eats needles, buds, berries, and insects
Willow flycatcher (*Empidonax traillii)*	2	1											1	Riparian shrubs and upland thickets of shrubs

Table A-6. *Special Status Species on the Siuslaw Field Office: Effects to Habitats from Alternatives*
** Indicates species that exist in the Siuslaw Field Office jurisdiction but are not expected to occur in the project area.*

Name	Presence on Siuslaw Field Office: Habitat	Presence in project area and effects from alternatives
Federally listed as threatened or endangered under the Endangered Species Act		
Fender's blue butterfly* *(Plebejus icariodies fender)*	***Documented (Eugene wetlands***): Obligate association with Kincaid's Lupine. Meadow/prairie/grassland/oak savanna habitats.	Not likely to occur in the project area.
Marbled murrelet *(Brachyramphus marmoratus)*	***Documented:*** Marbled murrelet suitable habitat is at least one giant tree with suitable nesting structure surrounded by buffer habitat within 100 meters and within 50 miles of the ocean; most nests are within 35 miles of the ocean. Marbled murrelet nesting structure includes the following conditions: average tree size 65" diameter, average platform size 11"x 20", and overhead cover within 3 feet averages 80% cover (USDI 1997). Live vegetation creating this overhead cover requires light. Suitable nesting structure is usually in somewhat open-grown trees because they have conditions needed to grow limbs or branches big enough to support large platforms with overhead cover. Average canopy closure in forests near nesting structure in Oregon is 43%, with one standard deviation ranging from 27–70% (USDI 1997).	· Removing the reservoir would increase habitat over time by replacing reservoir with forest, which could eventually become suitable nesting habitat in alternatives 1.1, 1.2, 3, 4 · Buffer habitat around low quality habitat would be removed by Alternative 3 where the 5-acre pond would be built · Blasting proposed in Alternative 2 would be Likely to Adversely Affect if within ¼ mile of occupied nest sites or unsurveyed suitable habitat (6 or more trees within a moving 5-acre circle). The only suitable habitat is more than 0.15 miles away from proposed blasting. This suitable habitat did not contain murrelets when surveyed in 2002 and 2005–2006 (Broom Top West) and again in 2020–2021 (Hult Crossing). Furthermore, all trees within ¼ mile of blasting have low-quality conditions for potential nesting.
Northern spotted owl *(Strix occidentalis caurina)*	***Documented:*** Complex late successional forest with nesting structure, especially large cavities, canopy layers, and large dead wood.	· Foraging is likely. Nesting is not likely. · Project would have negligible effect to supporting recovery due to the small amount of habitat affected by any alternative. · Removing the reservoir would increase habitat over time by replacing reservoir with foraging habitat in Alternatives 1.1, 1.2, 3, 4. · Blasting proposed in Alternative 2 would be Likely to Adversely Affect if within ¼ mile of known nest sites. Currently, there are no nests within ¼ mile of proposed blasting.
Pacific marten (Coastal Oregon & California distinct population segment) *Martes caurina*	***Suspected:*** Coastal martens are native to forests of Coastal Oregon and Coastal California. They occur in older forests but can also be found in younger forests with a significantly dense understory component that provides shelter and prey, such as in the coastal shore pine forests in and near the Oregon Dunes National Recreation Area.	· Presence is possible. · Project would have negligible effect to supporting recovery due to the small amount of habitat affected by any alternative. · Removing the reservoir would increase habitat over time by replacing reservoir with forest, which would become suitable habitat under Alternatives 1.1, 1.2, 3, and 4.
Streaked horn lark* *(Eremophila alpestris strigata)*	***Documented:*** Prairies, dunes, beaches, pastures; areas with low grassy vegetation.	Not likely to occur in the project area.
Taylor's Checkerspot Butterfly* *(Euphydryas editaha taylori)*	***Suspected:*** Grassland/meadow/prairie/oak savanna habitats.	Not likely to occur in the project area.

Name	***Presence on Siuslaw Field Office: Habitat***	***Presence in project area and effects from alternatives***
	Other special status species	
Aleutian Canada cackling goose *(Branta hutchinsii leucopareia)*	***Suspected:*** Winter resident only. Inhabits coastal grasslands, pasture, harvested agricultural fields, and marshes. Small numbers occasionally appear in the Willamette Valley, especially during migration.	· Presence is possible during winter due to the reservoir and open wetlands. · Project is not likely to cause a trend toward listing because alternatives would have negligible effect to the amount of habitat available to this species.
Bald eagle *(Haliaeetus leucocephalus)*	***Documented:*** Nest and roost in large trees and late-successional forest stands within 1 mile of lakes, rivers, and large streams. Nest site selection varies widely in deciduous, coniferous, and mixed-forest stands. Nest trees are usually large-diameter trees characterized by open branching and stout limbs. Communal roost sites contain large trees with stout lower horizontal branches for perching located close to foraging areas. Most roost areas on the Eugene District are known. Usually associated with large bodies of water but can occur in any open habitat with available prey. Primarily nests in forested areas near the ocean, along rivers, and at estuaries, lakes, and reservoirs. Oregon nests were within 1 mile of water (Marshall et al. 2003:141). When not breeding, may congregate where food is abundant, even away from water.	· Present in the project area foraging at the reservoir. Required protection measures will be applied (USDI 2016a:96) if nesting is found. · Project is not likely to cause a trend toward listing because alternatives would have negligible effect to the amount of habitat available to this species.
Band-tailed pigeon *(Patagioenas fasciata)*	***Documented:*** It breeds along the Pacific Coast from British Columbia to California and in Southwestern interior United States (mostly in Utah, Colorado, Arizona, New Mexico, and Texas), down to Mexico, Central America, and South America. Its South American breeding range spans from Venezuela to northern Argentina, mostly along the Andes. The band-tailed pigeon breeds mainly in temperate and conifer coastal forests along the Pacific Coast and is found in montane conifer or pine- and oak-dominated forests in the interior. The proximity to food sources (i.e., fruits) and to mineral sites are important habitat features.	· Presence is likely. · Project is not likely to cause a trend toward listing because alternatives would have negligible effect to the amount of habitat available to this species. · Beneficial effect from the increase in amount of shrubby habitat in early successional habitat after dewatering of the reservoir. Benefits from increase of food from an increase of shrubs with berries, such as elderberry, huckleberry, and salmonberry.
Black swift *(Cypseloides niger)*	***Suspected:*** Strongly associated with waterfalls in mountainous areas. Nest in canyon walls near water, sheltered by overhanging rock or moss, preferably near waterfalls or on sea cliffs.	Not likely to occur in the project area. No habitat present.

Name	**Presence on Siuslaw Field Office: Habitat**	**Presence in project area and effects from alternatives**
Bufflehead *(Bucephala albeola)*	***Documented***: Nests in flicker/pileated woodpecker cavities near ponds and small lakes. Uncommon breeder in central and southern Cascades; winters across Oregon. Widespread wintering in U.S.; majority of breeding is in Canada and Alaska with few year-round locations in the United States: Range maps show approximate area from crest of Coast Range to Cascade Range in Oregon, northern Rockies, and northeast California (Cornell Lab 2023). Bufflehead populations steadily increased by over 3% per year between 1966 and 2019, and the global breeding population numbers 1.3 million.	· Reproduction was documented in 2022. · Alternatives that remove the reservoir are likely to eliminate bufflehead from the project area. A small part of the global population are permanent residents in the lower 48 states. These permanent residents in the lower 48 may be genetically unique. However, the bufflehead breeding at Hult Reservoir are not likely to be genetically unique among bufflehead in Oregon, because birds can easily search for new places to live, and suitable habitat is not rare in the area of the Siuslaw Field Office (~14 ponds on BLM land and 81 nearby on other ownerships). Therefore, importance of bufflehead at Hult Reservoir is inconsequential to the entire population because the Hult Reservoir birds are not likely to be genetically unique. · Project is not likely to cause a trend toward listing, because alternatives would have negligible effects to the amount of breeding habitat available to this species in Oregon and throughout its range (Alaska to Mexico).
Chestnut-backed chickadee *(Poecile rufescens)*	***Documented***: Chestnut-backed chickadees live mainly in dense, wet coniferous forests along the Pacific Coast, including Douglas-firs; Monterey, ponderosa, or sugar pines; white firs, incense-cedar; and redwoods. They also occur in some deciduous forests, particularly willow and alder stands, along streams, eucalyptus groves, open patches of madrone and shrubs, and sometimes along the edges of oak woodlands. Food: seeds, berries, and fruit pulp; 65% of diet is insects (Cornell Lab 2024).	· Presence is likely. · Project is not likely to cause a trend toward listing because alternatives would have negligible effect to the amount of habitat available to this species. · Beneficial effect from the increase in amount of shrubby habitat in early successional habitat after dewatering of the reservoir.
Coastal greenish blue butterfly* *(Plebejus saepiolus littoralis)*	***Suspected:*** Associated with coastal and near coastal conditions. Typically found along stream edges, bogs, or wet meadows but also along drier sites that have blooming clovers such as roadsides and open meadows.	Not likely to occur in project area. Habitat is not present because of the distance from the coast.
Dusky Canada goose *(Branta canadensis occidentalis)*	***Documented:*** Winter resident only. Associated with open grasslands and wet meadows. Nest is usually located in an elevated area near water, such as streams, lakes, ponds, and sometimes on beaver lodges. In the Willamette Valley, is found in agricultural fields and wetlands. Winters almost exclusively in the Willamette Valley and to a lesser degree along the Columbia River. Wintering habitat in agricultural lands, lakes, reservoirs, and large rivers. Often associated with wildlife refuges.	· Presence is possible during winter due to the reservoir and open wetlands. · Project is not likely to cause a trend toward listing because alternatives would have negligible effect to the amount of habitat available to this species.
Evening grosbeak *(Poecile rufescens)*	***Documented***: The evening grosbeak is experiencing the steepest population decline (92% since 1970) of all landbirds in the continental U.S. and Canada. Formerly a favorite at winter feeders, this nomadic species has all but disappeared in the Appalachian Mountains and has suffered heavy declines elsewhere. Typically thought of as a boreal forest species, the evening grosbeak also breeds in mixed-conifer and aspen forests throughout the mountains of the western U.S. and northern Mexico. In some areas, this species is associated with older-age conifers as well as seed-producing hardwoods such as maple.	· Presence is likely. · Project is not likely to cause a trend toward listing, because alternatives would have a negligible effect to the amount of habitat available to this species. · Beneficial effect from the increase in amount of shrubby habitat in early successional habitat after dewatering of the reservoir. Benefits from increase of food from an increase of seeds and berries, such as big leaf maple, elderberry, huckleberry, and salmonberry.

Name	***Presence on Siuslaw Field Office: Habitat***	***Presence in project area and effects from alternatives***
Fisher (West Coast distinct population segment)* *(Pekania pennanti)*	***Suspected***: Fishers prefer large areas of dense mature coniferous or mixed forest and are solitary animals. They are mainly nocturnal but may be active during the day. They travel many miles along ridges in search of prey, seeking shelter in hollow trees, logs, rock crevices, and dens of other animals (USDI 2019d).	Not likely to occur in the project area. Project is not within the occupied range of this species.
Foothill yellow-legged frog *(Rana boylii)*	***Documented:*** Primary habitat requirement seems to be streams or rivers with open, coarse substrate (Fitch 1938:148). Perennial, low-gradient, medium-sized streams (4th–6th order) or side channels of larger creeks or rivers with rock, gravel, or sand substrate. Siuslaw Field Office is on the northern edge of their range. Water temperature is critical for development and survival of foothill yellow-legged frog aquatic life stages. Based on information compiled for the Oregon Conservation Assessment, frogs (tadpoles to adults) were found in water temperatures ranging from 12 °C to 27 °C (53 °F to 80 °F), and egg masses were found in water temperatures from 15 °C to 16 °C (59 °F to 60 °F) (Olson and Davis 2009:12).	· Presence is possible. Habitat is present in streams within the project area. · Project is not likely to cause a trend toward listing because alternatives would have a negligible effect to the amount of habitat available to this species.
Fringed myotis *(Myotis thysanodes)*	***Documented:*** Crevice dweller associated with large snags and live trees, abandoned buildings, mines, caves, and some bridges. Forages in openings and late or mid-successional forests.	· Presence is likely. Habitat present in upland and in dam and associated structures. If present, would forage over the reservoir. · Project is not likely to cause a trend toward listing because alternatives would have negligible effect to the amount of habitat available to this species.
Golden eagle *(Aquila chrysaetos)*	Nests in large trees, cliffs, rock outcrops.***:*** Inhabits shrub-steppe, grassland, juniper, open ponderosa pine, and mixed conifer/deciduous habitats. Year-round resident east of Cascades. Irregularly observed in winter in northwest Oregon (Marshall 2003:161).	Project is not likely to cause a trend toward listing because alternatives would have negligible effect to the amount of habitat available to this species.
Grasshopper sparrow* *(Ammodramus savannarum)*	***Documented:*** In Oregon, occurrence is restricted to grasslands. Rarely in habitats with abundant woody shrubs. In the Willamette Valley, they frequent lightly graze pastures with scattered shrubs. Construct domed nests on the ground, concealed under vegetation (Marshall et al. 2003:553). In Oregon, breeds primarily in native bunchgrass (*Agropyron* sp. And *Festuca* sp.) – *Lupinus leucophilus* plant associations (Janes 1983:52).	Not likely to occur in project area because habitat is not present.
Haddock's rhyacophilan caddisfly *(Rhyacophila haddock)*	***Documented on Northwest Oregon District. Suspected on Siuslaw Field Office:*** Small, cool mountain streams and adjacent riparian areas. *Rhyacophilid* species tend to have small geographic ranges, usually restricted to one or two high mountains. Larvae and pupae probably require cool, well-aerated microsites free of excessive accumulations of fine sediments to develop. Pupae occur on the underside of cobbles found at the base of riffles, cascades, or bedrock chutes. Two known sites: one at Mary's Peak to the north of Siuslaw Field Office and another to the south on the Siuslaw National Forest in Curry County.	· Presence is possible. Habitat is present in streams within the project area. · Project is not likely to cause a trend toward listing because alternatives would have negligible effect to the amount of habitat available to this species. · Alternatives that remove the reservoir would increase the amount of stream habitat.

Name	***Presence on Siuslaw Field Office: Habitat***	***Presence in project area and effects from alternatives***
Lewis's woodpecker *(Melanerpes lewis)*	***Documented:*** Associated with open woodland habitat near water. Primarily breeds in Oregon white oak, ponderosa pine, and riparian cottonwood communities. Winters in oak savanna (Marshall et al. 2003:351). Important components of breeding habitat include an open woodland canopy and large-diameter dead or dying trees. Seldom excavate their own nest cavities (*ibid.*). Winter resident in West Eugene Wetlands.	· Presence is possible in cottonwood communities. · Project is not likely to cause a trend toward listing because alternatives would have negligible effect to the amount of habitat available to this species.
Mountain quail *(Oreortyx pictus)*	***Documented:*** Inhabits remote mountainous areas typically covered with dense shrubs such as chaparral. In summer, they move to woodlands as high as 10,000 feet to take advantage of abundant plant and insect life. As autumn approaches, they descend toward lower ridges, gathering into small coveys.	· Presence is likely. Project is not likely to cause a trend toward listing because alternatives would have negligible effect to the amount of habitat available to this species. · Beneficial effect from the increase in amount of shrubby habitat in early successional habitat after dewatering of the reservoir.
Northwestern pond turtle *(Actinemys marmorata)*	See Issue 13 (western pond turtle) in Chapter 3.	
Olive-sided flycatcher *(Contopus cooperi)*	***Possible:*** Breeding habitat is conifer forest, particularly within forest burns where snags and scattered tall, live trees remain, near water along wooded shores of streams, lakes, rivers, etc., where standing dead trees are present. Also associated with forest openings and forest edge. In the Coast Range, more abundant in landscapes containing highly fragmented late-successional forest with high-contrast edges than in less fragmented landscapes (Marshall et al. 2003:374-5).	· Presence is likely. · Project is not likely to cause a trend toward listing because alternatives would have negligible effect to the amount of habitat available to this species.
Oregon red tree vole (outside Oregon north coast distinct population segment) *(Arborimus longicaudus)*	***Documented:*** Arboreal inhabitant of mid- to late-successional coniferous or mixed deciduous/coniferous forests. Nests in Douglas-firs containing substrates that provide platforms (e.g., large limbs, branches, mistletoe growths, broken topped trees, etc.) for nest construction. Feeds on conifer needles. Seldom leaves canopy.	· Presence is likely. Habitat present in upland. No impact to distinct population segment north of Highway 20. · Project is not likely to cause a trend toward listing because alternatives would have negligible effect to the amount of habitat available to this species.
Oregon vesper sparrow* *(Pooecetes gramineus affinis)*	***Documented:*** Associated with grasslands, fields, prairies, and roadsides. Dry, open habitat with moderate herb and shrub cover. Nesting habitat includes elevated perches for singing and a grass-dominated understory for foraging and nesting (Marshall et al. 2003:543). Territories are mostly grass dominated (88% cover) with equal amounts of bare ground (6%) and shrubs/herbs (6%) (*ibid.*).	Not likely to occur in project area because habitat is not present.
Pacific walker *(Pomatiopsis californica)*	***Suspected:*** Riparian zones in coastal fog belt. Springs and seeps in forest of Oregon Coast.	· Presence is possible. · Project is not likely to cause a trend toward listing because alternatives would have negligible effect to the amount of habitat available to this species. · Alternatives that remove the reservoir could increase the amount of spring and seep habitats.

Name	Presence on Siuslaw Field Office: Habitat	Presence in project area and effects from alternatives
Painted turtle* *(Chrysemys picta)*	***Suspected on Northwest Oregon District but not likely on Siuslaw Field Office:*** Found in slow-moving shallow waters of ponds, marshes, creeks, and lakes with soft, muddy bottoms, suitable basking sites, and ample aquatic vegetation. The Siuslaw Field Office is south of this species' range, and it is unlikely that any population exists at Hult Reservoir. There are no known sightings of this species on the former Eugene District and there was no known historical population on this District.	Not likely to occur in project area because habitat is not present; no effect.
Pallid bat* *Antrozous pallidus*	***Suspected:*** Associated with desert areas in Oregon. West of the Cascades it is restricted to drier interior valleys of the southern portion of the State. In Lane County, it occurs at low elevations and along the valley floor. Usually found in brushy and rocky terrain but has been observed along the edges of coniferous and deciduous woods and open farmlands. They also occur in oak woodlands (Weber 2009).	Not likely to occur in the project area.
Purple martin *(Progne subis)*	***Documented:*** Snags and trees with suitable nest cavities, typically in openings and burned areas. Commonly associated with rivers, marshes, and open water, especially when snags are present for nesting. Purple martins are aerial feeders and need large openings (at least 20 feet from live trees) to forage (Marshall et al. 2003:429). Also associated with oak habitats (Williams 2002). Uncommon local summer resident, principally inhabiting the Coast Range and Willamette Valley. Tre were 68 documented sightings of this species between 2006 and 2016 in various locations in the Siuslaw Field Office jurisdiction.	· Presence is possible. · Project is not likely to cause a trend toward listing because alternatives would have negligible effect to the amount of habitat available to this species. · Dewatering of the reservoir would eliminate the large opening over the reservoir under alternatives 1, 3, and 4, which could reduce foraging opportunities.
Rufous hummingbird *(Selasphorus rufus)*	***Likely:*** Common transient and breeder throughout most of western Oregon, especially in forested regions. It is found in a wide variety of habitats, though it shows a breeding preference for wooded areas with a fairly high canopy and well-developed understory (Marshall et al. 2003:347).	· Presence is likely. · Project is not likely to cause a trend toward listing because alternatives would have negligible effect to the amount of habitat available to this species. · Beneficial effect from the increase in amount of shrubby habitat in early successional habitat after dewatering of the reservoir.
Siuslaw sand tiger beetle* *(Cicindela hirticollis siuslawensis)*	***Suspected:*** Coastal dunes, sandy habitat near river and stream mouths at the Pacific Ocean.	Not likely to occur in the project area because of the distance from the coast.
Sooty grouse (subspecies of blue grouse) (*Dendragapus fuliginosus)*	***Documented:*** Variety of forest habitats combined with edges, meadows, and mosaics of forest/non-forest. They eat needles, buds, berries, and insects. Unlike their close relative, the dusky grouse of the Rockies, sooty grouse display from perches high up in trees. Their deep, rhythmic hooting calls are loud but can be difficult to locate.	· Presence is possible. · Project is not likely to cause a trend toward listing because alternatives would have negligible effect to the amount of habitat available to this species. · Beneficial effect from the increase in amount of shrubby habitat in early successional habitat after dewatering of the reservoir.

Name	***Presence on Siuslaw Field Office: Habitat***	***Presence in project area and effects from alternatives***
Suckley's cuckoo bumble bee *(Bombus suckleyi)*	***Documented on Northwest Oregon District. Suspected on Siuslaw Field Office:*** A few historic observations in the Coast Range. Three basic habitat requirements: suitable occupied nesting sites for its host (e.g., *Bombus occidentalis*), nectar and pollen from floral resources available throughout the duration of the colony period (spring, summer, and fall), and suitable overwintering sites for the queens. Uses diverse habitats that provide nectar, pollen, and host bee sites.	· Presence is possible. · Project is not likely to cause a trend toward listing, because alternatives would have negligible effect to the amount of habitat available to this species. · Beneficial effects from increased number of flowering plants when BLM dewaters the reservoir.
Townsend's big-eared bat *(Corynorhinus townsendii)*	***Documented:*** Roosts in mines, caves, tree cavities, and building attics. Forages in a variety of habitats.	· Presence is possible. There are no caves or mines in the project area. However, it could use the dam and associated structures, and the area has trees with cavities. If present, would forage over the reservoir. · Project is not likely to cause a trend toward listing because alternatives would have negligible effect to the amount of habitat available to this species.
Tricolored blackbird *(Agelaius tricolor)*	***Suspected:*** Oregon breeding colonies occur in hardstem bulrush, cattail, nettles, willows, and Himalayan blackberries. Small colonies and summering residents have been found in the Willamette Valley (Marshall et al. 2003:579).	· Presence is possible due to the reservoir and wetland. · Project is not likely to cause a trend toward listing because alternatives would have negligible effects to the amount of habitat available to this species.
Water flea sp.* (No common name) *(Dumontia oregensis)*	Willamette Valley swales and wet meadows.	Not likely to occur in project area because habitat is not present.
Western bumble bee *(Bombus occidentalis)*	***Suspected:*** This ground-nesting insect is found in diverse habitats with flowering plants that provide nectar and pollen sources throughout the colony's life cycle (early February to late November). Species richness tends to peak in flower-rich meadows of forests and subalpine zones. The amount of pollen available to foragers directly affects the number of new queens that a bumble bee colony can produce, and since queens are the only bumble bees that can form new colonies, pollen availability directly affects the number of future populations. Voucher specimens were collected on two sites in the Siuslaw Field Office jurisdiction—one in 1935, the other in 2006 (Xerces Society 2020)—but no other observations are documented in the BLM database.	· Presence is possible. The project area is within the former range, and habitat may be present. However, known populations in Oregon are at higher elevations along the Cascade crest. · Project is not likely to cause a trend toward listing because alternatives would have negligible effect to the amount of habitat available to this species. · Beneficial effect from the increase in acres of flowering plants in early successional habitat after dewatering of the reservoir.
Willow flycatcher *(Empidonax traillii)*	***Likely:*** Breeding habitat is characterized by dense shrubs or tall herbaceous plants with scattered openings of shorter herbaceous vegetation. Both riparian and upland habitat used for nesting. Nesting habitat in conifer-dominated forest landscapes occurs in early-successional forest, approximately 4–15 years following timber harvest or natural disturbance event that removes most of the forest canopy and allows for extensive growth of a shrub layer. Habitat used for nesting in the Willamette Valley includes both riparian shrub and upland thickets of shrubs, particularly patches of exotic Himalayan blackberry and Scotch broom (Marshall et al. 2003:379).	· Presence is likely. Project is not likely to cause a trend toward listing because alternatives would have a negligible effect to the amount of habitat available to this species. · Beneficial effect from the increase in amount of shrubby habitat in early successional habitat after dewatering of the reservoir.

Issue A-14. How would logging activity upstream affect the project area?

The BLM received comments from the public during the January 2022 scoping period requesting information on the impact of potential logging operations upstream from the reservoir. This issue was considered but is not presented in detailed analysis because there is no potential for significant effects and there no known timber harvest activities that are planned upstream from the reservoir at this time; therefore, effects under the action alternatives would be speculative and unlikely to be significant. In addition, differences in effects are not being used to inform the decision because the issue does not respond to the purpose and need for the EIS.

The Hult Pond Dam and Reservoir are located in a lumber-rich area and were created for Hult Lumber Company mill operations. The reservoir sits in a basin containing 12.3 square miles (7,872 square acres) of land upstream that drains into the reservoir. As shown in Figure 3-1 (see Chapter 3), ownership of this area includes BLM, CTCLUSI, and private lands. While much of this area contains timber that is viable for harvest, harvest actions in the vicinity of the reservoir are likely to be limited in the foreseeable future: The project area is within the BLM's N126 timber sale planning area, but planned BLM timber sales or salvage operations in the Siuslaw Field Office jurisdiction do not currently include any within the basin upstream from the project area. Although non-BLM entities may also harvest for commercial or other purposes, there are no known such operations planned for CTCLUSI or private land upstream from the reservoir at this time.

Any future timber harvests (by the BLM, CTCLUSI, or on private lands) would be required to follow Federal and State laws and regulations protecting downstream water and other natural resources. Timber harvest actions in the area would need to conform to the *Endangered Species Act*, the *Clean Water Act*, and the *Oregon Forest Practices Act*. In addition, for any timber harvest activity on BLM land, the BLM would conform to the 2016 RMP as well as complete a NEPA analysis prior to the action.

There is currently no foreseeable upstream timber harvest activity that would affect the project area, and the BLM determined that there was no potential for significant impacts if timber harvest were to occur. For these reasons, this issue is not presented in detailed analysis.

Issue A-15. How would implementation of the alternatives impact the hydrology of the basin?

The BLM received comments from the public and the Environmental Protection Agency during January 2022 scoping and the May 2022 public comment period for draft Chapters 1 and 2 asking how the implementation of the alternatives would change the hydrology of the basin. The future management of Hult Pond Dam and Reservoir and subsequent effects to hydrology and flow characteristics were of specific concern. This issue was considered but is not presented in detailed analysis because neither Hult Pond Dam or Hult Reservoir is, or ever has been, managed for flow control of Lake Creek. Significant effects are not anticipated under the action alternatives, and differences in effects would not be used to inform the decision because the issue does not respond to the purpose and need for the EIS.

While it is understandable to think that having a dam upstream of property and infrastructure (homes, buildings, roads, etc.) would be beneficial to lessen the effects of extreme hydrology (drought and/or floods), that is not the case with Hult Pond Dam and Reservoir, which in the summer is only diverting a maximum of 1 cubic foot per second (cfs) of Lake Creek to maintain itself at full capacity. In the winter, Hult Reservoir is still managed at full capacity, and Lake Creek freely flows to and through it.

In considering this issue, the BLM looked at flow availability and its effect on the landscape during both potential extreme hydrologic events (drought and flood).

Drought (summer)

Lake Creek is a perennial stream, and with no water diversions upstream of Hult Pond Dam and the water rights of Lake Creek fully allocated in the summer months, it is unlikely that the volume of water entering the project area would change in the foreseeable future. Similarly, the water available downstream is unlikely to change. Since Hult Reservoir is not regularly filled by Lake Creek, only topped off with small and incremental volumes to account for losses due to evaporation and groundwater infiltration, effectively all of Lake Creek enters and exits Hult Reservoir. Climate change is gradually increasing temperatures, which in turn increases evaporation, but evaporative losses represent approximately 341,510 gallons per day depending on exposure to solar radiation, temperature, water depth, surface area, etc. (Reichelderfer 1950). However, average summer streamflow of Lake Creek is approximately 3 cubic feet (22.44 gallons) per second which amounts to 1,938,816 gallons/day—more than enough to overcome evaporative loss under any climate scenario.

Flooding (winter)

With evaporative loss effectively nonexistent in the winter months when floods are most likely to occur, nearly all of Lake Creek that enters Hult Reservoir also flows out of Hult Reservoir. There are 12.3 square miles of catchment area routing precipitation and snowmelt runoff to Hult Reservoir. Hult Reservoir is managed at full or near-full capacity all winter and offers little to no flood control. It is true that in advance of and during forecasted flood events, the low-level outlet pipe at the bottom of Hult Pond Dam may be opened manually by BLM staff to increase available storage capacity and reduce the risk of dam failure. However, the purpose of these actions is to preserve the integrity of the dam and to prevent a dam failure rather than control flooding. Operation of the low-level outlet at Hult Pond Dam does not effectively mitigate downstream flooding, as it can be easily overwhelmed by relatively benign storm events and floods, which in turn trigger the emergency action plan.

Under the No Action Alternative, which would see the rapid draw-down of Hult Reservoir or a failure of Hult Pond Dam, the flows of Lake Creek would spike but quickly diminish (see Chapter 3's Issue 1: Flooding). Subsequent and annual variations in flow would remain unchanged. The flood resulting from a dam failure would change the geomorphology of Lake Creek (see Issue A-20, *How would implementation of the alternatives impact sediment transport?*). However, the amount of water flowing in Lake Creek in the summer and winter and how that water flowed by any property would remain unchanged. Lake Creek under the No Action Alternative would likely incise and carve new stream channels on its floodplain, but the subsequent volume and rates of water in Lake Creek would remain unchanged and bank stability would return within a decade.

Under Alternative 2 (Remove the Existing Dam and Build a New Dam), there would be no change to basin hydrology. A new dam would replace the existing Hult Pond Dam, and Hult Reservoir would continue to be managed at full capacity. A maximum of 1 cubic feet of water per second would be diverted to fill and maintain Hult Reservoir. The bulk of Lake Creek would continue to flow into and out of the reservoir.

Effects to basin hydrology under Alternative 3 (Remove Hult Reservoir; Add Little Log Pond) would be similar to those under Alternative 2. Although the Little Log Pond dam would be significantly smaller and located downstream from the current dam, the fluid dynamics of Lake Creek would be the same. A maximum of 1 cubic feet of water per second would be diverted to fill and maintain Little Log Pond. The bulk of Lake Creek would continue to flow into and out of Little Log Pond.

Alternative 4 (Remove Hult Reservoir) would see no dam on Lake Creek in the project area, and Lake Creek hydrology and flow patterns would return to what was historically the norm throughout the project area. Without a reservoir, there would be little to no evaporative losses once riparian vegetation takes root and affords the stream shade. Streamflow upstream and down from the project area would be unchanged. Floods would be mitigated by wetlands, but Lake Creek would still rise and fall in direct relationship to the amount of precipitation or snowmelt running off the 12.3 square mile catchment area above the project area.

Since seasonal flow patterns, water availability, flooding, and streambank stability would remain effectively unchanged in the basin, and because water diversions are maintained and regulated by the State of Oregon, it is expected that the volume and rate of Lake Creek would also remain unchanged under each of the alternatives. The form and function of Lake Creek would remain either unchanged (Alternatives 2 and 3) or improve (Alternative 4). Ultimately, under Alternative 4, there would be more water in Lake Creek in the summer due to savings from not having evaporative losses. However, since this would be a return to historic conditions, the effect would not be significant, and the changes would be difficult or impossible to measure and discern downstream of the project area. The BLM determined that there was no potential for significant impacts and that this issue did not need to be presented in detailed analysis.

Issue A-16. How would implementation of the alternatives affect downstream water quantity, including water available for consumptive use?

The BLM received comments from the public during January 2022 scoping and the May 2022 public comment period for draft Chapters 1 and 2 asking how implementation of the alternatives would impact water availability for downstream water users. When considering the effects of building a new dam or removing a dam that stores a volume of water on a perennial stream, there is a potential for an effect to downstream water users. The volume of water stored in Hult Reservoir or Little Log Pond would change depending on the alternative selected. However, significant effects are not anticipated under the action alternatives, and differences in effects are not being used to inform the decision because the issue does not respond to the purpose and need for the EIS.

At present, Hult Reservoir is managed as an instream reservoir. All of Lake Creek flows into and subsequently out of Hult Reservoir. However, the BLM's water right for Hult Reservoir allows for only 1 cubic foot per second (cfs) at any time. Since the BLM manages Hult Reservoir at full capacity for the entire year, excluding emergencies, Lake Creek diversions are only necessary to account for evaporative losses. Absent any active evaporation, when the reservoir is full, no water is diverted. If the reservoir were to be drained and refilled, only 1 cfs could be diverted until the reservoir was full.

When originally constructed, Hult Reservoir had the capacity to impound 481 acre-feet (1 acre-foot is equivalent to the volume of water covering one acre to a depth of one foot: 325,851 gallons). Following debris flows in December of 1964 and general sedimentation over time, the reservoir currently has a storage capacity of 364 acre-feet (USACE 2019:2-2).

To consider this issue, the BLM looked at water availability (volume) to downstream users. Although it seems intuitive to consider Hult Reservoir as the source for downstream users, technically, downstream users rely on diversions from Lake Creek that are not dependent on Hult Reservoir and would continue at the same flow rate and volume if the reservoir was removed. Lake Creek is a perennial stream and water diversions (water rights) are managed by the State of Oregon.

While Hult Reservoir represents storage of water in the Lake Creek system, the water contained within it belongs to the Bureau of Land Management for the beneficial use of supporting aquatic life and recreation. If that water supplements downstream water users, it is coincidental. Diversion and storage at Hult Reservoir are subject to the law of Prior Appropriation as dictated and enforced by the State of Oregon: Only downstream water users with senior water rights are entitled to their water before the BLM is guaranteed its water, and diversion and storage of water at Hult Reservoir shall not impinge upon senior water rights holders.

Under each alternative, these tenets of water law hold true. The BLM would not withhold any more water than it is entitled to by their water rights, and that amount cannot exceed 1 cfs from Lake Creek and 481 acre-feet in Hult Reservoir. (In other words, under all alternatives, the BLM's water rights allow it to withhold 0 to 1 cfs from Lake Creek and 0 to 481 acre-feet in Hult Reservoir.) Under all alternatives, and regardless of whether Hult Reservoir remains, Lake Creek is nearly entirely available for downstream water users. Downstream water users will not receive less water than they are entitled to, unless they are also regulated by the State of Oregon. For these reasons, the BLM determined that there was no potential for significant impacts to downstream water users and that this issue did not need to be presented in detailed analysis.

Issue A-17. How would implementation of the alternatives affect groundwater and groundwater infiltration rates?

The BLM received comments from the Environmental Protection Agency during January 2022 scoping requesting that the BLM discuss the effects of the alternatives to groundwater and wells. Groundwater infiltration rates are important attributes to consider in land management as they can potentially affect aquifers, springs, surface water, and water availability to users in the area. This issue was considered but is not presented in detailed analysis because, while each of the alternatives can affect groundwater infiltration rates differently, water availability to aquifers would effectively remain unchanged. Significant effects are not anticipated under the action alternatives, and differences in effects are not being used to inform the decision because the issue does not respond to the purpose and need for the EIS.

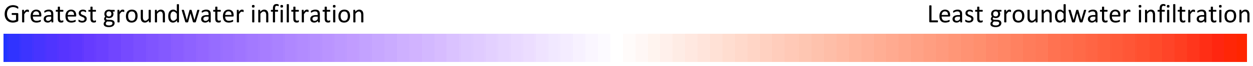
Water behaves differently under different conditions. In streams (surface water), the water table is at the surface, and very little water, relatively speaking, infiltrates soil and bedrock to become groundwater. Nonetheless, the presence of perennial streamflow is an asset to groundwater, as recharge can occur year-round. Unless the stream is wide and without canopy cover, groundwater infiltration usually exceeds evaporative loss (Winter et al. 1998).

In the case of standing bodies of water like Hult Reservoir, groundwater infiltration is much more prevalent. In an unlined reservoir, such as Hult Reservoir, groundwater infiltration can occur across the entire footprint. However, while groundwater infiltration is greater in a reservoir than in a stream, evaporative loss is also greater. Similarly, wetlands can withhold significant volumes of water, which is in turn available for gradual summer release to streamflow and gradual groundwater infiltration. Evaporative loss from wetlands does occur, but at a lower rate than a reservoir of standing water.

Groundwater infiltration rates in well-drained, unfrozen, fine- to medium-texture soils of the Oregon Coast Range generally range from 6–15 millimeters per hour (Brooks et al. 2013). Soils in the project area are well drained and deep with a moderately high hydraulic conductivity (water movement through soils) (Ducey 2021). The entire project area comprises weathered Tyee Formation sandstone, which is highly permeable to groundwater flow (Smith and Roe 2015). Like many natural lakes, reservoirs, and wetlands, the project area is underlain with layers of semi-permeable, fine-grained sediment (often silt and/or clay), which can slow infiltration rates and is often the reason the waterbody exists in the first place.

All other variables being equal, groundwater infiltration rates are driven by gravitational forces of energy (Rasmussen 2008); deep and voluminous water bodies experience the greatest groundwater infiltration, while in descending order, shallow waterbodies, wetlands, and streams would each produce less:

Greatest groundwater infiltration — Least groundwater infiltration



Natural lake — Reservoir — Wetland — River — Stream

To consider this issue, the BLM looked at acres of standing water and wetlands in addition to miles of stream in the project area (see Table A-7). Greater footprints of standing water would generally result in greater groundwater infiltration.

Table A-7. *Wetland and Standing Water Acreage with Stream Mileage per Alternative*

Alternative	Greatest effect on groundwater infiltration	Moderate effect on groundwater infiltration	Least effect on groundwater infiltration
	Standing water (acres)	Wetlands not in standing water (acres)	Streams (miles)
Affected Environment	53.9	11.7	7.1
Alts. 1.1 and 1.2: No Action Alternative	0.0	29.9	8.7
Alt. 2: Build a New Dam	53.3	11.7	7.2
Alt. 3: Add Little Log Pond	4.7	28.2	8.6
Alt. 3 with mitigation	4.7 to 7.4	36.4 to 39.1	10.4
Alt. 4: Remove Hult Reservoir	0.0	28.5	8.7
Alt. 4 with mitigation	0.0 to 2.7	36.7 to 39.4	10.5

Since Hult Reservoir is managed at full capacity, the affected environment sees the greatest footprint of standing water, wetlands, and streams, followed closely by effects under Alternative 2 (Remove the Existing Dam and Build a New Dam). Under the current scenario, groundwater infiltration rates are maximized, which means that a maximum amount of water is charging aquifers. This could imply that more water is available for downstream water users now and in the future. Unfortunately, aquifers are not mapped in the project area, so it would be difficult to make a direct connection between groundwater infiltration and downstream consumptive use.

Alternative 4 (Remove Hult Reservoir) would result in the fewest acres of standing water, wetland, and streams, which correlates to the least amount of groundwater infiltration. However, it is worth noting that although Alternative 4 would see the least groundwater infiltration, it is also more closely aligned to historic conditions at the project site than the current condition.

Given that both groundwater infiltration and evaporation is measured in millimeters per hour, Hult Reservoir is not a natural water impoundment, there are no known direct connections between groundwater infiltration and downstream water users, and water availability to current downstream water users is regulated by the State of Oregon, the BLM determined that there was no potential for significant impacts to groundwater and groundwater infiltration rates.

Issue A-18. How would implementation of the alternatives impact water quality and storm water discharges, especially during removal of the existing dam (and construction of a new dam)?

The BLM received comments from the Environmental Protection Agency during January 2022 scoping asking that the agency consider effects to water quality from the alternatives; water quality under the alternatives that involve removal and/or reconstruction of a dam was of greatest concern. This issue was considered but is not presented in detailed analysis because no significant impacts are expected to water quality.

Because the project area includes waterbodies impaired for temperature and those suspected of dissolved oxygen impairment, the BLM would incorporate antidegradation policies specific to both as detailed in Oregon DEQ's *Water Quality Standards: Beneficial Uses, Policies, and Criteria for Oregon* (OAR-340-041-0004(3)) into its management and monitoring plans for any activity potentially affecting water quality.

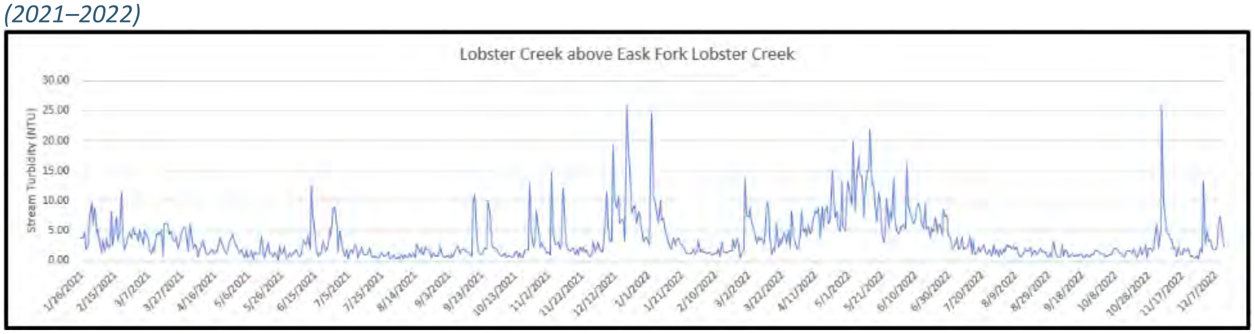
Water quality is regulated by multiple State and Federal agencies, meaning the BLM would be required to apply for permits, develop and adhere to stormwater and other water quality action plans, and use best management practices. Of specific concern are stream turbidity (a measure of water clarity), dissolved oxygen, and summer stream temperature. The BLM does not expect significant effects to any of these water quality metrics from any of the action alternatives.

Turbidity

Stream turbidity is a measure of water clarity and is regularly used as a metric of water quality. Virtually all municipal water providers have a range of acceptable (low) turbidity, so the water they provide to their constituents is clear. Higher turbidity values indicate water that is more difficult to see through and can also indicate the presence of suspended sediment and/or other material. Water from a stream or lake can be naturally turbid depending on various underlying conditions, including geology, erosion rates, and the point in the watershed where a sample is taken. The "Muddy Mississippi," for example, would generally have turbidity values higher than the Columbia River. But even the Mississippi River produces water of lower turbidity near its headwaters. Inasmuch, acceptable or recommended levels of stream turbidity for a naturally flowing stream are rarely established, since it is highly variable and site specific. For regulation purposes, activities occurring in a stream are instead held to maintaining stream turbidity to within a percentage of background levels, which must return to a baseline condition within a certain amount of time.

Lobster Creek is located 8 miles west of Lake Creek and Hult Reservoir and is a decent surrogate for Lake Creek. It has undergone continuous stream turbidity monitoring for the past 2 years and shows a natural range of stream turbidity values (Figure A-1). Typical summer stream turbidity ranges between 0.5 NTUs [6] and 4.0 NTUs, while winter stream turbidity ranges from 4.0 NTUs to 25.0 NTUs. The BLM's (noncontinuous) water quality monitoring on Lake Creek shows that a typical winter storm produces stream turbidity values between 4.5 NTUs and 9.5 NTUs—consistent with values observed on Lobster Creek.

Figure A-1. *Water Quality Monitoring Showing Seasonal and Daily Variability of Stream Turbidity in Lobster Creek (2021–2022)*



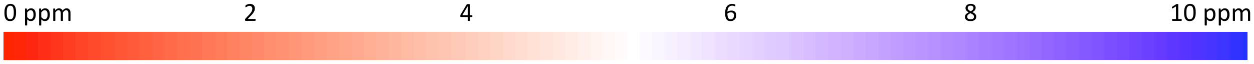
1. Note the peaks in winter as rainstorms move through the Oregon Coast Range and the summer baseline levels as flows stabilize. A similar profile is expected for Lake Creek.

Dissolved Oxygen

Water is hydrogen and oxygen at the molecular level. Dissolved oxygen in this context is a measure of oxygen saturation within a body of water. Although aquatic organisms, including fish, need water to survive, they still require dissolved oxygen to flourish; their bodies are uniquely adapted (e.g., gills) to extract small amounts of oxygen from water. Each species (salmon, mayfly, newt, etc.) occupying a body of water requires a slightly different amount of dissolved oxygen (see Figure A-2).

Figure A-2*. Generic Range of Dissolved Oxygen Suitability for Aquatic Organisms*[1, 2]

0 ppm 2 4 6 8 10 ppm



Lethal Bacteria Bluegill and Bass Salmon Trout

1. For reference, parts per million (ppm) of oxygen = mg/L

2. One-time dissolved oxygen readings of Hult Reservoir collected by BLM hydrologists in June 2022 were between 5.0 ppm and 9.0 ppm.

[6] NTUs are the standard unit used by the Environmental Protection Agency for reporting turbidity.

A variety of attributes affect the amount of dissolved oxygen in a waterbody. Moving water, especially if it is turbulent, can capture and dissolve much more oxygen than a non-moving body of water like a lake or reservoir. Additionally, warm water temperatures increase production of algae and other aquatic vegetation, which, when it dies and decomposes, consumes oxygen found in the waterbody. The Oregon Department of Environmental Quality (ODEQ) has listed Lake Creek below Hult Reservoir as a Category 2 stream, [7] which means that a dissolved oxygen impairment is suspected, and data is being attained in advance of a potential *Clean Water Act* 303(d) listing. Neither Lake Creek nor Hult Reservoir is currently listed as impaired (Category 5) for dissolved oxygen.

Summer Stream Temperature

Stream temperature is a product of exposure to solar radiation. The more exposure to direct sunlight, the warmer a body of water will get. Riparian vegetation is the primary means of filtering sunlight and thermal buffering for a body of water from ambient air temperature. Dense and functional riparian microclimates can be several degrees cooler than upland temperatures and much cooler than openings in the forest (e.g., meadows, mountain tops, clearcuts, etc.) Because of water's high specific heat capacity, it cools slowly once heated. Hult Reservoir gradually heats through the spring and summer above the temperatures of Lake Creek immediately upstream and then gradually cools through fall and early winter; all the while, Hult Reservoir acts as a source of detrimental warm water for lower reaches of Lake Creek. Lake Creek above and below Hult Reservoir, in addition to the Reservoir itself, are all listed for year-round thermal temperature impairment by the ODEQ; each body of water is listed as Category 5, meaning there is a verifiable impairment. However, it should also be noted that BLM stream temperature monitoring immediately upstream from Hult Reservoir shows that Lake Creek is beneath the level for thermal impairment as defined by the ODEQ.

To consider this issue, the BLM looked at the potential effects of the various activities under each alternative to stream turbidity, dissolved oxygen, and temperature beyond the range of natural variability.

Effects to Turbidity

Flow events in Lake Creek capable of transporting sediment (in suspension or as bedload) erode streambeds and banks and produce varying levels of natural stream turbidity, usually in the winter months. During construction activities (Alternatives 2, 3, and 4), stream turbidity levels at the project site would be regulated and mitigated as necessary by State and Federal permits and best management practices. Any sediment generated would likely be minimal and travel only a short distance before settling. The same sediment is expected to flush from the system as suspended sediment in the winter months following construction and would be within the range of natural variability. Any sediment within Lake Creek or its tributaries related to construction activities would be completely dissipated within one winter following cessation of construction. Under Alternatives 3 and 4, there would be elevated turbidity from Lake Creek and its tributaries as they adjust in the Hult Reservoir Restoration Area after removal of the reservoir. However, these effects would be similar to construction effects in that they would only be observed during elevated winter flows when stream turbidity is naturally elevated. The effects to stream turbidity in the Hult Reservoir Restoration Area would likely last up to 5 years or until riparian vegetation takes root.

Effects to Dissolved Oxygen

Under Alternatives 2 and 3, Lake Creek would remain a Category 2 (suspected impairment) stream for dissolved oxygen for the foreseeable future. BLM water quality monitoring of the area shows that in mid-June, dissolved oxygen in Lake Creek and Hult Reservoir is 5.0–9.0 ppm, which is adequate to sustain most aquatic organisms. The BLM and ODEQ would continue to monitor water quality conditions in Lake Creek, Hult Reservoir, and/or Little Log Pond to determine if a Category 5 impairment is warranted. Under Alternative 3, the concern of a dissolved oxygen impairment would be much less than Alternative 2 (Remove the Existing Dam and Build a New Dam), where Hult

[7] Waterbodies are placed into one of five categories that describe the water quality, including Category 2: Suspected impairment and Category 5: Impaired water (also called the 303(d) list).

Reservoir has an order of magnitude more surface area of water exposed to solar radiation than Little Log Pond. Regardless, this potential impairment would likely exist for the lifespan of the new dam.

Under Alternative 4 (Remove Hult Reservoir), there would be no reservoir or pond, and it is likely that ODEQ would no longer consider Lake Creek for a dissolved oxygen impairment within the Hult Reservoir Restoration Area. Dissolved oxygen in Lake Creek would return to baseline conditions almost immediately, even in areas exposed to direct sunlight.

Effects to Summer Stream Temperature

Under every alternative, Lake Creek's listing as a thermally impaired (Category 5) stream would remain unchanged until ODEQ evaluates stream temperature data available in the project area. At present, the BLM has multiple years of monitoring data that show Lake Creek 7-day average maximum stream temperatures to be between 60 ˚F and 62 ˚F, which is below the ODEQ-established threshold of 64.4 ˚F.

Under Alternatives 2 and 3, stream temperature below Hult Reservoir and Little Log Pond would remain elevated. BLM stream temperature monitoring in this reach shows a 7-day average maximum stream temperature of 77.9 ˚F, which is well above the established ODEQ threshold. Little Log Pond in Alternative 3 would result in cooler Lake Creek stream temperatures than Alternative 2 (Remove the Existing Dam and Build a New Dam), but these would likely remain elevated above the ODEQ threshold.

Under Alternatives 3 and 4, for 5–10 years after implementation, stream temperatures of Lake Creek through the Hult Reservoir Restoration Area are likely to remain elevated until a dense, functional riparian vegetation corridor is established. Wetlands and hyporheic exchange between stream channels would both play a cooling role in Lake Creek's ultimate disposition. After 10 years, Lake Creek through the Hult Reservoir Restoration Area would reach stream temperature levels similar to those currently observed upstream. Only under Alternative 4 would downstream thermal impairment of Lake Creek potentially cease. However, given enough surface flow distance, every stream in western Oregon would eventually absorb enough solar radiation to become thermally impaired. Even under Alternative 4, it would only be a matter of time before stream temperatures in Lake Creek reached the ODEQ threshold.

While water quality is of paramount concern to the BLM, it would also be monitored and regulated by multiple State and Federal regulators. The three primary attributes that would be affected by the alternatives are stream turbidity, dissolved oxygen, and stream temperature. Stream turbidity would be minimized through best management practices, and fine sediment would be flushed during winter storms following construction and would be indistinguishable from background levels. Dissolved oxygen would either remain unchanged (Alternative 2) or improve slightly (Alternatives 3 and 4). However, dissolved oxygen at the site is only a potential concern at present, and monitoring shows that conditions are favorable to most aquatic life. Stream temperature would either remain unchanged (Alternative 2) or improve slightly (Alternatives 3 and 4).

BLM stream monitoring shows that Lake Creek temperature above the project area is beneath the ODEQ stream temperature threshold. Thermal impairment would continue downstream under Alternative 3 because of solar warming in Little Log Pond, but not under Alternative 4. However, even under Alternative 4, although stream temperatures would improve, this would not last and Lake Creek would eventually reach a level of thermal impairment, likely before it reaches Triangle Lake. For these reasons, the BLM determined that there was no potential for significant impacts and that this issue did not need to be presented in detailed analysis.

Issue A-19. Would implementation of the alternatives disturb potentially contaminated soil in the project area?

The BLM received comments from the Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians regarding a concern for potentially contaminated soils at the former Hult Mill site near the current equestrian staging area between Lake Creek Road and Lake Creek. This issue was considered but is not presented in detailed analysis because, although contaminated soils were found at the mill site in the early 1990s, before the BLM acquired the land, the site was subsequently and adequately remediated. Therefore, significant effects are not anticipated under the action alternatives. Additionally, differences in effects are not being used to inform the decision because the issue does not respond to the purpose and need for the EIS.

Soil contamination is serious in several contexts. Historically, before environmental protection and health and safety policies, mill sites did not operate under any level of scrutiny or regulation, as they would today. Pollutants were released accidentally or intentionally into the atmosphere, soils, and waterways as standard operating procedure. Pollutants released into the atmosphere and/or streams quickly dissipate as they leave a site, but pollutants deposited on the ground do not readily evacuate and can be detected decades or even centuries later if not mitigated.

Pollutants in the soil are generally stable but can mobilize if disturbed. If contaminated soils are dry, and dust is formed, any pollutants present can be mobilized and transported by wind, thus becoming a respiratory health concern to human, plant, and animal populations. Conversely, if contaminated soils are wet, they can be transported to the stream network where they could also become problematic for human, plant, and animal populations, either from direct contact or ingestion.

In evaluating this issue, the BLM considered the presence of various heavy metals and petrochemicals commonly associated with industrial sites of the mid-twentieth century. Additionally, the BLM closely examined realty files documenting soil contamination, cleanup efforts, monitoring, and regulatory compliance dating from when the agency took possession of the property where the Hult Mill site is located. The BLM acquired the site in July 1994. It is worth noting that then, as now, the BLM cannot take ownership (through sale, trade, or other means) of a site known to be contaminated (USDI 1995).

The former Hult Mill site occupies most of the project area, either directly or indirectly, in addition to other lands, some of which are no longer managed by the BLM. Hult Mill ran continuously from the late 1930s through the 1980s, although in different capacities, with some mill operations ceasing in 1964 and others ceasing in 1972. By the 1980s, much of the mill's infrastructure had fallen into disrepair, been dismantled, or been otherwise lost. Although mill operations occurred in and adjacent to Hult Reservoir and, although millpond contamination from certain activities would not be unheard of, the U.S. Army Corp of Engineers determined in 2018 that Hult Reservoir sediment was not contaminated and posed no risk to health and human safety.

Multiple assessments, investigations, and reports have been performed at the mill site, as documented in Table A-8. These studies are available on the BLM's ePlanning website.[8] Investigation, cleanup, and monitoring were all performed by Kennedy/Jenks Consultants with the intent of identifying areas and issues of concern, sampling to determine the extent of contamination, and cleanup and remediation of the site as necessary prior to the BLM assuming ownership of the land.

Table A-8. *Soil Contamination Assessment, Monitoring, and Cleanup Timeline*

May 1992	Phase I Environmental Assessment (Kennedy Jenks 1992a)
September 1992	Phase II Site Investigation (Kennedy Jenks 1992b)
March 1993	Small Pond Characterization (Kennedy Jenks 1993a)
July 1993	Site cleanup by Willamette Industries
December 1993	Initial Site Characterization Report & Groundwater Investigation Workplan (Kennedy Jenks 1993b, c)
March 1994	Groundwater Investigation Report & Small Pond Remediation Report (Kennedy Jenks 1994a, b)
May 1994	Groundwater Monitoring Program (Kennedy Jenks 1994c)
July 1994	**Property transfer from Willamette Industries to BLM**
September 1994	Groundwater monitoring wells abandoned

[8] See the *References* section for additional information about ePlanning and how to access it.

The Phase 1 Report identified sites of concern and made recommendations for further investigation (Kennedy Jenks 1992a). The Phase 2 Report concluded that soils were contaminated in some locations at some depths, exclusively with petrochemicals (hydrocarbons) (Kennedy Jenks 1992b). Cleanup of contaminated soils identified in 1992 began in July 1993, directed by Willamette Industries and the BLM (Kennedy Jenks 1993b). Soil monitoring and water quality samples in mid-1993 showed that remediation had been successful to the point that contaminants were reduced to a level below ODEQ concern or had been eliminated entirely (Kennedy Jenks 1993c). Kennedy/Jenks, Willamette Industries, and the BLM all concluded that soil contamination had been fully remediated to ODEQ standards and that acquisition of the land could move forward.

At the time of acquisition, the BLM followed current American Society for Testing and Materials standards for Phase I Environmental Site Assessments and Phase II Site Investigation, including sampling in areas of concern. Multiple investigations performed in the early 1990s concluded that contaminated soils were limited to the approximate 120 acres of the former Hult Mill site. The mill site underwent a cleanup and monitoring regimen that brought contaminant levels at the site beneath ODEQ thresholds for concern, allowing the BLM to take ownership of the parcel.

The U.S. Army Corp of Engineers further sampled reservoir sediment in 2018 and determined that there were no contaminated soils in the bottom of Hult Reservoir (USACE 2018b[9]). This determination expired in 2023. Because the BLM has not used materials that would be expected to contribute to contamination of the reservoir, for analysis purposes, the BLM assumes that new testing would return the same results as the 2018 U.S. Army Corps of Engineers sediment testing results. Additional testing will be done prior to project implementation. If testing reveals that contaminant remediation and removal is needed, the BLM will determine a course of action and develop a removal and disposal plan. The BLM would complete any required NEPA and describe remediation activities, related permits, and monitoring when those actions have been decided.

The BLM will also do a data gap analysis of the project area before project implementation to verify the testing and remediation that occurred in the 1990s. If this additional sampling indicates higher levels of contaminants, the BLM will complete additional remediation as part of the implementation of the action. For these reasons, the BLM determined that there was no potential for significant effects and that this issue did not need to be presented in detailed analysis.

Issue A-20. How would implementation of the alternatives impact sediment transport?

The BLM received comments from the Environmental Protection Agency and the public during January 2022 scoping and the May 2022 public comment period for draft Chapters 1 and 2 concerning the mobilization and routing of sediment under the alternatives. This issue was considered but is not presented in detailed analysis because all sediment stored in Hult Reservoir is naturally derived from higher in the watershed, arrived in the watershed through natural processes, and would either remain in place or quickly route downstream as it seeks a state of dynamic equilibrium (a balance of stream gradient and sediment size (see Figure A-3)). Additionally, the U.S. Army Corp of Engineers sampled reservoir sediment in 2018 and determined that there were no contaminated soils in the bottom of Hult Reservoir (USACE 2018b), and the BLM will perform testing again prior to project implementation. See Issue A-19 (Contaminated Soil) for more details.

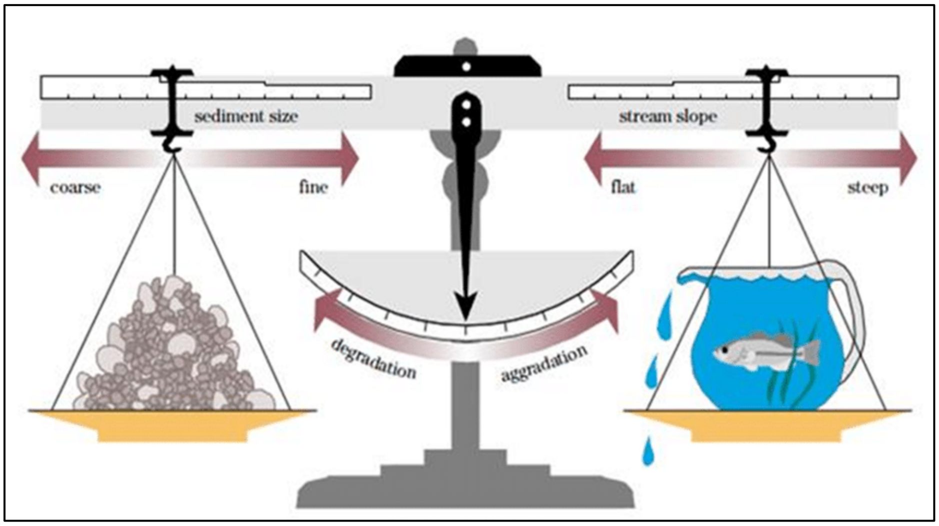
Significant effects are not anticipated under the action alternatives, because while a large amount of sediment has filled in portions of Hult Reservoir following the floods of December 1964, that material has since stabilized and represents a low chance of mobilization. Coupled with the very gradual slopes, both longitudinally and laterally, excessive erosion, slope failure, or even general sediment flushing is unlikely even in the event of a rapid dewatering of Hult Reservoir.

Before Hult Pond Dam was constructed, Lake Creek would have slowly flowed through the project area in a

[9] Available on the BLM's ePlanning website.

sinuous pattern analogous to low-gradient stream systems. This reach of Lake Creek, controlled by the narrow valley near the present-day dam location, would have been a reach of sediment deposition. Based on the geologic parent material of the area, this depositional reach of Lake Creek would have ranged from coarse sand to fine gravel. Over time, as sediment was annually conveyed to the site and deposited, stream levels would rise, spill onto the floodplain, and cut new channels. Over millennia, Lake Creek would have meandered back and forth across the entire valley. Occasional floods and debris flows could have accelerated the lateral migration of Lake Creek, but because stream systems always seek dynamic equilibrium, if a glut of sediment was introduced, Lake Creek would respond by steepening, then cutting through that sediment and transporting it downstream.

Figure A-3. *Lane's Sediment Balance*
Figure shows stream equilibrium (or degradation, aggradation) as a function of sediment size and stream gradient (adopted from Lane 1954).



Once Hult Pond Dam was installed on Lake Creek, 99 percent of downstream sediment conveyance stopped. The reach of Lake Creek between the dam and Pucker Creek became sediment starved and remains so to this day. Sediment starvation coupled with annual winter flows results in overly steep channels and stream degradation (incision). A small amount of suspended sediment does make it over the spillway in the winter, but most of that material is transported through the system to the ocean. Another small amount of sediment is released through the bottom drain of Hult Reservoir, but since this sediment is accompanied by high flows, most of it is transported downstream to at least the confluence of Lake Creek with Pucker Creek. The BLM's stream monitoring in Lake Creek at the former Hult Mill site on December 21, 2020, showed that a "typical" winter flood (exceedance probability greater than 50 percent) was capable of producing flow velocity of 4.6 ft/sec at the point of lowest elevation in Lake Creek. At that velocity, substrate up to a diameter of approximately 2 inches can be mobilizing as bedload in Lake Creek.

Between November 1964 and February 1965, two to four significant flood events occurred in Lake Creek, each with a recurrence interval of 15 to 88 or more years. Unfortunately, much of the area surrounding Hult Reservoir had been logged in the decade prior. Intense rain overwhelmed what little root strength was left on the hillslopes, and at least two debris flows occurred: one came down Willow Creek and another came down Sandy Creek. With elevated flows came logging slash, other woody debris, and sediment. This debris and sediment were deposited when it reached Hult Reservoir. These events set the stage for how sediment entered Hult Reservoir in successive years: All flows from Lake, Willow, and Sandy Creeks entering Hult Reservoir between 1965 and 2022 dropped most of their sediment loads before entering Hult Reservoir. While these events have resulted in lost water storage capacity in Hult Reservoir, that lost capacity was limited mainly to the northern extent of the reservoir, while the main body of water that comprises the reservoir today has a depth that has remained nearly constant.

Because 60 years of sediment has been deposited in a direction that moved mostly upstream instead of down, there isn't a large volume of sediment resting just upstream of the dam, and sediment movement under all the alternatives is expected to be essentially unchanged. Furthermore, if the Hult Reservoir Restoration Area could be immediately stabilized with vegetative regrowth, little to no sediment would mobilize from Hult Reservoir. This theory has been tested recently when, on several occasions, Hult Reservoir has been partially or fully drained for emergency maintenance. In the absence of water, old tree stumps were visible across the reservoir with little to no sediment accumulation near their base, and a defined stream channel for Lake Creek was apparent. Meanwhile, where Lake, Willow, and Sandy Creeks enter Hult Reservoir, sediment continues to deposit before reaching the reservoir, and vegetation continues to stabilize the sites. Each of these areas are high-quality wetland ecosystems at present.

The only sediment expected to mobilize and move downstream would come from disturbed and/or exposed soils not stabilized by restoration structures, including placement of instream and streambank woody debris and riparian vegetation. There would be little to no headcutting (erosion) and only some instances of streambank collapse, but this would be limited to the first few years before vegetation takes root. Some of this mobilized sediment (large gravel) would seed the stream reach between the current Hult Pond Dam location and Pucker Creek, creating small gravel bars on the edge of Lake Creek and behind larger boulders. However, most of the moving sediment (fine gravel and sand) is expected to deposit in the reach of Lake Creek between Pucker Creek and Swartz Creek. Sediment smaller than sand (silts and clay) would remain mostly suspended through these reaches and be carried to Triangle Lake, where it, too, would settle out. The smallest percentage of mobilized super-fine sediment would remain in suspension all the way to the ocean but would be undetectable from background levels downstream of Triangle Lake.

As shown in Figure A-3, Lake Creek without a dam would see a flush of fine sediment and begin to aggrade. [10] Stream aggradation can lead to floodplain reconnection, which is a valuable and natural process but can also result in damage or loss of infrastructure if the infrastructure is located on the floodplain. However, if these changes do occur, they would stabilize and reach equilibrium within a decade. Once Figure A-3 tilts toward aggradation, in order to return to dynamic equilibrium, the stream would trend towards eventual steepening. And with an increased stream gradient, the fine sediment would flush, the stream channel would deepen, and flooding will happen less frequently.

To better describe the affected environment, similar stream reaches between the headwaters of Lake Creek and Triangle Lake have been described in Table A-9 below. The three geomorphic stream reaches and their locations include:

- Reach 1: Headwaters of Lake Creek and all tributaries entering Hult Reservoir
- Reach 2: Lake Creek between Hult Pond Dam and Pucker Creek
- Reach 3: Lake Creek between Pucker Creek and Triangle Lake

Table A-9. *Geomorphic Response to the Alternatives*

Reach	***Affected Environment and Alt. 2: Build a New Dam***	***Alts. 1.1 and 1.2: No Action Alternative***	***Alt. 3: Add Little Log Pond***	***Alt. 3 with mitigation***	***Alt. 4: Remove Hult Reservoir***	***Alt. 4 with mitigation***
Reach 1	· Steep · Sediment transport · Gravel, cobble	· Headcutting · Sediment size increases	No change because of restoration structures	More fine sediment in lower reaches	No change because of restoration structures	More fine sediment in lower reaches
Reach 2	· Moderate gradient · Sediment transport · Gravel, cobble	Some gravel moves in and forms small bars	Substrate trends to gravel			

[10] Aggradation is infilling of a stream that occurs when the stream is supplied with more sediment than it can carry, and some of the sediment is deposited, building up the stream bed.

Reach	Affected Environment and Alt. 2: Build a New Dam	Alts. 1.1 and 1.2: No Action Alternative	Alt. 3: Add Little Log Pond	Alt. 3 with mitigation	Alt. 4: Remove Hult Reservoir	Alt. 4 with mitigation
Reach 3	· Low gradient · Sediment deposition ·Gravel, sand	· Fine sediment moves in and stream aggrades · Floodplain reconnection · Within 10 years, returns to present condition	No change because of Little Log Pond.		· Fine sediment moves in and stream aggrades · Floodplain reconnection · Within 10 years, returns to present condition	No change because of the amount of side channels, wetlands, and stabilization efforts

In summary, there is not much sediment sitting in Hult Reservoir that could mobilize under any of the alternatives. The greatest change to stream geomorphology would occur in a dam failure event, as described in the No Action Alternative. High flow velocities would mobilize significant volumes of sediment through erosive processes, which would create new stream channels and inundate floodplains. But even in the No Action Alternative, those effects would be temporally limited to approximately 10 years. Alternative 2 (Remove the Existing Dam and Build a New Dam) would see similar morphologies to current conditions. Alternative 3 (Remove Hult Reservoir; Add Little Log Pond) would see upstream changes but no changes below Little Log Pond, which would act as a barrier to sediment transport. Alternative 4 (Remove Hult Reservoir) would see upstream and downstream changes to stream morphology in line with historic conditions. None of these changes under any of the alternatives would be significant, as most sediment that has entered Hult Reservoir since early 1965 has settled before ever reaching the reservoir, has since stabilized, and is therefore not at risk of mobilizing. For these reasons, the BLM determined that there was no potential for significant impacts and that this issue did not need to be presented in detailed analysis.

Issue A-21. How would implementation of the alternatives contribute to climate change?

The BLM received comments from the Environmental Protection Agency during January 2022 scoping asking the BLM to consider the impacts of project alternatives contributing to climate change. To ensure that Federal agencies consider the incremental contribution of their actions to climate change, agencies should quantify the reasonably foreseeable direct and indirect greenhouse gas emissions of their proposed actions and reasonable alternatives (as well as the No Action Alternative) and provide additional context to describe the effects associated with those projected emissions in NEPA analysis. (CEQ 2023).

This issue was considered but is not presented in detailed analysis because the contribution of the effects to regional carbon budgets and emissions is too small to be measurable; the impact would not be discernable, therefore there is no potential for significance. Additionally, differences in effects are not being used to inform the decision because the issue does not respond to the purpose and need for the EIS.

The accumulation of greenhouse gases in the atmosphere has been identified as the primary driver of climate change. In theory, the emission of any amount of greenhouse gases has the potential to contribute to climate change on a global scale. Without international intervention to reduce these emissions, the effects (including global warming, extreme weather events, and ocean acidification) are expected to be long-lasting (from decades to centuries).

Greenhouse gases would be emitted as a result of the project under all alternatives because of construction and/or recreational activity at the site, travel to and from the site, or production of building materials used in construction. While some alternatives would result in long-term (potentially decades-long) changes to emissions from the project area, the largest potential amount of project-related emissions would be limited to a 3-year period during implementation.

The BLM looked at the emissions of carbon dioxide and methane, both potent greenhouse gases,[11] from various sources under the alternatives. The BLM considered emissions resulting from use of heavy equipment in construction, transportation for administrative access of the project site, the production of concrete used for construction, recreation-related fuel burning (campfires and charcoal grilling), and decomposition of organic matter in wetlands and standing water.

The effects of the alternatives on the likelihood of wildfires in the project area are addressed in Issues A-1, *How would implementation of the alternatives affect the availability of water for use for aerial wildland fire suppression?* and A-2, *How would implementation of the alternatives affect the availability of water for ground-based water delivery for local fire department as well as wildland fire suppression?*

Heavy Equipment and Machinery
All alternatives would involve the use of some heavy equipment (dump trucks, excavators, etc.) that would produce carbon dioxide emissions (SDGE 2016). The amount of heavy equipment and the duration of its use would vary by alternative based on the construction required. The number of annual equipment workdays could range from 5 annually (under the No Action Alternative) to an approximate maximum of 140 for a period of 1 to 3 years (Alternatives 2 and 3).

Administrative Transportation
BLM personnel currently need to travel to the project area for management or administrative purposes. In addition to ground transportation (USDOT 2021) to and from the Field Office, personnel from outside the area may use air travel (Carbon Independent 2023). Because of increased management and oversight activities, the action alternatives will increase the number and frequency of visits and the associated emissions.

Cement
Under some action alternatives, cement would be used to build infrastructure in the project area. Although using cement in construction doesn't in itself release greenhouse gases, its manufacture for use as a building material produces 0.9 lbs of carbon dioxide emissions per pound of cement (Portland Cement 2022). Under all action alternatives, cement is likely to be used in bridge construction and for building recreation infrastructure, including structures in day-use areas, camp sites, and a paved ramp for watercraft access under Alternative 3 (Remove Hult Reservoir; Add Little Log Pond).

Campfires and Grilling
Carbon dioxide emissions are released from burning charcoal or propane gas for grilling or wood for campfires (Johnson 2009, Guerra 2012). For the purposes of analysis, the BLM assumes that on any given day at Hult Reservoir, there is at least one campfire or grill in use for at least 1 hour. Under the No Action Alternative, the projected eventual loss of the reservoir would reduce visitor use by an estimated 80 percent, which would lower emissions from fires and grilling as well as from visitor vehicles traveling to the area. Under Alternatives 2, 3, and 4, the BLM expects that use of campfires or grills would remain the same as present, so the amount of related emissions would remain the same.

Wetlands
Wetlands and lakes produce methane and nitrous oxide emissions, created by the biological processes and decomposition of plants, other organisms, and organic matter in the water and sediment. The amount produced varies with the amount of aquatic vegetation and other organic materials and the ambient temperature (Li et al. 2020, Harrison et al. 2017, Silvey et al. 2019). The area at Hult Reservoir covered by wetlands or standing water is estimated to produce approximately 1,228 lbs of methane emissions per year. This amount would either remain the same or be reduced under all alternatives.

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[11] The potency of a greenhouse gas refers to its potential to raise Earth's temperature. While carbon dioxide is not the most potent greenhouse gas, it's used as the basis of comparison and baseline for reporting of greenhouse gases because it's the most common emission. Methane is the second most common greenhouse gas after carbon dioxide and is about 28–34 times more potent than carbon dioxide in its warming capacity.

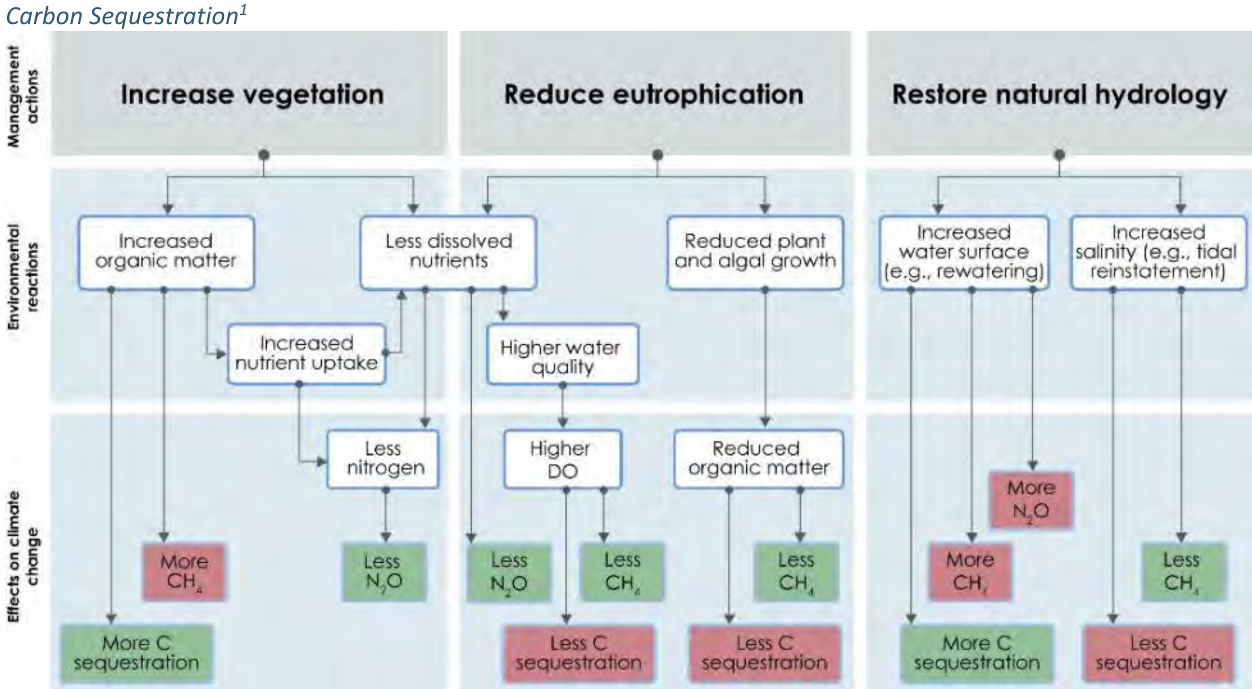
Nitrogen cycling is a natural process that occurs in wetlands. Wetlands can absorb (denitrify) nitrogen from the atmosphere and upstream sources of pollution rich in nitrogen. While wetlands can denitrify systems, depending on various chemical and biological attributes, they can also emit nitrogen in the form of nitrous oxide, a potent greenhouse gas. Based on the processes shown in Figure A-4, Alternatives 1.1, 1.2, 3, and 4 would create less nitrous oxide emissions than Alternative 2 (Remove the Existing Dam and Build a New Dam) because they would increase vegetation, improve water quality (eutrophication), and reduce water surface area (Malerba et al. 2022).

The total estimated carbon emissions from carbon dioxide and methane for the alternatives and their contributing sources are presented below in Table A-10.

The greatest annual amount of carbon dioxide equivalent[12] (CO_2e emissions, i.e., those emissions resulting from carbon dioxide and methane) produced by any alternative is estimated to be 143,771 lbs (65 metric tons). On a regional scale, this would represent 0.0068 percent of the estimated 2021 CO_2e emissions for the Eugene metropolitan area (950,000 metric tons) (City of Eugene 2022) and 0.000106 percent of total annual CO_2e emissions for the State of Oregon (61.4 million metric tons, or 135 billion lbs) (ODEQ 2021).

Because of the small comparative contribution to greenhouse gas emissions, the relatively short duration of the most intensive potential emissions (3 years or less), and the inability to make specific predictions about the effects of emissions on climate change at this scale, the BLM determined that there was no potential for significant impacts and that this issue did not need to be presented in detailed analysis.

Figure A-4. *Vegetation, Water Quality (Eutrophication), and Surface Area Effects on Nitrous Oxide, Methane, and Carbon Sequestration[1]*



1. From Malerba et al. (2022)

[12] A metric used to compare greenhouse gas emissions based on their potential to raise the Earth's temperature. The carbon dioxide equivalent of a greenhouse gas represents the number of metric tons of carbon dioxide emissions that have the same global warming potential as one metric ton of that gas.

Table A-10. *Estimated Carbon Emissions Under Each Alternative and Their Contributing Sources*

Affected Environment	***Alts. 1.1 and 1.2: No Action Alternative***	***Alt. 2: Build a New Dam***	***Alt. 3: Add Little Log Pond***	***Alt. 4: Remove Hult Reservoir***
~5 pieces of heavy equipment (dump truck, excavator, etc.) used for 5 days annually, resulting in 25 equipment days. If each equipment day results in ~12 lbs of carbon dioxide emissions, heavy equipment would produce 300 lbs of carbon dioxide emissions annually.		~8 pieces of heavy equipment used for 7 months (140 days), resulting in 1,120 equipment days. Given ~12 lbs of total carbon dioxide emissions produced per day, heavy equipment would produce 13,440 lbs of carbon dioxide emissions annually. For 3 years of construction work, this amount is 40,320 lbs.	~8 pieces of heavy equipment used for 7 months (140 days) results in 1,120 equipment days. If each equipment day results in approximately 12 lbs of carbon dioxide emissions, heavy equipment would produce 13,440 lbs of carbon dioxide annually.	
From administrative use, there will be 1 standard passenger vehicle per day, travelling 15,360 miles per year, resulting in 163 lbs of carbon dioxide emissions annually.[1]	From administrative use, there would be 2 standard passenger vehicles per day travelling 30,720 miles per year, resulting in 325 lbs of carbon dioxide emissions annually.[1]	From administrative use, there would be 4 standard passenger vehicles per day, travelling a total of 61,440 miles per year or 184,320 miles over 3 years, resulting in the emission of 650 lbs of carbon dioxide annually and 1,950 lbs in 3 years.[1]	From administrative use, there would be 4 standard passenger vehicles per day, travelling a total of 61,440 miles per year, resulting in the emission of 650 lbs of carbon dioxide annually.[1]	
Site visits that require a flight (~198 lbs/person/hour): There would be at least 2 hours of flight time per year associated with annual operations, resulting in 396 lbs of carbon dioxide emitted.		Site visits that require a flight (198 lbs/person/hour): There would be at least 6 hours of flight time per year associated with annual operations, resulting in 1,188 lbs of carbon dioxide emitted.		
On any given day at Hult, there is at least one campfire or grill in use for at least 1 hour. 1 hour of wood or charcoal burning produces 11 lbs of carbon dioxide emissions; 1 hour of gas burning produces 5.6 lbs of carbon dioxide emissions. Averaging these amounts (8.3 lbs of carbon dioxide) would result in 3,029 lbs of carbon dioxide per year.	Visitation would be reduced by ~80% absent any reservoir or pond and recreational amenities. 80% of 3,029 lbs equals 606 lbs of carbon dioxide from campfires and charcoal/gas grills.	On any given day at Hult, there is at least one campfire or grill in use for at least one hour. One hour of wood or charcoal burning produces 11 lbs of carbon dioxide emissions; 1 hour of gas burning produces 5.6 lbs of carbon dioxide emissions. Averaging these amounts (8.3 lbs of carbon) would result in 3,029 lbs of carbon dioxide per year.		

Affected Environment	***Alts. 1.1 and 1.2: No Action Alternative***	***Alt. 2: Build a New Dam***	***Alt. 3: Add Little Log Pond***	***Alt. 4: Remove Hult Reservoir***
No anticipated cement use in typical annual operations.	No anticipated cement use in dam failure or emergency decommissioning.	No anticipated cement use in building the new dam at Hult Reservoir. A few cement foundations for toilets and picnic tables. The manufacture of cement produces 0.9 lbs of carbon dioxide for every pound of cement. One picnic table foundation requires 1,840 lbs of cement (4-inch slab with 40 square feet of area). 6 similar foundations across the project area would require 11,040 lbs of cement, resulting in 9,936 lbs of carbon dioxide emissions.	Added recreation infrastructure would triple the amount of concrete in Alternative 2, requiring 33,120 lbs of cement which produces 29,808 lbs of carbon dioxide emissions. Additionally, the paved boat launch at Little Log Pond would require 83,360 lbs of cement (given slab dimensions = 40 ft x 20 ft x 6 in), producing 48,024 lbs of carbon dioxide emissions. Total cement needed: 116,480 lbs. Total carbon dioxide emissions: 104,832 lbs.	Recreation infrastructure would use three times the amount of concrete as Alternative 2, requiring 33,120 lbs of cement and producing 29,808 lbs of carbon dioxide emissions.
65.6 acres in the project area of either standing water or wetlands would produce 1,228 lbs of methane emissions per year.[2]	29.9 acres in the project area of either standing water or wetlands would produce 560 lbs of methane emissions per year.[2]	65.0 acres in the project area of either standing water or wetlands would produce 1,217 lbs of methane emissions per year.[2]	32.9 acres in the project area of either standing water or wetlands would produce 616 lbs of methane emissions per year[2] (or 43.8 acres and 820 lbs methane emissions with aquatic/wetland mitigation).	28.5 acres in the project area of either standing water or wetlands would produce 534 of methane emissions per year[2] (or 39.5 acres and 738 lbs methane emissions with aquatic/wetland mitigation).
TOTAL				
5,116 lbs of CO_2e emissions	2,187 lbs of CO_2e emissions	29,460 lbs (1 year) or 68,508 lbs (3 years) of CO_2e emissions	123,775 lbs of CO_2e emissions (143,771 lbs with aquatic/wetland mitigation)	48,648.7 lbs of CO_2e emissions (68,869 with aquatic/wetland mitigation)
% of 2021 Eugene metro area annual emissions (950,000 metric tons / 2.1 billion lbs)				
0.000244%	0.000105%	0.0014% (1 year)	0.0059% (0.0069% with aquatic/wetland mitigation)	0.0023% (0.0033% with aquatic/wetland mitigation)
% of 2021 Oregon total annual emissions (61.4 million metric tons / 135 billion lbs)				
0.000004%	0.000002%	0.000022% (1 year)	0.000092%[3]	0.000036%[3]

1. Based on travel to and from offices approximately 40 miles away from the site (80 miles roundtrip), 4 days per week, with carbon dioxide emissions from light-duty trucks of 4.8 g per mile.
2. Wetlands and lakes produce 0.5–11 mg per m^2 per day of carbon in the form of methane. Assuming the average (5.75 mg per m^2 per day) yields 2,099 mg per m^2 per year.
3. Percentages with and without aquatic/wetland mitigation are essentially equal at this scale.

Issue A-22. How would implementation of the alternatives impact carbon sequestration?

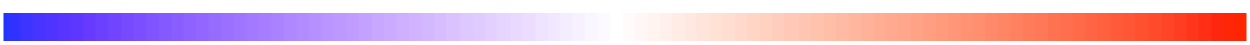
The BLM received comments from the public during the May 2022 draft Chapters 1 and 2 public comment period requesting that the BLM evaluate and disclose the carbon sequestration potential of the alternatives. This issue was considered but is not presented in detailed analysis because the effects are minimal in both spatial and temporal extent: Significant effects are not anticipated under the action alternatives, and differences in effects are not being used to inform the decision because the issue does not respond to the purpose and need for the EIS.

This issue is limited to a discussion of carbon sequestration as a function of wetlands and standing water since no other variables in the alternatives have any bearing on the sequestration of carbon. While some alternatives would produce greater CO_2e emissions than others (see Issue A-21: Climate Change), this issue will focus only on the ability of the project to sequester carbon. It should also be noted that, because the system is not closed and because carbon is present in the atmosphere and not contained at the project site, carbon generated at the project site may leave the area while carbon sequestered at the site may come from carbon sources elsewhere. In other words, when an alternative produces an amount of carbon, wetlands at the site may serve only as a carbon offset—not necessarily as a direct carbon sink.

The two aspects under consideration for effects to carbon sequestration are 1) the presence of standing water and 2) the presence of wetlands. [13] While standing water, especially deep water, can act as a carbon sink, shallow water can lead to increased primary production and aquatic plant growth. As algae and plants grow and die, they settle in the water column and begin decomposition. This decomposition generates methane gas, which is gradually released into the atmosphere. Wetlands can also sequester carbon through the oxidation of methane, but because of their high productivity and slow decomposition, wetland soils are an important global sink for carbon (Mobilian and Craft 2022). In the Oregon Coast Range, wetlands are capable of sequestering approximately 1.283 tons of carbon per acre per year (Melcher 2021). The interaction of standing water and wetlands in each alternative represents a balance of emissions and sequestration.

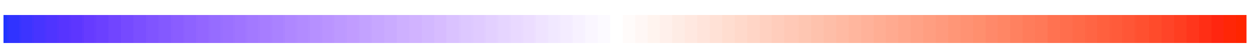
To consider this issue, the BLM looked at CO_2e as compared to sequestration from both standing water and wetlands under each alternative. There are numerous variables (climate, temperature, water depth, stream turbulence, stream periodicity, etc.) to consider when quantifying values; however, as described below, relative carbon production and sequestration will be used for purposes of this analysis. The analysis uses the following assumptions and relative production and sequestration of carbon (adapted from Amani et al. 2022):

Deep water produces fewer carbon emissions than shallow water.



Deep water (sequestration) **Shallow water (emission)**

Lotic (flowing) systems can release more carbon into the atmosphere than lentic (standing) systems because water turbulence creates an atmospheric gas exchange.



Lentic systems (sequestration) **Lotic systems (emission)**

Wetlands release less carbon than lentic and lotic waters because of methane oxidation (methane combines with sulfates to produce bicarbonate, sulfides, and water), a chemical reaction driven by an anaerobic environment and the presence of certain bacteria. Standing water produces three orders of magnitude more carbon than wetlands because of the methane production in those lentic environments.

[13] Although carbon is stored in vegetation, it was not considered here. Current conditions are most water and thereby unvegetated. Replanting strategies vary between early seral and late successional plant species and hinge largely on the presence of instream and riparian restoration activities and recreational facilities. Compared to carbon sequestration in wetlands, most other ecosystems sequester less (Nahlik and Fennessy 2016).

Wetlands (sequestration)	**Lentic systems**	**Lotic systems (emission)**

When an area transitions from standing water to soil (e.g., when a reservoir is drained), methane emissions decrease while carbon dioxide emissions increase. Although carbon dioxide represents over three-quarters of all greenhouse gases, methane has 84 times the warming power over a 20-year time period (CEQ 2023).

Drained reservoir (soil) ***Carbon dioxide***	**Full reservoir (standing water)** ***Methane***

The existing and proposed acres of standing water and wetlands under each alternative, in addition to the mileage of streams, are detailed in Table A-11. Each of these conditions were weighted relative to one another when assessing the level of overall carbon sequestration.

***Table A-11**. Wetland and Standing Water Acreage with Stream Mileage per Alternative*

Alternatives	*Wetlands not in standing water (acres)*	*Standing water (acres)*	*Streams (miles)*
Affected Environment	11.7	53.9	7.1
Alts. 1.1 and 1.2: No Action Alternative	29.9	0.0	8.7
Alt. 2: Build a New Dam	11.7	53.3	7.2
Alt. 3: Add Little Log Pond	28.2	4.7	8.6
Alt. 3 with mitigation	36.4 to 39.1	4.7 to 7.4	10.4
Alt. 4: Remove Hult Reservoir	28.5	0.0	8.7
Alt. 4 with mitigation	36.7 to 39.4	0.0 to 2.7	10.5

Under the affected environment, there is more standing water than wetlands. Standing waters generally produce greater amounts of methane. Alternative 2 (Remove the Existing Dam and Build a New Dam) would result in effectively the same carbon emissions and sequestration as the affected environment. The No Action Alternative (Alternatives 1.1 and 1.2, after the dam has failed or breached and the reservoir drained) would result in a large acreage of wetlands capable of carbon sequestration—an even larger number of wetland acres than Alternative 4 (Remove Hult Reservoir) (incorporating only design features). Alternative 3 (incorporating aquatic/wetland mitigation proposals) would result in a large acreage of wetlands, but between Alternatives 3 and 4, also has more standing water. Alternative 4 (incorporating aquatic/wetland mitigation proposals) would result in the greatest amount of wetland acreage with nearly the least amount of standing water, which should result in the smallest amount of methane production and emission. And although the stream mileage in Alternative 4 (incorporating aquatic/wetland mitigation proposals) is the highest of any alternative, the volume of atmospheric carbon dioxide exchange in stream courses would be minor compared to methane (carbon) sequestration in the wetlands.

While each alternative results in different levels of carbon production, emission, and sequestration, the *Proposed Resource Management Plan and Final Environmental Impact Statement for Resource Management Plans for Western Oregon,* which this EIS tiers to, does not specify any management thresholds. Rather, this narrative presents a relative and comparative balance of emission and sequestration between the alternatives, none of which are potentially significant. Under the affected environment, the project area emits the most carbon (most standing water and fewest wetlands), whereas Alternative 4 would sequester the most carbon (the least standing water and most wetlands). Absent any management thresholds, the BLM determined that there was no potential for significant impacts and that this issue did not need to be presented in detailed analysis.

Issue A-23. How would implementation of the alternatives impact air quality?

The BLM received comments from the Environmental Protection Agency during January 2022 scoping expressing concern that the alternatives would impact air quality. This issue was considered but is not presented in detailed analysis because the effects are minimal in both spatial and temporal extent and are not anticipated to be significant. This issue is limited to a discussion on dust generation and distribution. Although other emissions would be introduced into the atmosphere from vehicles, construction equipment, and recreational activities, these emissions are discussed in Issue A-21 (Climate Change).

The presence and disturbance of exposed soils and unsurfaced roads can generate fine particulates of dust, which if unabated, can aerially distribute with the help of wind. While most particulates are larger, heavier, and settle within minutes, finer particulates can remain suspended for hours or even days. Suspended particulates can reduce visibility and impact recreational experience and human health if significant. Dust particulates smaller than 10µm (PM_{10}) are associated with human respiratory issues (Edvardsson and Magnusson 2009). Depending on the selected alternative, this project would produce an amount of dust. The effects are expected to be spatially limited to the topographic confines of the valley. No dust or reduced air quality is expected to be measured or observed over any ridges or down Lake Creek to the community of Horton. At the project site itself, a minimal amount of dust is currently produced; greater volumes would be produced under the action alternatives (see Table A-12).

To consider this issue, the BLM looked at the generation of dust under each of the alternatives. For each alternative, although there would be varying levels of dust produced and distributed, those levels would be limited to the project site and dissipate daily (in the evenings) and seasonally (once fall rains begin). Finally, all areas of exposed soils under each alternative would either be well vegetated or vegetated to the point that dust is no longer being generated within three years. In other words, air quality is expected to return to background levels within three years.

All roads, trails, existing, and potentially exposed soils are considered dust sources. Daily work and dust production would peak in the late afternoon and reduce considerably overnight as work stops and humidity increases. Additionally, during construction, there would be daily dust mitigation measures, as needed, to keep dust production to a minimum. The 2016 RMP includes air quality management objectives and directions to protect air quality. This includes using best management practices to reduce dust, such as applying water to roadways during construction, and following State guidance and permitting as needed (USDI 2016:76).

At present, dust generation and PM_{10} distribution are limited to within 45 meters of all unsurfaced roads, trails, beaches, and exposed stream banks (Edvardsson and Magnusson 2009). Under the various alternatives, dust would be generated along roadways and at construction sites wherever vegetation is removed and soils are disturbed. Although the amount of work and disturbed areas varies greatly by alternative, and the amount of dust mobilized similarly varies, the overall conclusion is the same: Dust production would be mitigated and limited to the project area. Fine particulates suspended in the air would dissipate daily and seasonally and ultimately return to background levels within three years once the site has stabilized and revegetated.

Dust production is quantified in Table A-12 in relative terms based on the amount of area disturbed under each alternative. These estimates are inflated to assume that every acre in an alternative will be exposed and disturbed and dust would be unabated. During implementation, and aside from the act of reservoir drainage, only small patches of land at a time would be exposed and disturbed, and dust abatement would be applied as necessary. Actual volumes of dust generation are not quantified because of unknown factors including soil moisture during implementation, reservoir dry-out rates, numbers and types of equipment, size of equipment, speed of equipment, and footprint of disturbance.

Table A-12. *Dust Production Relative to Affected Environment*

Alternatives	***Description***	***Dust production relative to affected environment***
Affected Environment	Next to no dust would be generated or distributed because all access roads are paved, and all recreation areas are well vegetated and shaded (not conducive to dust creation).	Not applicable
Alts. 1.1 and 1.2: No Action Alternative	Exposed soils not immediately stabilized would be prone to summer drying. Small chance of wind creating some dust, especially if off-highway vehicles access the area and disturb the soil. Overall, very little dust would be created and mobilized, but potentially up to two times the amount produced under the affected environment.	2 times
Alt. 2: Build a New Dam	Effects limited to dam site and roughened channel. More dust would be created than No Action Alternative: three times the affected environment.	3 times
Alt. 3: Add Little Log Pond	More dust than Alt. 1 because of work at Little Log Pond and a planned/aggressive revegetation plan in Hult Reservoir Restoration Area, but less than Alt. 3 with mitigation. Double the dust production of Alt. 2 because of Little Log Pond and work in Hult Reservoir Restoration Area. Different mitigation doesn't change effects because all activities are occurring in same footprint.	6 times
Alt. 3 with mitigation	Ten times more dust production than Alt. 3 with design features because of extensive ground-disturbing activities within the Hult Reservoir Restoration Area plus construction work at Little Log Pond.	60 times
Alt. 4: Remove Hult Reservoir	Slightly less dust than the No Action Alt. and Alt. 2: Placing logs in the stream as design features would produce less dust than building a new dam at Hult Reservoir. There will also be a vegetation plan, which would reduce exposed patches of dirt. Approximately 1.8 times the affected environment.	1.8 times
Alt. 4 with mitigation	Similar dust production to, but slightly less than, Alt. 3 with mitigation, because there would be no ground disturbance at Little Log Pond.	54 times

Because of the limited spatial extent of dust production and subsequent mobilization, coupled with the daily and seasonal fluctuations in suspended particulate concentrations and the fact that air quality would return to baseline within a maximum of three years, the BLM determined that there was no potential for significant impacts and that this issue did not need to be presented in detailed analysis.

Appendix B: Oregon Department of Fish and Wildlife's Native Turtle Best Management Practices

The following best management practices are taken from the Oregon Department of Fish and Wildlife's (ODFW) *Guidance for Conserving Oregon's Native Turtles Including Best Management Practices* (ODFW 2015).

Western Pond Turtle Nesting Habitat Creation Best Management Practices

- Create and maintain areas of bare ground with low-growing (herbaceous species that reach ≤ 2 feet in height), sparse vegetation, and little or no overhead tree canopy that receives full solar exposure, preferably south-facing.
    - Suitable turtle nesting habitat creation would be within 100 meters and no farther than 200 meters from wetlands and other waterbodies occupied by turtles. Choose a location that would not flood periodically.
    - Use of native, on-site, and well-draining soil is preferable to prevent introduction of different weeds and soil microbes. If soil must be brought in to create or enhance nesting areas, material would be clean and weed-free.
    - Add nesting habitat near existing nesting habitat to increase the likelihood that females will use the nest site immediately. Ideal suitable nesting habitat is in relatively close proximity to aquatic habitat, above the annual high-water level.[14]
    - Use silt fencing to prevent nesting material from entering adjacent wetlands during construction. Silt fencing would also be used to keep gravid females out of construction zones (ODFW 2015:22–25).
    - Implement periodic maintenance as needed to preserve ideal vegetation characteristics (see Appendix C, *Monitoring*).
- Complete creation, enhancement, and maintenance of turtle nesting areas by May 15 so the area is available to gravid females for egg laying.
    - Time enhancements and maintenance of existing nesting areas or areas where nesting is suspected to avoid impacts to already laid eggs, hatchlings overwintering in the nest, emerged hatchlings present near the nest, and nesting females; generally, April 1 through May 15 (ODFW 2015:26–27).
    - When planning to conduct work (creation, enhancement, maintenance, trail construction, trail maintenance, etc.) in suitable turtle nesting habitat, install silt fencing or other barriers to prevent turtles from entering the work zone. If the work zone includes nesting habitat, place silt fencing around the nesting habitat, particularly in late April to early May, to prevent turtles from nesting in the project area (ODFW 2015:43).

[14] Hatchling and post-hatchling emergence survival rates are higher at sites that are inundated for a shorter period of time or not at all.

Western Pond Turtle Habitat Protection and Maintenance Best Management Practices

- Identify and protect existing movement corridors that provide safe travel for turtles between aquatic and terrestrial habitats, especially nesting sites (ODFW 2015:37).
- Control invasive plants, particularly reed canarygrass, which makes nesting habitat unsuitable or difficult for gravid females to access (ODFW 2015:59).
- Improve turtle aquatic habitat by promoting or planting (if necessary) native, floating, emergent, and submergent plant species to provide food and hiding cover for turtles and their prey. Small turtles will sometimes bask atop floating vegetation, and emergent vegetation provides hiding cover. Turtles are omnivorous, eating a variety of animals and submergent and emergent vegetation (ODFW 2015:30).
- Around wetlands and other waterbodies, provide native vegetation buffers and allow some areas to remain open and sunny, with low-growing vegetation to allow solar exposure for turtle basking and nesting habitat (ODFW 2015:19).
- Provide a range of water depths and water temperature. Turtles need both shallow water and deeper water areas to meet requirements of various life stages. Shallow water areas that are sunny, sheltered from the wind, and have a mixture of submerged and emergent aquatic vegetation contribute to ideal habitat conditions for hatchling turtles. Deeper areas are needed by larger turtles. Provide permanent slow flowing or static water at least 3 to 4 feet deep year-round (ODFW 2015:29).

Protect and Maintain Western Pond Turtle Nesting Habitat

- Monitor western pond turtle population trends by surveying the Hult Reservoir population using one or more of the following survey methods:
    - Mark recapture surveys – Provide measures of true population size, sex ratios, demography, growth, survivorship, and turtle well-being (e.g., sick or diseased turtles).
    - Telemetry – Determine local movement patterns of pond turtles. Telemetry studies can determine overland movement, aquatic habitat use, and movement corridors.
    - GPS survey – GPS surveys may be less effective while turtles are submerged but can provide a pinpoint location of nesting sites, movement corridors, and overwintering and summer dormancy habitat.
- During May through July, seek information on observations of gravid females in search of suitable nesting sites.
- Note the location of nests and protect with signage or fencing.
- Contact the appropriate regulatory agency. Work with the appropriate regulatory agency on nest protection measures. If resources and priorities allow, cover the nest with a flat 3- by 3-foot piece of half-inch wire mesh to protect the egg contents from predation. Remove the wire mesh before the turtles hatch and emerge from the nest.
- Do not disrupt or destroy western pond turtle nesting habitat. Buffer all actions 100 meters off the nesting habitat perimeter. Exceptions include actions that are linked to habitat restoration efforts that would benefit or improve turtle habitat and actions that are directly related to meeting the purpose and need (e.g., reservoir construction, deconstruction, maintenance, or enhancement).

Guidance for Conserving Oregon's Native Turtles: Construction and Operational Best Management Practices

- When implementation allows, avoid temporary changes to the hydrology or sedimentation rates of waterbodies supporting turtles. Avoid ground disturbances within 500 feet (150 meters) of native turtle habitat, or within 165 feet (50 meters) of waterways that flow to native turtle habitat (ODFW 2015:44).

    - To prevent and minimize the potential harmful effects of roads on turtles, the following actions are recommended:
        a. Locate project staging areas, temporary work areas, and other construction-related support features (e.g., access routes, concrete truck washout area, and equipment fueling stations) at least 165 feet (50 meters) from waterbodies and suitable turtle nesting habitat (ODFW 2015:45).
        b. If small engine equipment such as pumps for temporary water management must be used within 165 feet (50 meters) of a waterbody, place in a leakproof container to contain spills from broken fuel lines or accidental spills during refueling (ODFW 2015:45).
        c. Develop a spill prevention and response plan (ODFW 2015:45).
        d. Construct stormwater management infrastructure prior to all other project components to control stormwater and sediment (ODFW 2015:44).
        e. Properly install silt fencing around work areas, with regular inspection and maintenance. Bury silt fences into the ground 6 inches to prevent turtles from moving underneath the fence. Monitor regularly. Remove the fencing after work is completed (ODFW 2015:48).
        f. Use jute matting, weed-free native straw, mulch berms, or other natural fiber erosion control products on disturbed areas immediately after project completion to minimize erosion; avoid use of nonbiodegradable materials (ODFW 2015:44).
        g. Promptly revegetate areas of temporary disturbance with native species.
- Mark confirmed turtle nests with temporary flagging and surround with silt fencing, etc., to protect from disturbance. Install silt fencing such that it does not shade the nest site. Remove temporary nest markers and barricades as soon as possible after the project is completed to minimize possible attraction of predators (ODFW 2015:44).
- Avoid injuring or disturbing native turtles during construction activities in or near occupied habitat (ODFW 2015:45).

    In addition, the following actions are recommended:
    a. Monitor for turtle presence during project activities (ODFW 2015:45).
    b. Work with a qualified biologist to install an appropriate barrier to keep turtles out of an active site. If possible, install silt fencing after hatchlings have left nest sites and before nesting season. Inspect daily to locate turtles moving along the fence (inside or outside). If a turtle is found moving along the silt fencing, implement conditions outline in the ODFW Wildlife Capture, Holding, Transport, and Relocation Permit or contact your local U.S. Fish and Wildlife Service and Oregon Department of Fish and Wildlife biologists for directions. The turtle would be moved to nearby suitable habitat, out of the work zone (ODFW 2015:45).

    Or do both c and d below:
    c. Have work areas inspected by a qualified biologist experienced with turtles before and during construction (ODFW 2015:45).
    d. Seasonally restrict certain construction activities (ODFW 2015:45).

- Avoid introduction of invasive non-native species to waterbodies. Invasive species (e.g., nutria, bullfrogs, largemouth bass, etc.) can degrade habitat conditions and cause direct mortality to native turtles (ODFW 2015:59).
    - Thoroughly wash construction equipment off-site before use (ODFW 2015:45).
    - Use only native plant species and weed-free mulches, gravels, and soils for landscaping (ODFW 2015:45).
    - Conduct weed monitoring and treatment for at least the first 5 years after construction to intercept invasive plants that inadvertently come in with equipment, soil, etc. (ODFW 2015:45).
- For large-scale projects in known turtle areas, consider implementing the project in multiple phases, preferably with each phase no longer than 6 weeks in duration, so turtles have a place to go to escape impacts (ODFW 2015:45).
- Designate work paths to and from the staging area and work site(s) to reduce unnecessary ground disturbance (ODFW 2015:45).
- Make construction staff and other on-the ground personnel with the potential to encounter turtles aware of possible turtle presence and familiar with native/non-native turtle identification, applicable turtle protocols, and permit requirements in the event a turtle is encountered (ODFW 2015:46).
- If turtle nests are encountered during construction, immediately stop work and contact the appropriate regulatory agency. If an ODFW Wildlife Capture, Holding, Transport, and Relocation Permit has been obtained, implement the protocol described in the permit conditions (ODFW 2015:45).
- If required, obtain an ODFW Wildlife Capture, Holding, Transport, and Relocation Permit (ODFW 2015:45).
- Conduct turtle capture and relocation efforts in coordination with fish salvage and amphibian capture/relocation efforts when possible (ODFW 2015:52).
- Eliminate construction-related pitfall hazards, such as trenches which can entrap turtles and other small animals. Cover pits, trenches, etc., to prevent entrapment. Provide ramps (e.g., a rough board) to allow wildlife that does enter the hole to exit on its own (ODFW 2015:46).
- Manage vegetation with turtles in mind. Turtles are vulnerable when they move to and from upland habitats to nest, overwinter, and go dormant in summer. When conducting landscaping, mowing, or other vegetation work, be careful not to injure turtles or destroy habitat with vehicles, power tools, and other equipment. Remember that leaf litter, downed wood, and other "messy" features make good habitat. Retain native plants to the extent possible (ODFW 2015:46).
- If possible, retain existing native cover (hiding habitat) where it exists when controlling invasive non-native plants or replanting areas. Promote native bunchgrass or shrub growth in riparian areas (ODFW 2015:47).
- Increase areas of shrub cover near aquatic habitats suitable for turtles to use as summer dormancy and overwintering sites. Ensure that plantings do not shade out suitable basking sites and leave some areas unplanted to provide suitable nesting habitat (ODFW 2015:47).

Road Construction and Maintenance

To prevent and minimize the potential harmful effects of roads on turtles, the following actions are recommended:

- Minimize the extent (length and width) of new roads (ODFW 2015:48).
- For new and existing roads, provide and maintain undeveloped areas (buffers) between habitat and roads to minimize disturbance, ideally at least 500 feet (150 meters) wide (ODFW 2015:48).
- Avoid and minimize road construction activities in key turtle areas[15] from mid-May to mid-July when movement of female turtles is highest or implement measures to prevent turtles from entering the work zone (ODFW 2015:48).
- Install silt fencing in road construction areas to prevent turtles, including nesting females, from entering the work zone (ODFW 2015:48).
- Treat stormwater run-off from roads before it enters waterbodies (ODFW 2015:48).

[15] Key turtle areas include nesting habitat; basking sites; wildlife managed ponds, pools, and wetlands.

- Construct bridges or oversized, natural bottom culverts where water and stream channel crossings occur so that streams and other waterbodies are not constrained, and turtles and other wildlife can move more freely (ODFW 2015:49).
- Install wings to funnel turtles to culverts or other under-crossings and away from roadbeds and project work activities (ODFW 2015:49).

Culvert Cleaning, Repair, and Replacement

To prevent and minimize the potential harmful effects of roads on turtles, the following actions are recommended:

- Install wings to funnel turtles to culverts or other under-crossings and away from roadbeds and project work activities. Incorporate other design elements from "Best Practices Manual: Wildlife Vehicle Collision Reduction Study." Be aware that most projects have unique elements that need to be addressed specifically (ODFW 2015:49).
- If you encounter a native turtle while cleaning or replacing culverts in winter, postpone your activities until spring, if possible (ODFW 2015:50).
- If you encounter a turtle in a culvert at other times of the year, follow Construction and Operational best management practices to avoid adversely impacting or harming native turtles (ODFW 2015:50).

Dredging, Filling and Pond Management

Periodic dredging of man-made ponds or waterways used for water conveyance may be necessary to achieve or maintain certain uses or site conditions. Waterway dredging can benefit turtles by increasing available aquatic habitat or improving water depth profiles (ODFW 2015:51).

To prevent and minimize the potential harmful effects of roads on turtles, the following actions are recommended:

- If dewatering, dredging, or filling a waterbody, obtain an ODFW Wildlife Capture, Holding, Transport, and Relocation Permit when turtles are known to be or likely present (ODFW 2015:52).
- Conduct dewatering, dredging, and filling activities when turtles are not hibernating, generally April through October (ODFW 2015:52).
- If dewatering or suction dredging, screen nozzles to avoid sucking up (entraining) turtles, including hatchlings (ODFW 2015:52).
- When dewatering a waterbody known or suspected to harbor turtles, leave the drained waterbody undisturbed and free of any wildlife exclusion fencing for at least two days (48 hours) before dredging or filling to allow any turtles present to leave overnight on their own when human presence/activity is low.
    - It may be more appropriate to install silt fencing to keep turtles within the project area if adjacent areas are inappropriate for turtle dispersal (i.e., the work site is next to a busy road). In this case, turtles would be captured and relocated to an ODFW-designated site (ODFW 2015:52).
- When dredging, if possible, remove and stockpile existing basking structures such as logs and tree branches prior to work. Replace basking structures after dredging is completed (ODFW 2015:53).
- Have a wildlife biologist knowledgeable about turtles on the work site throughout dewatering, soil removal, and fill activities to monitor for turtles.
- If possible, use dredged material on-site to created new or enhance existing turtle nesting habitat (ODFW 2015:53).
- Dispose of dredged sediment in piles ideally no more than 6 inches deep to avoid smothering turtle nests and to allow any turtles buried in the material to dig themselves out (ODFW 2015:53).
- When dredging, start at one end of the waterbody and slowly move to the other so that turtles can move out of the way on their own (ODFW 2015:53).
- Control of aquatic vegetation can negatively affect turtles. If control of pond aquatic vegetation is planned, implement control techniques when turtles are inactive. When removing unwanted vegetation (e.g., algae blooms or non-native invasive plants), stage removal over space and time to reduce adverse

impacts to turtles through immediate and total loss of food and hiding cover. Search removed vegetation for trapped turtles (ODFW 2015:53).

Recreation

To prevent and minimize the potential harmful effects of roads on turtles, the following actions are recommended:

- Avoid constructing new barriers such as fences and public trails between aquatic and terrestrial habitats (ODFW 2015:37).
- Install interpretive signs for public education. Educating the general public about turtles, what they need to survive, what threatens their existence, and their ecological significance can increase awareness and support for native turtle conservation efforts.
- Restrict public access in areas managed specifically for turtle nesting habitat during the critical breeding period. Turtles and their habitats can be affected by the overuse of an area by people engaged in recreational activities. Avoid or minimize disturbance from public access or other human activities (ODFW 2015:22, 41).
- Restrict presence of dogs in known key turtle areas. Dogs can disturb, severely injure, or kill turtles. Restrict off-leash dogs and coordinate with the appropriate law enforcement entity to enforce leash laws (ODFW 2015:55).
- Conduct trail construction and maintenance activities (e.g., mowing, grading) with turtles in mind. Avoid or minimize activities from mid-May to mid- July. If this is not possible, have someone walk ahead of maintenance equipment to look for turtles on or near the trail and be ready to move them out of harm's way (ODFW 2015:55). Set the height of the mowing deck or sickle bar to at least 10 inches off the ground to avoid injuries to turtles (ODFW 2015:57).
- Manage larger areas on a rotational basis with no more than one-third of the site impacted (e.g., mowed) in any given year (ODFW 2015:57).
- Immediately prior to maintenance activities that could harm turtles (e.g., mowing, maintenance, construction), conduct visual searches for turtles in work areas where they are known to occur or may be present based on habitat suitability (ODFW 2015:57).
- Manage vegetation with turtles in mind. Turtles are vulnerable when they move to and from upland habitats to nest, overwinter, and go dormant in summer. When conducting landscaping, mowing or other vegetation work, be careful not to injure turtles or destroy habitat with vehicles, power tools, and other equipment. Remember that leaf litter, downed wood, and other "messy" features make good habitat. Retain native plants to the extent possible (ODFW 2015:46).
- If a turtle is accidentally injured during mowing or other vegetation management activity, transport it immediately to the nearest ODFW-licensed wildlife rehabilitation facility or contact your local ODFW office for other instructions (ODFW 2015:57).

Trail Construction and Maintenance

To prevent and minimize the potential harmful effects of trail construction and maintenance on turtles, the following actions are recommended:

- Trails fragment habitat, affecting turtle movement patterns and subjecting turtles to increased disturbance and higher risk of illegal collection and mortality (ODFW 2015:41). When considering construction of new trails, location is crucial. Keep new trails out of key turtle areas.
    - New trails ideally would be sited at least 1,650 feet (500 meters) away from key turtle areas to prevent and minimize disturbance to turtles. If this is not possible, site trails the farthest distance from key turtle areas as the project design allows. Use existing corridors or rights-of way for trail placement whenever possible (ODFW 2015:54).
- Minimize the extent (length and width) of new trails. A smaller project footprint generally has less impact (ODFW 2015:54).

- In wetland areas, elevated boardwalk trail designs generally have fewer impacts on turtles than other designs. Design and site trails so that hydrology is not altered and turtle movement within and between suitable habitats (aquatic and upland) is not impeded (ODFW 2015:54).
- For construction and maintenance activities, follow Construction and Operational best management practices to avoid adversely impacting or harming native turtles.
- For existing trails, provide and maintain buffers around key turtle areas of at least 500 feet (150 meters) between habitats and trails to minimize disturbance (ODFW 2015:55).
- Use fencing and/or vegetative plantings to keep people on designated trails (ODFW 2015:55).

Angling

To prevent and minimize the potential harmful effects of angling on turtles, the following actions are recommended:

- Turtles are attracted to fish bait, especially live worms, and are sometimes found with fishhooks embedded in their mouths or even swallowed entirely. If possible, angling would be prohibited in key turtle areas to reduce risk to turtles. Alternatively, post signs for anglers with instructions on what to do if they hook a turtle or instructing them to immediately transport the turtle to the closest ODFW-licensed wildlife rehabilitation facility that can accept turtles (ODFW 2015:65).

Appendix C: Monitoring

Monitoring is the orderly collection, analysis, and interpretation of resource data to evaluate progress toward meeting management objectives. Monitoring provides information to determine whether the BLM is following management direction (i.e., implementation monitoring) and to verify if the actions are achieving desired results (i.e., effectiveness monitoring). This appendix lists the existing monitoring that currently occurs in the project area; briefly summarizes monitoring that would be required with implementation of an action alternative; and describes additional potential monitoring that may be selected along with mitigation measures in the Record of Decision.

Existing Monitoring

The following monitoring currently occurs in the project area:

- The BLM inspects and monitors Hult Pond Dam as described in the dam's emergency action plan (USDI 2017). Appendix F (*Hult Pond Dam Operations*) outlines the annual and monthly inspections that occur at the dam. In addition, water levels and weather at the dam are constantly monitored. Under Alternatives 2 (Remove the Existing Dam and Build a New Dam) and 3 (Remove Hult Reservoir; Add Little Log Pond), similar monitoring would occur as described by those dam's emergency action plans.
- The 2016 RMP requires the BLM to do effectiveness monitoring for both the northern spotted owl and marbled murrelet (USDI 2016a:116). This would continue under all alternatives.
- The BLM does stream monitoring annually. This would continue under all alternatives.
    - Summer stream temperatures are taken at multiple sites within the Lake Creek system. This monitoring is conducted to Oregon DEQ standards.
    - Dissolved oxygen samples are taken from mid- to late-summer. Samples are taken in Lake Creek above and below the reservoir and within the reservoir itself.
- The BLM monitors annual reservoir storage and reports it to the Oregon Water Resources Department to comply with BLM's water rights.

Required Monitoring under Implementation

The following monitoring would be required as part of implementation of an action alternative:

- Monitoring of restoration in the Hult Reservoir Restoration Area is addressed with the following project design feature, adopted under Alternatives 3 (*Remove Hult Reservoir; Add Little Log Pond*) and 4 (*Remove Hult Reservoir*):
    - Use an adaptive management process (i.e., an annual invasive plant treatment and restoration plan[16] that encompasses the project area) to maintain a functioning ecosystem in the Hult Reservoir Restoration Area, with ongoing planting and non-native invasive plant control, depending on how the terrain evolves and what will grow well in the area.
- Monitoring to protect archaeological resources is addressed by the following project design feature, adopted under all action alternatives:
    - As required, monitor certain actions during their implementation in the vicinity of some known cultural resources when archaeological resources are not identified but their presence is

[16] Under Alternatives 3 and 4, invasive plant treatments in the project area will be included in this annual invasive plant treatment and restoration plan. This plan would conform with the Northwest Oregon District *Invasive Plant Management and Habitat Restoration EA*'s Treatment Key, treatment prioritization, and implementation and effectiveness monitoring (USDI 2023a). The Hult annual invasive plant treatment and restoration plan will also address specific invasive plant prevention activities (such as native plant restoration). This process of planning and prioritization, treatments and restoration, and monitoring will help determine if management actions are meeting outcomes and, if not, facilitate management changes that will best ensure desired outcomes are met or reevaluated.

possible. See Appendix D (*Cultural Resources Monitoring and Inadvertent Discovery Plan*) for details.

- As described in Issue 12 (Invasive Plants), BLM Manual 9015 (Integrated Weed Management) requires that any project with a risk assessment rating of moderate or high is required to be monitored for 3 or 5 years. The District will treat noxious weeds found and take additional preventative measures (such as seeding disturbed sites). This monitoring includes protocols such as surveying highest risk areas (e.g., roads, restoration area, construction areas) annually and documenting new or expanded weed infestation sites.
- The BLM expects that consultation with U.S. Fish and Wildlife Service and National Marine Fisheries Services on federally listed species will result in implementation monitoring. Under Alternative 4 (Remove Hult Reservoir, the Preferred Alternative), consultation would be covered by the programmatic ARBO II, which addresses aquatic restoration. ARBO II would require the following monitoring (USDI et al. 2013, NMFS 2013):
    - Stream turbidity above and below the project site would be monitored continuously through construction.
    - Protocol wildlife surveys (e.g., marbled murrelet, northern spotted owl), when required by consultation, would be done for activities during the breeding season within the disruption distance of suitable habitat. If surveys determine occupancy, actions would be delayed until after the critical breeding season, as required by ARBO II.
    - Marbled murrelet nest structure would be protected in the adjacent stands.
    - To minimize the risk of attracting predators to the site, all garbage (especially food products) would be contained or removed daily from the vicinity of any activity.
- As described in Appendix A, Issue A-19 (Contaminated Soil), if contaminated sediment is discovered during implementation of the alternatives, clean up would be required. This would include monitoring of soil, groundwater, and water quality.

Potential Monitoring

The following additional potential monitoring may be selected along with mitigation measures in the Record of Decision:

To monitor impacts to western pond turtles under Alternatives 3 (*Remove Hult Reservoir; Add Little Log Pond*) and 4 (*Remove Hult Reservoir*):

- Annually, before and after dam removal, track the status and trends of western pond turtle populations within the project area. Monitoring would include data collection on turtle size and health to inform management actions.
    - To monitor relative abundance, health, and size class, utilize hand catch-and-release surveys and/or mark-recapture surveys.
    - Surveys can be contracted, in-house, or a combination of both.
- Annually, before and after dam removal, track the status and trends in the amount and distribution of western pond turtle habitat use within the Hult Reservoir Restoration Area.
    - Utilize telemetry surveys to locate turtle habitat.
    - Utilize GPS monitoring to locate nest sites. Monitor the nests by field visits and trail cameras.
    - Conduct hatchling visual observation surveys.
    - Surveys can be contracted, in-house, or a combination of both.
- To monitor genetic diversity of western pond turtles at the Hult Reservoir Restoration Area, collect sampling such as shell filings, nail clippings, or blood draws to provide genetic markers for a locality that can be used in a wider context with regional partners to determine isolation, dispersal, and law enforcement functions such as poaching prosecution and return of seized turtles. Samplings would be collected during annual surveys.

    - Genetic diversity sample collection can be contracted or a combination of in-house and contracted.
- Monitor for adequate turtle habitat after dam removal and evaluate habitat annually. Evaluations would include a site ranking with habitat variables (e.g., water availability, water bottom substrate, aquatic vegetation, terrestrial vegetation, basking areas, nesting areas, hatchling and juvenile habitat, site area, riparian zone, and connectivity). Evaluations will guide restoration decisions for western pond turtle habitat management. Monitor short-term effects that would occur in the first 3 years (e.g., during project implementation) and long-term effects that would occur after 3 years.
    - Habitat monitoring surveys can be contracted or in-house.

To monitor impacts to surface and ground water monthly under Alternatives 3 (Remove Hult Reservoir; Add Little Log Pond) and 4 (Remove Hult Reservoir) if proposed wetlands and Hult Marsh mitigation is adopted:

- Utilize a staff plate (depth ruler) to look at Hult Marsh elevation and annual fluctuation which can be monitored with a game cam. Alternatively, install a well with an automated water level meter.
- Install cross-sectional profile surveys at Broad and Runout Creeks culverts so that sediment mobilization and headcutting can be monitored.
- To track and monitor wetland acres near Hult Marsh: In addition to performing a visual assessment, install shallow piezometers approximately 10 feet deep and track with automated water level meters. Piezometers could be installed in Hult Reservoir or Little Log Pond or adjacent to them in a riparian area.
- Monitor water inflow at Hult Marsh using a variety of means, ranging from manual channel discharge monitoring to adjustment of a headgate valve flowing through a flume.

To monitor native fish species distribution and habitat use under the action alternatives, perform snorkel, eDNA, and spawning surveys annually.

Survey Bureau sensitive aquatic plants annually if Hult Marsh mitigation measures are selected. This would include counting individual plants or estimating percent cover and comparing that data to previous visits to determine population trends in the project area.

Appendix D: Cultural Resources Monitoring and Inadvertent Discovery Plan

Implementation Monitoring

When archaeological resources are not identified, but their presence is possible, monitoring certain actions during their implementation would be required in the vicinity of some known cultural resources. Specifically, monitoring will be required where ground-disturbing activities are to take place adjacent to specific contributing features within south mill and dam/reservoir areas of the Hult Lumber Company Mill and Dam site. This includes the veneer plant (features 6 through 8; see Table 3-14 in Chapter 3) and log pond (feature 20) of the south mill area and the debris barrier (feature 24), spillway weir (feature 29), concrete platform (feature 30), concrete wall (feature 31), Hult log storage reservoir (feature 32), and the spillway (feature 34) of the dam/reservoir area. Monitoring will also consider additional historic mill and dam features found during the 2023 archaeological survey.

Not all ground-disturbing actions in the vicinity of the contributing features within the dam/reservoir area will require monitoring. Specifically, ground disturbance that is limited to the sedimentation layers within the Hult log storage reservoir footprint does not need to be monitored, as any cultural material-bearing strata, if they are present at all, would be buried very deep. However, any deep digging that is expected to penetrate beyond the reservoir's sedimentation layers should be monitored. Monitoring ground disturbing project activities directly related to the dam (feature 26) and dike (feature 27) (i.e., their removal) will not be necessary due to the highly disturbed and mixed nature of the earthen materials from which they are constructed.

The project implementation manager must coordinate with District cultural resource staff to ensure appropriate project monitoring takes place. If monitoring results in the discovery of previously undiscovered cultural resources, all work must cease in the vicinity of the find, and the process outlined in the Cultural Resources Inadvertent Discovery Plan (see below) will be followed.

Inadvertent Discovery Plan

I. In the event that cultural materials are discovered, all activities in the immediate area will stop and the following steps will be taken:

- A. All artifacts and materials will be left in place and protected from further damage. The area will be secured, and the District Archaeologist, Field Office Manager, and Contracting Office Representative (if applicable) will be notified immediately; and
- B. A 30-meter minimum buffer will be placed around the discovery, with work to proceed outside of this buffered area unless additional cultural materials are encountered.

II. Work will not resume in that area until the District Archaeologist or designated cultural resource specialist has:

- A. Contacted SHPO and the appropriate Tribes;
- B. Analyzed the recovered materials and the area of disturbance;
- C. Provided documentation to SHPO and the appropriate Tribes for review, including the completion of an archaeological resource record for the new discovery;
- D. Notified the Field Office Manager or District Manager that the applicable requirements of 36 CFR 800.13 (Section 106) and the *Native American Graves Protection and Repatriation Act* (NAGPRA)

have been completed.

III. If avoidance is not possible, SHPO and the appropriate Tribes will be notified and required consultation and evaluation completed:
   A. Discoveries will be reported in individual evaluation/mitigation documents; and
   B. Activity can proceed only after required consultation with SHPO and the appropriate Tribes is completed, including the completion of agreed-upon mitigation measures, and obtaining authorization from the Field Office Manager.

IV. Work may continue in the vicinity of the area if the District Archaeologist and the Field Office Manager determine the activity will not compromise security nor impact the discovery until applicable requirements are met.

V. After an inadvertent discovery, some areas may be specified as "no work zones":
   A. Any such areas will be identified by the District Archaeologist to the Field Office Manager, Contracting Officer Representative, and appropriate contractor personnel.
   B. In coordination with the District Archaeologist, the appropriate program staff will verify these identified areas and ensure they are clearly demarcated in the field as needed.

Discovery of Human Remains or Cultural Items Subject to NAGPRA

I. During undertaking activities, if human remains or remains thought to be human or cultural items are identified, the Field Office will ensure that employees, contractors, permittees, and partners comply with the following plan: [17]
   A. Cease all activity within 30 meters of the discovery and secure the area.
   B. Leave all artifacts and materials in place and protect the discovery from further damage, theft, or removal.
   C. Immediately notify the Field Office Manager and District Archaeologist about the discovery of human remains. The Field Office will then notify the appropriate law enforcement authorities and/or the County coroner.
   D. If law enforcement officials determine the human remains are not of recent age or criminal concern, the District Archaeologist will consult with affiliated Indian Tribes and other consulting parties to fulfill the requirements of NAGPRA (43 CFR 10).
   E. Unless there is a security risk and/or the age of the remains are in question, the human remains will not be removed from their location until their disposition is determined in consultation with the affiliated Tribes in accordance with NAGPRA.
   F. Native American human remains or cultural items found on Federal land will be handled according to Section 3 of NAGPRA and its implementing regulations (43 CFR 10). The Field Office recognizes that any human remains or cultural items encountered during undertaking operations will be treated with dignity and respect.
   G. Photographs of the human remains will not be taken by non-authorized personnel out of respect for Tribal concerns and because of law enforcement forensic concerns.
   H. A record will be completed for the discovered archaeological resource and submitted to SHPO.

II. Resumption of Work
   A. The Field Office Manager will decide to resume work on the advice of the appropriate law enforcement officers and District Archaeologist.
      - Work in the immediate vicinity of the human remains may not resume until after the disposition of the human remains is determined and a written binding agreement is executed between the necessary parties in accordance with 43 CFR 10.4(c).

[17] For the purposes of this plan, human remains and cultural items are defined as set forth in NAGPRA, Section 2(3) and 43 CFR 10.2.

Appendix E: Hult Pond Dam Events, Repairs, Upgrades, Engineering Issues, and Reports

The following timeline describes repairs, modifications, and additions to Hult Pond Dam, along with information about the dam's condition and engineering issues. The information was compiled from BLM records, various reports, inspections, newspaper articles, and other historical sources.

There is little documentation of the dam's condition or of maintenance and repairs done to it before 1989, when inspections by the Oregon Water Resources Department revealed signs of deterioration. The inspection's findings prompted the dam's then-owner, Bohemia Lumber Company, to find an agency to assume responsibility for the structure and reservoir. In 1994, the dam was transferred to the BLM, following some repairs made by Bohemia Lumber (and by Willamette Industries after that company acquired Bohemia's assets). All repairs and modifications after 1994 were made by the BLM, except where noted.

- Mid or Late 1930s – The Hult Lumber Company builds a sawmill and log holding ponds next to and upstream from the mill site (Lower Hult Reservoir/Little Log Pond and Hult Reservoir, respectively) (Kennedy Jenks 1992a). It's unknown exactly what year this occurs in, but a 1947 aerial photo shows an active mill site and both ponds in use for log storage (Kennedy Jenks 1992a).
    - Little is known about the original construction of the dam at Hult Reservoir. It appears that a cut-off trench was dug across the valley floor at the base of the dam and the embankment constructed using material excavated from the spillway channel and an adjacent area (USACE 1994, cited in USDI 2012, USDA 2015).
- 1948 – The Hult Lumber Company applies to receive a permit to construct (the already-constructed) Hult Pond Dam to create a log holding pond upstream from its mill site (Hult Lumber Company 1948). The granted permit is dated 1949. The company is also granted water rights to "store the waters of Upper Lake Creek … for the purposes of log storage" not to exceed 481 acre-feet (Oregon 1948a) and "maintenance of a log pond" not to exceed one cubic foot per second (Oregon 1948b).
- Early 1950s – The spillway structure is modified to include a fish ladder and a concrete weir (USDI 2012).
- 1964 – Hult Lumber Company ceases operations and dismantles the sawmill facilities.
- November 1964 to February 1965 – Storms (including two to four large flood events/a 15- to 88-plus-year flood event) resulted in debris flows that filled 10–15 acres with sediment and woody material in the north portion of the reservoir.
- 1967 – Property sold to American Can Company
- 1972 – Bohemia Lumber Company purchases the property
- 1973 – Little Log Pond (Lower Hult Reservoir) removed

- 1982 – In preparation for the construction of a new timber bridge to replace the existing structure crossing the dam (known as the Mill Pond Creek Bridge), the BLM and Federal Highway Administration prepare a geotechnical report on the site's foundation material. Soil and boring samples indicate a layer of softer, sandy soil sitting between an upper and lower layer of harder, more dense material (USDI 1982).
- Early 1980s – A new timber bridge is constructed.
- December 1989 – During a study to modify the fish ladder at the dam, the Oregon Water Resources Department (OWRD) finds erosion and seepage through the dam (OWRD 1989, cited in USDI 2012). Additional comments from an Oregon Water Resources Department dam safety engineer suggest the dam had not been regularly maintained, as indicated by growth of trees and brush on the downstream embankment and an accumulation of debris on the trash rack. The dam's deteriorated condition prompts

Bohemia to consider demolishing the dam for liability reasons unless they could find an agency to assume responsibility for its repair and maintenance (Stahlberg 1989). (As noted later in this appendix, the fish ladder was eventually rebuilt in 1996–1997.)

- April 1990 – A Bureau of Reclamation inspection finds that the dam is in "in poor condition, but in no immediate danger of failing" (USBR 1990, cited in USDI 2012).
- August 1990 – Bohemia Lumber announces plans to drain the reservoir in order to repair the headgate (Eugene Register-Guard 1990a).
- September 1990 – The Bureau of Land Management and Bohemia Lumber Company reach a tentative agreement for the dam to be transferred to the BLM, contingent on the lumber company making repairs to the headgate (the lower outlet) and dam.
- October 1990 – Bohemia Lumber Company drains the reservoir to make repairs. Later that month, the Oregon Department of Fish and Wildlife requests that the lumber company close the headgate and fines Bohemia for killing 3,500 fish. During the drainage, the faulty headgate is repaired (Bishop 1990).
- 1992 – Kennedy/Jenks Consultants complete the *Phase II Investigation: Former Sawmill Facility and Veneer Plant Horton, Oregon*. This report investigates soil and sediment conditions for hazmat identified in a Phase I assessment the same year (Kennedy Jenks 1992b).
- 1992–1994 – Repairs are made by the dam's then-owner, Willamette Industries. The 1994 U.S. Army Corps of Engineers Dam Safety Inspection Report for the dam notes the repair of an outlet gate and the trash rack, along with removal of brush and trees from the downstream embankment.
- 1994 – BLM assumes management of the dam and reservoir as well as neighboring lands (approximately 4 square miles).
- 1994 – U.S. Army Corps of Engineers (USACE) prepares a Dam Safety Inspection Report for the BLM. The report recommends that the BLM sample and test dam materials (done in 1999); replace the bridge to remove a spillway constriction (completed in the 2000s); and conduct monthly safety inspection and monitoring (USACE 1994, cited in USDI 2012).
- 1994 – The Interagency Committee on Dam Safety updates its Federal dam safety guidelines to ensure consistency across Federal agencies and other dam owners. This includes the creation of the Hazard Potential Classification System for Dams (FEMA 2005) (see Table 1-1, *Embankment Dam Hazard Potential Classification*, in Chapter 1).
- 1995 – U.S. Army Corps of Engineers prepares a seismic stability report on the dam.
- Late 1990s – BLM adopts the Interagency Committee on Dam Safety guidelines.
- 1996–1997 – The existing fish ladder is built, and a higher sill constructed at the spillway (USDI 2012).
- 1999 – AGRA and Otak complete their *Hult Dam Safety Evaluation*. The report recommends compaction grouting to mitigate liquefaction due to seismic activity (done in 2003) and slip-lining the low-level outlet pipe (done in 2003) (AGRA and Otak 1999). This report is the first time the dam is referenced as being classified as high hazard.

- January 2001 – The Federal Highway Administration completes *Geotechnical Report No. 1-01*. This report analyzes soil borings and was done before the current bridge over the spillway was constructed (USDOT 2001).
- 2000s – Sometime in the early 2000s, the Federal Highway Administration performs modification work at the bridge that included driving piles at each abutment.
- 2002 – The existing concrete bridge over the spillway is constructed. Water rights (from 1948) are modified from "log pond" to a beneficial use of "multiple purposes, including, but not limited to pond maintenance for aquatic life and recreation" (Oregon 2002a, b)
- 2003 – Five low-level outlet pipe cutoff collars and slip-lining are installed. Compaction grouting for seismic stabilization is injected into the dam east of the primary outlet conduit. Riprap is placed on the downstream slope for stabilization and erosion prevention.
- 2007 – A drain system and rock are applied to the lower bench on the downstream face.
- 2008 (?) – An emergency action plan (EAP) is developed for the dam and reservoir.
- 2008 – Erosion in the spillway foundation is noted during a BLM dam safety inspection.

- 2008 – Concrete weirs are installed in the groins of the downstream slope of the main embankment. Additional riprap is placed on the downstream slope.

- January 2012 – Due to flooding because of a rain-on-snow event, the reservoir elevation rises to 814 feet, [18] thus triggering the initiation of the EAP. BLM and Lane County emergency services are activated because of the potential for dam failure due to overtopping of the dam and spillway dike.
- 2012 – The Bureau of Reclamation completes *Hult Dam Comprehensive Dam Evaluation* (For Official Use Only), which characterizes the dam as having an "unacceptably high" risk of failure due to issues caused by seepage through the foundation of the dam and spillway dike following an earthquake, as well as the potential for overtopping of the dam and spillway dike during a flood event (USDI 2012).
- 2013 – Geotechnical investigations begin for a 2016 study of the dam.
- 2013 – A security enclosure is installed around the control system of the headgate.
- 2014 – Geotechnical boreholes are done to classify materials in the dam (for 2016 study) and vibrating wire piezometers are installed in the embankment dam and spillway dike.
- 2016 – The U.S. Forest Service completes the *Hult Log Storage Pond Dam Liquefaction Study and Recommendations* for the BLM. The purpose of this report is to analyze the risk reported in the 2012 Bureau of Reclamation dam evaluation. The report finds that the dam is not stable enough to withstand a 500-year seismic event and recommends options to reinforce or modify the dam (USDA 2015).
- 2016 – In response to seismic stability concerns, soil nailing is completed on the dam's downstream face to improve earthquake resilience.
- 2016 – The Grimes Road realignment is completed. This project involved a vertical realignment of the road that is the primary emergency access route for the dam.
- 2017 – A security door is installed on the control tower catwalk.
- 2017 – BLM develops a new emergency action plan (For Official Use Only) to identify incidents that would lead to potential emergency conditions. The plan specifies preplanned actions to be followed to minimize property damage, potential loss of infrastructure and water resources, and potential loss of life in the event of dam failure (USDI 2017).
- 2017 – A telemetry system is installed: Monitoring instruments are automated, and an emergency warning system is installed.
- 2017 – The spillway access road gate is repaired after being damaged by a dump truck.
- 2018 – The U.S. Army Corps of Engineers completes the *Hult Pond Dam Periodic Inspection and Periodic Assessment* (For Official Use Only), which finds several potential failure modes (USACE 2018a). The primary potential failure mode was overtopping and breach during a flood event (USACE 2019:1-3). A secondary potential failure mode was instability of the spillway dike near the spillway. This area is only marginally stable and is built on a foundation of ancient landslide material. Prolonged rainfall and elevated flows may also cause an increase in seepage and saturation, leading to the failure of the dam and spillway dike (USACE 2019:1-4).
- 2018 – Minor repairs are made to the soil nailing covering after vandalism.
- 2019 – At the request of the BLM, the U.S. Army Corps of Engineers completes *Hult Pond and Dam Alternatives Report* (USACE 2019), which outlines options to repair dam to reduce the risk of failure modes described in its 2018 *Hult Pond Dam Periodic Inspection and Periodic Assessment* (USACE 2018a).

- Fall 2020 – A new drain is installed in the right groin after a falling tree damages the toe drain. Seepage weirs in the right groin are removed as part of this project.
- September 2021 – The upstream face of the embankment is repaired and regraded where rotting of woody material in the dam had caused loss of mass and slope instability. Also, wave action in the reservoir was eroding a "step" in the upstream face, and repairs were made to prevent this from reoccurring.
- December 2021 through January 2022 – Strong winter storms in the region necessitated constant in-person and remote monitoring to ensure the dam did not overtop.

[18] As detailed in Chapter 2's description of the No Action Alternative, the elevation of the spillway is 811 feet, the spillway dike is 814.5 feet, and the embankment dam is 820 feet.

Appendix F: Hult Pond Dam Operations

This appendix outlines annual and monthly operations and inspections that occur at the dam.

Standard Operation Procedures

A. Winter Operations

a. Roles and Responsibilities:

- Siuslaw Field Office Manager is the primary decision-maker regarding operation of the gate valve.
  - Field Manager (FM) is responsible to notify the on-call operator no later than 3:00 p.m. on Thursday (or Wednesday in the event of a Thursday holiday) and identify if they will be in "On-Call" status and prepared to respond to a call or will be off duty for the weekend.
- Northwest Oregon District Engineer will provide recommendations to the FM, and in the event that the FM is unavailable, shall assume the role of decision-maker.
- Siuslaw Field Office Hydrology Group will forecast incoming storms and provide operation recommendations to the decision-makers.
- Siuslaw Field Office Fisheries will provide recommendations to decision-makers and conduct fish salvage prior to full closure of the outlet gate valve.
- On-call Operator will:
  - Be familiar with the emergency action plan and report any perceived problems to the Field Manager and District Engineering Group.
  - Record reservoir surface elevation in the logbook.
  - Record any changes made to the gate valve in the logbook.
  - Only make changes to the gate valve as recommended by the decision-maker.
  - Report reservoir surface elevation and changes to gate valve to hydrology, fisheries, engineering, and the field manager.
- A Google Calendar has been created to reserve the weekend work. Access the calendar "Hult Dam Winter Operations" and sign up for the weekend work.
- A contact information sheet has been created and will need to be revised as employees leave or come onboard.

b. On-call Overtime Policy:

- [Redacted]

c. Location of Equipment and Logbook:

- [Redacted]

d. Keys:

- [Redacted]

e. Employee Tracking and Safety:

- When possible, operators will use the buddy system. Don't go out alone.
- Due to these operations occurring during the weekend when dispatch may not be available, the operator will track through the FM as to when they leave the office and when they return.
- Use caution when lifting the control wheel; it is heavy.
- Never operate wheel when without shaft collar securely in place. Wheel can fall and injure the operator if shaft collar is not in place.

f. **EAP Summary**:
- EAP is the document that outlines BLM's required action to an emergency situation with the dam.
- There are four response levels (from most serious to least: A, B, C, and D):
  - Condition Level D (Get ready): Reservoir level is greater than 813' and a large amount of runoff is expected.
  - Condition Level C: Reservoir level is greater than 813' and/or shows evidence of a slowly developing dam failure.
  - Condition Level B (Serious): Reservoir level is greater than 814' and/or shows evidence of a rapidly developing dam failure.
  - Condition Level A (Extremely Serious): Reservoir level is greater than 815', dam has less than 1 foot of freeboard, and/or the dam is partially to totally failing and failure cannot be prevented.
- Contact Field Manager and District Engineer if any of these situations are observed.
  - There are multiple routes to the dam. In the event of high water or an emergency, do not access the dam from Horton, as this puts the operator downstream of the dam. Emergency access should be from Grimes Road or through Monroe on BLM Road 15-7-36.
  - In the event of an emergency, parking on the dam surface or within the emergency spillway (low point immediately west of the spillway bridge) should be avoided. Vehicles should be parked either east of the dam on BLM Road No. 15-7-26 or to the far west of the dam on BLM Road No. 15-7-35.

g. **Earthquake Response:**
- An on-call responder will be required to respond if an earthquake occurs (felt or not) within the area of the dam shown in the following table.

Table G-1. *Earthquake Magnitude – Distance Relationships Associated with Peak Horizontal Ground Acceleration of Approximately 0.05g*

Magnitude	Distance (miles)
4	6
4.5	9
5	12
5.5	18
6	27
6.5	38
7	50
7.5	69
8	100

h. **Telemetry Alarm Response**:
- Telemetry data can be accessed through Contrail (https://contrail.onerain.com/login/).
- Intrusion alarms will be directed to law enforcement.
- Any other alarm that has been set in the telemetry system will be evaluated by the Field Manager and supporting staff.
- Alarms from the telemetry system may trigger an immediate response from the on-call operator.

B. Inspections

a. **Annual Inspection** – Annual inspections will be conducted by the OR/WA BLM State Bridge and Dam Engineer. A representative from Northwest Oregon District (NWOD) engineering should attend the annual inspection as well. The OR/WA BLM State Bridge and Dam Engineer will prepare a report from this inspection and file the report in the appropriate locations. The annual inspection also counts as a monthly visual inspection and seepage monitoring.

b. **Monthly Visual Inspection and Seepage Monitoring** – Every month, NWOD engineering will conduct the Visual Inspection and Seepage Monitoring and prepare a report of findings *(see October 2022* *example below)*. If NWOD engineering is unavailable to conduct the inspection, Siuslaw Field Office will be responsible to complete this inspection. This report will be distributed to:

- The OR/WA BLM State Bridge and Dam Engineer
- NWOD District Engineer
- The Siuslaw Field Manager
- The Siuslaw Lead Engineer

C. Routine Maintenance. The following items require routine maintenance:

a. Vegetation. The vegetation on the upstream and downstream face of embankment, along the groins and the banks of the service spillway should be mowed two to three times in a year, with the mowings being concentrated during the growing season, typically April–November.

b. Exercising the Gate. The gate to the outlet works is required to be operated at least once annually to ensure that the gate is in operating condition should an emergency occur. This can be scheduled to occur during the annual Dam Safety Condition Assessment. Seasonal operations satisfy this requirement as well.

c. Cleaning Weirs. There is a concrete weir located on the downstream left groin of the dam. Any debris and vegetation that is blocking the flow through this weir should be removed after observations are made for boils. Cleaning should occur monthly and should be scheduled to occur on the same day as the monthly visual inspection and seepage monitoring. Cleaning the weir will cause the water to become muddy, obscuring any visible signs of boils and sediment transport within those boils.

d. Toe Drains and French Drain. The outflow of each toe drain and the French drain are marked with a fence post. During monthly visual inspection and seepage monitoring, check to make sure nothing is blocking the outflow from these pipes. Remove any blockage that is found. Also, make sure that the fence posts are still in place. If any fence posts are missing, replace them.

e. Service Spillway Weir. The service spillway weir is located adjacent to the top of the fish ladder. Remove vegetation growing in joints and cracks in the concrete weir as needed. Schedule removal of vegetation during the instream work window for Lake Creek.

f. Service Spillway Riprap. Occasionally the riprap adjacent to the downstream edge of the weir is displaced during winter flows. If the riprap is not replaced, the flows in the spillway will undermine the weir. If the annual Dam Safety Condition Assessment notes that riprap has been displaced and the weir is being undermined, replace riprap during the next available instream work window.

g. Gate Stem and Box. During monthly visual inspection and seepage monitoring, check to make sure no vandalism has occurred to the metal box that protects the gate stem. If the box has been vandalized, open the box, and check the condition of the gate stem. Any damage that impacts the ability of the gate to operate should be repaired immediately. Annually check the grease level on the gate stem and top off with additional grease. If operations open the gate and expose dry portions of the gate stem, fresh grease should be applied before the gate is closed.

h. Telemetry Desiccant Packs. During monthly visual inspection and seepage monitoring, check that no condensation is present in the telemetry enclosures. If condensation is present, replace the desiccant packs with dry packs. The wet desiccant pack should be brought back to the office to be dried. The desiccant packs can be dried for reuse by placing them in an oven or microwave. When not in use, desiccant packs should be stored in sealed plastic bags so they do not absorb moisture.

i. Telemetry Batteries. Each telemetry site uses two batteries. The batteries are 12 volt, 30-35AH, AGM batteries. Current (as of 8/23/2022) batteries are Duracell part number DURDC12-35J. Batteries should be marked with the date they are put into service. Batteries should be scheduled for replacement every 4 years. Replacement may be required sooner if minimum battery voltage reported in Contrail falls below 11.0 volts. Never unplug both batteries at the same time.

j. Telemetry Solar Panels. At least annually, clean the solar panel to remove dust and debris. Solar panels should be cleaned with a clean, soft, lint-free cloth and diluted dish soap or glass cleaner. Squeegees may also be used to clean the solar panels. Solar panel at the dam site can be reached from the control tower. Solar panel at the downstream site will require a ladder to access.

k. Telemetry Sensor Maintenance: At least annually, clean the rain gauge tip bucket at the dam site and downstream site. Both rain tip buckets will require a ladder to access. A Phillips screwdriver is needed to remove the funnel portion of the device and access the sensor. Any accumulated debris should be removed. The rain tip buckets can be cleaned with diluted dish soap and a rag or other approved cleaners (Clorox disinfectant wipes or equal). During monthly visual inspection and seepage monitoring, check that no debris has accumulated on the float sensors or downstream stage sensor. Annually, the float in the float sensors should be removed and checked that they move freely.

Monthly Visual Inspection and Seepage Monitoring (December 2022 example)

Bureau of Land Management – Safety of Dams Program
NW Oregon District, Oregon
Ongoing Visual Inspection Checklist
Hult Pond Dam

Date: 12/22/2022

Schedule: Under normal operating conditions, perform monthly. If the reservoir is above elevation 812, perform daily. If the reservoir is above elevation 813.5, maintain a 24-hour presence at the dam site, and document the continuing inspections of the dam at least daily. Additionally, perform a complete inspection immediately following a significant earthquake in the vicinity of the dam (estimated acceleration of 0.05g or greater at the dam), and at the conclusion of a major flood event (reservoir level exceeded elevation 812).

Inspector: E. Wernecke
Date: 12/22/2022
Reservoir Elev.: Old: 811.1 Feet
New: 811.2
Tele: 810.82 (uncorrected)
Time: 10:45 AM

Weather: Overcast w/ moderate winds
Temperature: 27 F

A "YES" response should be given to question(s) below where observed conditions are different than previously observed conditions. Re-reporting conditions that have previously been reported and currently are unchanged should not be done ("NO" answer is appropriate). For any question answered "YES," please promptly telephone the contact listed on the L-23 (when appropriate), and please provide additional information describing the situation as completely as possible under item 10, "Additional Information." Also, take photographs of the situation and include with this report, as appropriate.

1. Upstream Slope of Dam:

a. Any significant erosion or beaching due to wave action? ☒ No ❐ Yes
b. Any sinkholes, sloughs, or areas of unusual settlement? ☒ No ❐ Yes
c. Any rodent holes, burrows, or other evidence of significant rodent activity? ☒ No ❐ Yes
d. Any evidence of whirlpools in the reservoir? ☒ No ❐ Yes

2. Dam Crest:

a. Any new cracks, either transverse or longitudinal, or significant changes at any existing cracks? ☒ No ❐ Yes
b. Any sinkholes, depressions, or areas of unusual or excessive settlement? ☒ No ❐ Yes

3. Downstream Slope of Dam:

a. Any seepage areas or wet areas? ☒ No ❐ Yes

b. Any evidence of materials being transported by seepage flows (such as discolored water or sediment deposits trapped behind weirs or headwalls)? ☒ No ❒ Yes

c. Any sinkholes, depressions, sloughs, slides, bulging, or areas of unusual settlements or deformations? ☒ No ❒ Yes

d. Any rodent holes, burrows, or other evidence of significant rodent activity? ☒ No ❒ Yes

4. Seepage Flows (in gallons/minute, gpm) – Estimate as best as possible, where necessary:

A	Left Weir	0*		G	Lower Right Toe Drain	Trace
B	Boil Flow	2.0**		H	Lower Left Toe Drain	0
C	Upper Right Toe Drain	.25		I	Primary Outlet (record opening)	~5.1, Closed
E	Upper Left Toe Drain	0				
F	Center Drain	0				

* No water behind weir wall. No seepage noted during this inspection.

** Visual estimate, vegetation makes assessment of volume difficult. Volume appears to be equal to or less than volume noted during November Inspection.

5. Downstream Toe Area, Abutment Areas, and Areas Downstream of the Dam, Including the Outlet Works Discharge Channel:

NOTE: Extend the inspection to all areas within 100 feet of the downstream toe of the dam and to all abutment areas within 25 feet of the downstream groin areas. Also, carefully inspect the flow channel downstream of the outlet works for new or changed seepage conditions for a distance of 150 feet downstream from the outlet works outfall.

a. Any new seepage areas or wet areas? ☒ No ❒ Yes

b. Any significant changes at seepage seen into the downstream outlet works channel, either location or flow quantity, or both? ☒ No ❒ Yes

c. Any significant changes at other existing seepage areas? ☒ No ❒ Yes

d. Any evidence of materials being transported by seepage flows, new or existing (such as discolored water or sediment deposits along flow paths)? ☒ No ❒ Yes

e. Any slides, sloughs, sinkholes, depressions, bulges, or areas of unusual settlement or deformation? ☒ No ❒ Yes

6. Outlet Works Outfall:

a. Any seepage flow occurring adjacent to the outlet works pipe? ☒ No ❒ Yes

b. Any evidence of materials being transported by seepage from the outfall, or adjacent to the outfall (such as discolored water or sediment deposits)? ☒ No ❒ Yes

7. Bridge Across Channel to Service Spillway:

a. Any debris clogging or other obstructions that are restricting flows into the service spillway channel? ☒ No ❒ Yes

8. Spillway Dike (Located between Spillway Bridge and Service Spillway/Fish Ladder Structure:

a. Any new cracks, either transverse or longitudinal, or significant changes at any existing cracks? ☒ No ❒ Yes

b. Any slides, sloughs, sinkholes, depressions, bulges, or areas of unusual settlement or deformation? ☒ No ❒ Yes

c. Any rodent holes, burrows, or other evidence of significant rodent activity? ☒ No ❒ Yes

d. Any seepage areas or wet areas at the downstream toe, or downstream? ☒ No ❒ Yes

e. Any evidence of materials being transported by seepage flows (such as discolored water or sediment deposits trapped behind weirs or headwalls)? ☒ No ❒ Yes

9. Service Spillway/Fish Ladder:

a. Any evidence of structural problems (e.g., cracks, spalling, unusual settlements, etc.)? ☒ No ❐ Yes

b. Any debris clogging or other obstructions that are restricting flows? ☒ No ❐ Yes

10. Additional Information:

Provide additional information concerning any of the above questions that were answered "YES":

Piezometer Well B monitoring

Change* in stage of Well B:

- (November 21, 2022 – December 22, 2022): -0.07'
- (Jan 1, 2018 – December 22, 2022): +1.78'

* Change in stage calculated using measurement from the 01:00:00/00:00:00 time stamped telemetry data for the dates shown.

NOTE: All descriptions should include specific location information and all other seemingly relevant information. Seepage area descriptions should include estimated seepage amount and water clarity description (clear/cloudy/muddy, etc.). Crack descriptions should include orientation and dimensions. Descriptions of changes at joints should include the estimated amount of movement, and movement direction. Deteriorated or spalled concrete descriptions should include degree of deterioration and approximate dimensions of the affected area.

- There was flow over the spillway crest at the time of inspection. Water appeared to be approximately 0.5" above the spillway crest elevation+.
- Leakage flow from the outlet conduit was approximately half the volume of the measurement taken during the November inspection.
- Fish ladder trash rack has minor debris accumulation. Debris does not appear to significantly impact flow.
- Locks on the telemetry enclosures were frozen shut. Was unable to access the telemetry enclosures.
- Boil flow in the table above was noted in the left groin in a location that usually has seepage. The color of the seepage appears consistent with what has been observed in the past. The volume appears to be similar to the last inspection.
- Standing water was noted in the right groin in the vicinity of the former upper right weir. No change to color or location; size appears to be reducing.
- Vegetation was trimmed prior to the Annual Inspection in July; no additional trimming has occurred since then. The trimmed areas have had very little regrowth, but the untrimmed areas remain long and obscure being able to see the surface of the dam.
- No operations have occurred since the last inspection.
- Reservoir Elevation reported in Contrail was adjusted on 11/7/2022 to more accurately reflect the reservoir height. This should also make the values reported in Contrail applicable to the thresholds listed in the EAP. Data taken prior to the adjustment was not recalibrated.
- The gate valve remains closed with the rod flush with the ring gear. Leakage flow in the conduit was approximately 11" wide X 1/4" deep.
- Evidence of rodent activity persists on the lower toe of the dam. Activity does not appear recent and there was no perceived new activity.
- There was no seepage flow noted on the ground below drain H.
- There was water in the pipe of monitoring point E but insufficient flow out of the pipe to be measured.
- The witness post for the lower right toe drain has been removed and thrown into the outlet pool.

Recommended Maintenance:

- Trim vegetation.
- Reset the clocks in the telemetry systems. The clocks have drifted over time and are contributing to Contrail reporting data latency in the future.
- Clean well points that house the pressure transducers for telemetry systems. After talking with a OneRain rep, this may be the cause of the discrepancy between the reported reservoir elevation and the

established elevations. This will take some work, as the dam site well point is approx. 8' below the water surface. It is recommended that this maintenance be done after this season so as not to introduce additional error.

- Ensure the downstream rain gauge is level and has smooth operation. Also check for continuality in the circuit by disconnecting the gauge from the board and using a multimeter while cycling the tip bucket. This will require two people.
- Money should be budgeted to replace the batteries in the telemetry systems. Batteries were last replaced in 11/2018.


Upstream face from catwalk looking to left abutment.


Upstream face from left abutment looking to catwalk.


Reservoir looking upstream from dam crest. Also, catwalk and control tower.


Upstream side of debris boom and bridge over spillway channel.

Spillway channel looking downstream from bridge.

Dam crest looking toward left abutment from bridge.

Looking downstream from approximate mid-point of dam crest.

Downstream face from parking area near left abutment.

Downstream face from spillway dike near gate.

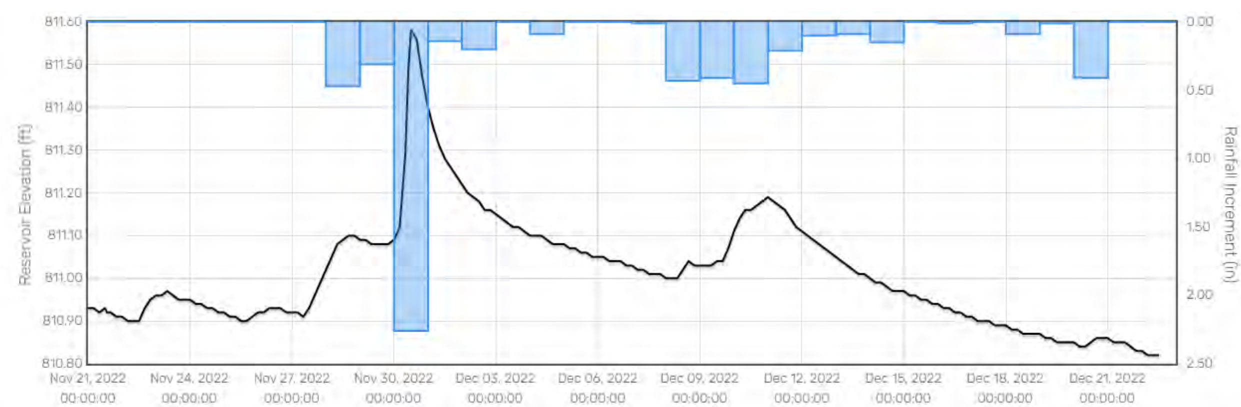
Spillway dike looking downstream from near gate.


Fish ladder trash rack and spillway crest from spillway dike.

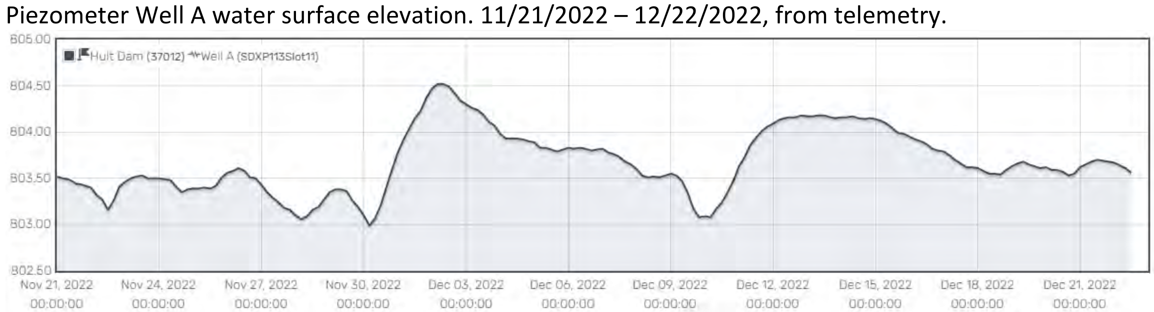

Outlet conduit with leakage.

Additional photos are available at [redacted].

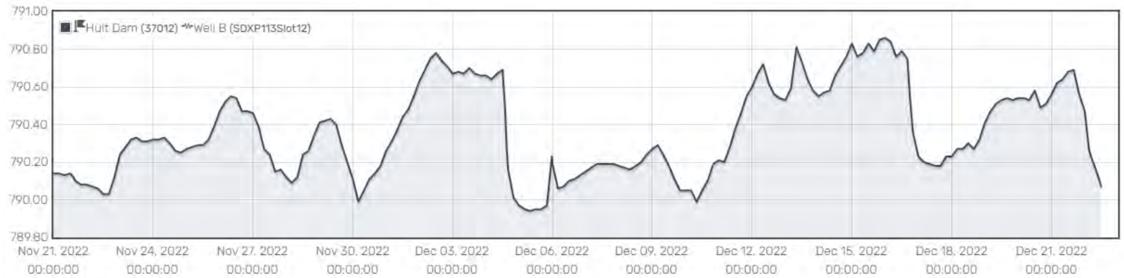
Reservoir elevation with daily rainfall overlaid date range 11/21/2022 – 12/22/2022, from telemetry. Note: Telemetry readings for reservoir elevation differ from onsite measurements by approximately 0.2’ on day of inspection.



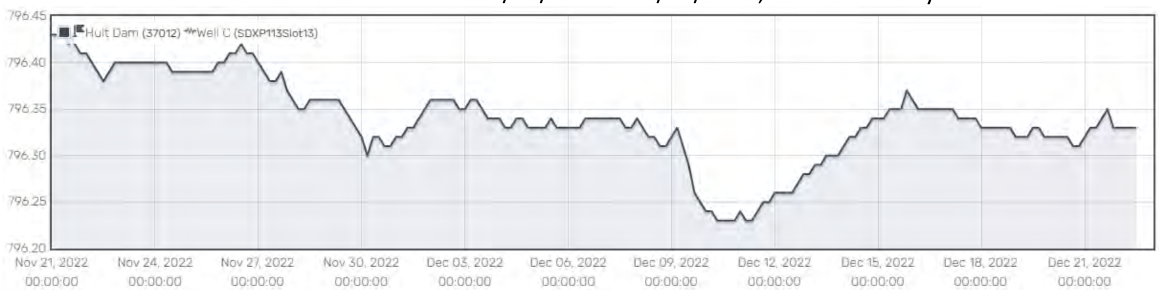
Piezometer Well A water surface elevation. 11/21/2022 – 12/22/2022, from telemetry.



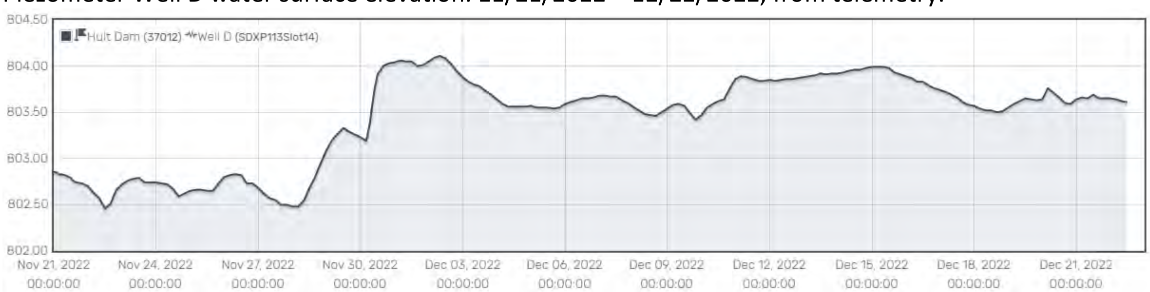
Piezometer Well B water surface elevation. 11/21/2022 – 12/22/2022, from telemetry.



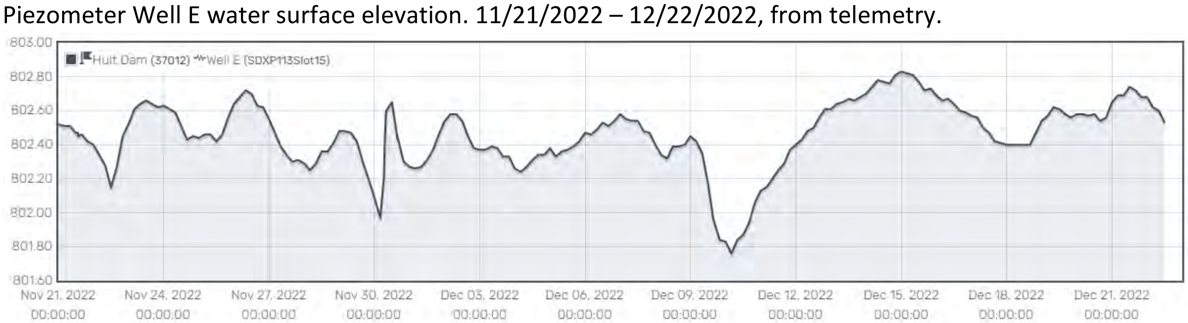
Piezometer Well C water surface elevation. 11/21/2022 – 12/22/2022, from telemetry.



Piezometer Well D water surface elevation. 11/21/2022 – 12/22/2022, from telemetry.



Piezometer Well E water surface elevation. 11/21/2022 – 12/22/2022, from telemetry.



Appendix G: Response to Public Comments on the October 2023 Draft EIS

On October 20, 2023, the BLM posted the October 2023 Hult Reservoir and Dam Safety Draft EIS on ePlanning (the BLM's national register for land use planning and NEPA documents). This began a 45-day public comment period for the draft EIS. The BLM sent emails to persons on the project mailing list who had previously indicated an interest in such analyses or the EIS in particular and persons who contributed scoping or other comments on the EIS.

The BLM received 35 letters commenting on the draft EIS during this public comment period, including one from the U.S. Environmental Protection Agency; two from environmental groups (Oregon Wild and Cascadia Wildlands), one from Blue Ribbon Coalition, a recreation organization; and the remainder from members of the public. These letters may be viewed in the Siuslaw Field Office. The BLM received the comments via mail, email, ePlanning, and in person during a public open house held in Blachly on November 17, 2023.

The BLM NEPA Handbook (USDI 2008c) states that substantive comments are those that:

- Question, with reasonable basis, the accuracy of the information in the EIS;
- Question, with reasonable basis, the adequacy of, methodology for, or assumptions used for the EIS;
- Present new information relevant to the analysis;
- Present reasonable alternatives other than those analyzed in the EIS; or
- Cause changes or revisions in one or more of the alternatives (USDI 2008c:66).

Additionally, the NEPA Handbook states nonsubstantive comments are those that:

- Comment in favor of or against the proposed action or alternatives without reasoning that meets the criteria for a substantive comment;
- Comment only to agree or disagree with BLM policy or resource decisions without justification or supporting data that meets the criteria for a substantive comment;
- Do not relate to the project area or the project; or
- Take the form of vague, open-ended questions (USDI 2008c:66).

The Council on Environmental Quality (CEQ) regulations at 40 CFR 1503.4 recognize several options for responding to substantive comments, including:

- Modifying one or more of the alternatives as requested
- Developing and evaluating suggested alternatives
- Supplementing, improving, or modifying the analysis
- Making factual corrections
- Explaining why the comments do not warrant further response from the BLM, citing cases, authorities, or reasons to support the agency's position

The BLM reviewed all of the comments submitted. Letters were not treated as votes; all letters were treated equally and not given weight by the number received, organizational affiliation, or other status of the respondents. Similar substantive comments voiced in multiple letters were grouped into one comment statement (40 C.F.R. 1503.4(b)); unique concerns generated their own comment statement. Substantive public comments are specifically responded to in this appendix, and many resulted in improvements to the analysis presented in the final EIS. Such changes are noted at the beginning of the EIS in the section *Changes Between Draft and Final EIS.*

The BLM very much appreciates the public's review and participation.

Chapter 1: Purpose and Need

Comment 1: The purpose and need for this project should be amended to include aquatic conservation to meet resource management plan and Endangered Species Act objectives. A critically important factor in making the final decision should be aligning management of this area with established policy priorities, including the Endangered Species Act and the land use plan goals for the land allocation, riparian reserve and Late Successional Reserve, and recreation area. In fact, the BLM prioritized Hult Pond Dam removal as part of its May 2015 final *Western Oregon Aquatic Restoration Strategy* (USDI 2015), which said, "Fish passage restoration and addition of habitat complexity were prioritized ahead of riparian and road treatments due to the relative speed and simplicity of implementation as well as the nearly instantaneous aquatic benefits." BLM's 2015 strategy is specifically targeted at federally listed species, so it is well-aligned with subsequently adopted land use plan objectives.

> **Response:** The BLM is not amending the purpose and need for this analysis. The BLM considered pertinent issues such as fish passage, recreation, and aquatic conservation while originally drafting this project's purpose and need. However, the BLM realized that the overriding needs for the project were public safety and cost. Expanding the purpose and need to additionally address restoration and conservation would have unnecessarily constrained the alternatives. All action alternatives conform with the resource management plan and applicable laws and policies. As described in Comment Response 9-1, when choosing a preferred alternative, the Northwest Oregon District Manager considered the beneficial and adverse environmental impacts of each alternative (including beneficial impacts to fish passage) in addition to how well each alternative responded to the project's purpose and need.
>
> In addition, the *Western Oregon Aquatic Restoration Strategy* is not a planning analysis, and priorities listed within it were not policy decisions.

Comment 2: The EIS mistakenly call the fish ladder "impassable," although it is passable. If the Pacific lamprey can't make it through the fish ladder, that can be described for that species. The BLM should not be proposing this project just because of an "impassable" fish ladder.

> **Response***:* The purpose and need of the Hult Reservoir and Dam Safety EIS is focused on dam safety. The function of the current fish ladder, while notable, is not why the BLM is proposing this project. Implementing any of the EIS action alternatives would trigger Oregon Department of Fish and Wildlife fish passage rules that would require the BLM to design and implement a fully passable structure. Based on the BLM's conversations with National Marine Fisheries Service and ODFW fish passage experts, the method they prefer to provide that passage would be a naturelike fishway or a roughened channel providing year-round passage for all fish.
>
> The BLM and ODFW consider the fish ladder at Hult Reservoir impassable to all native fish except a few adult steelhead trout that can navigate the high water velocities. During electrofishing surveys completed in 2019, ODFW detected no coho salmon upstream from the Hult Reservoir fish ladder. ODFW concluded that the ladder was ineffective at passing coho salmon. Over the last 12 years, the BLM, in partnership with the Siuslaw Watershed Council, has been conducting surveys for coho salmon and steelhead in Lake Creek upstream of Hult Pond Dam. Over that period, only a single coho salmon was detected. eDNA surveys did not result in any detection of Pacific lamprey above the dam, indicating they also are unable to pass the ladder or spillway. Other native fish are also unlikely to pass the ladder.
>
> Non-native game fish in Hult Reservoir may occasionally be swept downstream either through the ladder, spillway, or overflow culvert at higher flows. They would be stranded there, as the high velocities of water through the fish ladder would not permit upstream passage.

Background and History

Comment 3: The *Background and History* section of the EIS focuses on the history of the dam's ownership and safety record but fails to describe the concurrent policy developments that highlight the need for restoring fish habitat and passage, especially for coho.

> **Response:** As described in Comment Response 29-1, the need for this project centers around dam safety and cost, not fish habitat and passage. The *Background and History* section in Chapter 1 sets the stage for the BLM's focus on those priorities. Issue 14 (Native Fish) describes BLM policy and the Endangered Species Act and addresses the potential for impacts to native fish under the alternatives. When choosing the preferred alternative, the Northwest Oregon District Manager considered the beneficial environmental impacts to native fish. These impacts are most beneficial under Alternative 4 (Remove Hult Reservoir), the preferred alternative.

Decision to Be Made

Comment 4: Many members of the public have voted for Alternative 2 (Remove the Existing Dam and Build a New Dam). The BLM is failing to consider this public input when it selected Alternative 4 (Remove Hult Reservoir) as the preferred alternative.

> **Response**: Public involvement is a central component of the National Environmental Policy Act (NEPA), and the BLM is required to provide meaningful opportunities for public participation. Comments may be the most important contribution from citizens because they promote informed decision-making. During this public comment period, the BLM asked for the public's input on the following:
>
> - Is there new information that would have a bearing on this analysis?
> - Are there inaccuracies or discrepancies in the analysis?
> - Did the analysis miss any impacts, alternatives, or potential mitigation measures?
>
> However, as described in the Council on Environmental Quality's (CEQ)[19] *Citizen's Guide to NEPA*, commenting is not a form of "voting" on an alternative. The number of negative comments an agency receives does not prevent an action from moving forward. (CEQ 2021:21). As described in the final EIS's *Decision to Be Made* section (Chapter 1), the Northwest Oregon District Manager determines which alternative is selected. When choosing a preferred alternative, the District Manager considered the beneficial and adverse environmental impacts of each alternative (including impacts to the human environment) as well as how each alternative responded to the project's purpose and need.[20]

Conformance with Laws, Land Use Plan, and Other Decisions

Comment 5: Where work will disturb an acre or more (e.g., developing a staging area for construction equipment), this may require obtaining coverage under the State of Oregon's 1200-C Construction Stormwater General Permit, part of the Clean Water Act Section 402 National Pollution Discharge Elimination System (NPDES) permitting requirements. EPA recommends that the EIS identify any required Clean Water Act permits for the proposed project and describe any Clean Water Act permit requirements associated with discharging into an impaired water body that apply to the proposed project. Include describing any best management practices or other measures

[19] CEQ oversees NEPA implementation, principally through issuing guidance and interpreting regulations that implement NEPA's procedural requirements.
[20] "…to decommission the current Hult Pond Dam structure to reduce the potential for failure of the aging structure and associated loss of life and property, and to be fiscally responsible to the public in managing the costs associated with the dam." See Chapter 1.

taken to reduce temperature loading into impaired waters. If there are additional discharges to waters of the state that are not included in the range covered by the Construction Stormwater Permits – General Use (see Parts 1.3, 1.4, and 1.5), additional permits will need to be obtained.

> **Response**: As described in Chapter 1, the BLM will obtain all applicable permits in the implementation phase of the project. The removal of a dam and restoration of a formerly impounded reservoir would require careful planning, engineered designs, and may require permits from various regulatory agencies, including a 1200-C permit from the Oregon DEQ dictating construction project water discharges. Best management practices are employed to ensure compliance with the Clean Water Act, and the BLM would select many of these for implementation of reservoir draw-down, dam removal, bridge construction, and all instream, wetland, and riparian restoration work. Many of the best management practices likely to be selected for these projects are listed in Table A-11 of the 2016 *Northwestern and Coastal Oregon Resource Management Plan* (USDI 2016a:178-179). Before implementing the decision, the BLM will complete a tiered environmental assessment, categorical exclusion review, or Determination of NEPA Adequacy, as appropriate.

Chapter 2: The Alternatives

Comment 6: The summaries of the impacts of the alternatives that are included at the end of Chapter 2 are biased against Alternative 2 (Remove the Existing Dam and Build a New Dam) and do not provide enough detail.

> **Response**: The BLM believes that *The Comparison of the Effects of the Alternatives* table in Chapter 2 (Table 2-3) accurately reflects the impacts of the alternatives by resource. The table briefly summarizes the analysis of the issues contained in Chapter 3 (*Affected Environmental and Environmental Consequences*) in table form. Additional details about adverse and beneficial impacts can be found in that chapter. Both beneficial and adverse impacts are listed in the comparisons table and are described in detail in Chapter 3. The table indicates Alternative 2 would have the least amount of impacts to recreation, the economy, environmental justice factors, and the western pond turtle. For Alternative 4 (Remove Hult Reservoir), the table shows that there would be beneficial impacts to native fish (including coho salmon) and wetlands, as well as lower implementation cost and less risk of dam failure. It also shows Alternative 4's adverse impacts to recreation, the economy, environmental justice factors, and the western pond turtle.

Alternative 3 (Remove Hult Reservoir, Add Little Log Pond)

Comment 7: If Alternative 3 builds a new dam in a new location, why not also keep the existing dam?

> **Response**: As described in the purpose and need for this project, the existing Hult Pond Dam represents an unacceptably high risk to the downstream population and therefore needs to be removed. The NEPA process requires the BLM to look at a range of alternatives that meet the purpose and need of the project. For this EIS, the action alternatives look at what to do with the area after the existing Hult Pond Dam is removed. Alternative 3 was developed in response to public comments about the desire to retain a reservoir. Through analysis of Alternative 3, the BLM determined that the construction and maintenance of the Little Log Pond Dam and Reservoir would represent a minor savings in costs compared to Alternative 2, which would rebuild a dam in the location of the existing Hult Pond Dam.
>
> The BLM does not expect that the presence of Little Log Pond and its dam would decrease the impacts of a Hult Pond Dam failure if the current dam remained in place: In fact, it expects that if two dams were to exist in the project area, the failure of the upper one would severely damage the lower one. An additional recreation area below Hult Pond Dam may also increase the population at risk that could be impacted by dam failure.

Comment 8: The EIS is not clear about whether kayaks would be allowed in Little Log Pond under Alternative 3.

> **Response**: Kayaks would be allowed in Little Log Pond under Alternative 3 as they are non-motorized boating. Alternative 3 describes that Little Log Pond would have ramps for boaters to hand-launch non-motorized watercraft, and sandy beaches would offer additional areas for non-motorized boating.

Alternative 4 (Remove Hult Reservoir)

Comment 9: How would stream restoration, including the use of beaver dam analogs, be incorporated into the alternatives?

> **Response**: The BLM is proposing project design features and mitigation measures to improve fish habitat and wetland features for aquatic species. The full application of mitigation measures in the Hult Reservoir Restoration Area (the former Hult Reservoir footprint) under Alternative 4 (Remove Hult Reservoir) include a range of options for process-based restoration. These include placing up to 1,500 logs across the valley, including the stream, tributaries, floodplain, and off-channel water features. This proposed mitigation includes grading the valley to create a uniform cross section that would allow the stream to create multiple channels and complex habitat for aquatic species.
>
> Mitigation measures for botany, wildlife (turtles), wetlands, and fish all include beaver dam analogs to develop and maintain habitat for sensitive aquatic species. BLM restoration work will use beaver dam analogs to retain surface water in wetland habitat and to dissipate high flows on floodplain and tributary channels.

Alternatives Considered but Not Presented in Detailed Analysis

Comment 10: The BLM should not be responsible for dams as this is not within their normal authority nor their staff expertise. BLM may "inherit" dams through various historic circumstances, but that does not justify the BLM continuing to waste public funds trying to endlessly monitor and maintain them.

> **Response**: The BLM is a Federal agency that owns, builds, maintains, and decommissions dams. As a dam owner, the BLM is responsible for the operations and maintenance of those dams. The BLM is also responsible for the safety of its dams. Like all infrastructure, dams require maintenance to ensure continued safe operations. Department of Interior Departmental Manual 753 DM 1 provides the policy and responsibilities for Department of Interior Dam Safety programs. Department of Interior Departmental Manual 753 DM 2 provides requirements for a bureau dam safety and dam security program. BLM Manual 9177 specifies how the BLM will apply this departmental policy. These policies require that the BLM continue to monitor and maintain the dams it owns.
>
> The BLM employs licensed engineers at the District, State, and National levels, who form the backbone of the BLM dam safety program. When situations arise that an individual engineer does not have the experience and expertise to address, the engineer can call on the experience and expertise of others in the agency. If the agency lacks the capabilities internally, it can use other Federal agencies or private consultant engineers. Examples of this cooperative approach can be seen in the EIS, with studies authored by the U.S. Army Corps of Engineers, U.S. Bureau of Reclamation, U.S. Forest Service, AGRA-OTAK, and others.

Comment 11: The BLM should consider removing all dams from Lake Creek.

> **Response**: An alternative proposing this would be similar in design and effects to Alternative 4 (Remove Hult Reservoir); the BLM does not manage any other dams on Lake Creek and is not aware of any other reservoirs or dams on Lake Creek on lands not administered by the BLM.

Comment 12: The BLM should consider draining the reservoir and leave the dam in place to save money.

> **Response**: As described the *Seasonally Lower Water Levels* section of Chapter 2's *Alternatives Considered but Not Presented in Detailed Analysis*, because the outlet pipe would pass a maximum of approximately 250 cfs of water if the reservoir were drained, any Lake Creek flow over 250 cfs would start to fill the reservoir. Flows at 250 cfs may not happen yearly but are still common, occurring about every 1.4 years (see Issue 1 in Chapter 3). Hence, this alternative would still pose a risk of catastrophic dam failure.
>
> Alternatively, the BLM could breach the dam, allowing a higher flow in order to drain the reservoir. The impacts of that action are described in Alternative 1.2 (No Action Alternative: Drain Reservoir) and Alternative 4 (Remove Hult Reservoir). Note that the BLM would only initiate Alternative 1.2 if dam failure appeared to be imminent and it was necessary to protect human life. Alternative 1.2 is not a viable action alternative, as various laws, policies, and agreements would require some level of restoration to benefit federally listed coho salmon and other Bureau sensitive species, as well as a new bridge to allow rights-of-way holders access. Issue 3 in Chapter 3 addresses these costs.

Comment 13: The BLM should figure out who originally built the dam and have them cover costs associated with replacing the dam instead of that private company profiting from the project and leaving the public to pay.

> **Response**: As described in the *Background and History* section of Chapter 1, the existing Hult Pond Dam was built in the 1930s or 1940s by the Hult Lumber Company. Willamette Industries eventually assumed ownership of the dam before it was transferred to the BLM in 1994. Given the original design and construction of the dam, as well as the known repair and maintenance record, it's unsurprising that the dam has the potential for failure. However, the dam has already survived well beyond its expected lifespan: As described in *The Need for Action* section, the average lifespan of an embankment dam is only 50 years, and Hult Pond Dam has survived several decades beyond that, despite its condition. A well-built, well-maintained, and well-constructed dam can have a life-expectancy of up to 100 years, which means that even if the dam had those advantages, it may also be approaching the end of its lifecycle.
>
> Appendix A details that Bohemia Inc. (which owned the dam before Willamette Industries acquired its assets) had plans to demolish the dam for liability reasons until the BLM took it over.

Comment 14: Volunteers and many organizations could build a new dam for a lot less.

> **Response**: Costs shown in the EIS are preliminary estimates intended to show the relative costs between alternatives and are included for decision-making purposes only. The BLM will do further cost analysis throughout the design and implementation phases of this project.
>
> The Government will need to contract the removal of the existing dam and potential construction of a new dam and/or bridge. Under Federal contracts, contractors are required to provide licenses, bonding, and insurance to protect the Government. These protections do not exist with volunteer agreements. Further, the contracts themselves provide the Government with the means to ensure that work is accomplished to the Government's satisfaction and standards. Federal contracting laws (i.e., Davis-Bacon and Related Acts, McNamara-Ohara Service Contract Act) require that the contractors pay, at minimum, locally prevailing wages for work under construction contracts over $2,000 and service contracts over $2,500. These labor costs are passed along to the Government as part of the contract cost.

Portions of the restoration activities may be suitable for volunteer work; however, these specific activities do not drive cost for the project as a whole and would not change the general cost estimates included in the EIS.

Comment 15: The BLM should consider using a huge pond liner and concrete to stabilize the existing dam.

Response: As described in Appendix E (*Hult Pond Dam Events, Repairs, Upgrades, Engineering Issues, and Reports*), since the BLM took ownership of the dam, the agency has performed various maintenance projects to stabilize and maintain it. These have included but are not limited to: slip lining the outlet conduit, compaction grouting and soil nailing to increase resilience to seismic events, applying rip rap to the upstream and downstream dam faces, and construction of drainage features in the downstream groins and toe. Despite these efforts, unacceptably high risks of failure remain at the dam.

The BLM does not believe that additional maintenance of the existing dam would comprehensively address the risks associated with the dam. To address the entirety of the existing dam's risks and keep a reservoir in the existing location, the current dam would need to be removed and a new dam constructed in its place. This was analyzed in the EIS under Alternative 2 (Remove the Existing Dam and Build a New Dam).

Chapter 3: Affected Environment and Environmental Consequences

Issue 1: Flooding

Comment 16: Hult Reservoir was drained [in October 1990] over the course of a night. There were no homes damaged, no one was hurt, and only a few riverside decorations were harmed. This shows that the idea that the community is in danger is a fallacy.

Response: As described in the EIS in Issues 1 (flooding) and 2 (public safety), drainage of the reservoir and regular flooding in the communities downstream are not comparable to what could occur if Hult Pond Dam were to fail.

Hult Reservoir has a volume of 364 acre-feet (USACE 2019), or approximately 16 million cubic feet. The BLM would drain the reservoir through the outlet pipe, which discharges approximately 250 cfs. Assuming the reservoir was full, Lake Creek had an average fall flow of 15 cfs, and no other measures were taken to drain the reservoir (e.g., a partial dam breach),[21] the fastest that the reservoir could be drained would be more than 19 hours. As shown in Table 3-2 (Issue 1), the BLM predicts that Lake Creek flowing at 250 cfs will happen about every 1.4-years.

Issue 2 describes the potential impacts to public safety under the alternatives and states that a Hult Pond Dam *failure* would be expected to have flows of more than 3,500 cfs through the community of Horton—nearly 14 times the rate of the potential fastest drainage of the reservoir without a breach. Issue 2 goes on to describe that, based on the Bureau of Reclamation's *A Procedure for Estimating Loss of Life Caused by Dam Failure* (USDI 1991)—given the severity of the flooding, population downstream, potential

[21] The BLM took over management of Hult Reservoir in 1994 and is not aware of how quickly the reservoir was drained in 1990, nor how this was accomplished. As described in Comment Response 5-2 later in this appendix, to the BLM's knowledge, this was not accomplished by breaching the dam, as rebuilding the dam after a breach would have taken significant work and money.

warning times if a dam failure occurs, and potential vague public understanding of flood risk—there is a risk of fatalities downstream (in addition to property damage) if Hult Pond Dam were to fail.

Comment 17: Why doesn't the EIS include analysis of the water above and around the project area?

> **Response:** Issue 1 (Flooding) in Chapter 3 (*Affected Environment and Environmental Consequences*) describes that the geographic scale of that issue's analysis includes the 12.3 square mile Lake Creek catchment that is above and around Hult Reservoir, because water in the catchment contributes to any flooding below Hult Reservoir. It's unclear from this comment what additional water analysis would be necessary or relevant to the project.

Issue 4: Recreation

Comment 18: The BLM should consider making the area day-use only. This would solve a myriad of problems, including homeless camping, drunk drivers, trash, fire danger, and property damage.

> **Response**: The BLM appreciates your comments and understands your concerns. Issue 4 states: "Unwanted uses such as illegal dumping, vandalism, garbage, long-term residing, illegal or irresponsible fires, partying, and other problematic behaviors have been and continue to be a management challenge at Hult Reservoir. Local residents have expressed concerns about these activities."
>
> This issue is also described in Appendix A, Issue A-4 (Undesirable Public Behavior). The BLM typically provides an on-site volunteer host to improve management presence, assist visitors by providing information about the area, and report unwanted activities or behaviors to the BLM. However, the camp host site lacks power or other utility services such as water or electrical hookups, and the absence of these amenities greatly reduces the BLM's ability to attract and retain the kind of hosts the agency desires to have present at this location. In addition, the dispersed nature of the existing campsites makes camping more difficult for the BLM to manage.
>
> Under Alternative 1 (No Action), the BLM expects these conditions would continue. Under the action alternatives, the BLM would add a designated campground with a developed host site. The presence of a host should make it easier to manage camping use, discourage unwanted behavior, and report illegal activities to law enforcement when they occur. Many people who have commented on this project highly valued low-cost camping opportunities, so the BLM's goal is to continue providing those opportunities while minimizing behaviors that local residents and other visitors—and the BLM—find undesirable.

Comment 19: The EIS does not disclose that Alternative 4 (Remove Hult Reservoir) would remove year-round fishing in the area.

> **Response**: Fishing for non-native game fish would not be available under any of the alternatives (including Alternative 1 following dam failure). Fishing in Lake Creek for cutthroat trout would be available between May 22 and October 31, based on current fishing regulations. Issue 4 (Recreation) has been updated to reflect this.

Comment 20: The BLM should continue to explore the development of non-water-based activities to mitigate impacts in the locale and support communities in the area.

> **Response:** The action alternatives contain proposed measures to mitigate the reduction of recreational opportunities. The BLM also notes that it is not possible to entirely mitigate changes to or loss of a valued place to which people have become attached. The analysis shows that Alternative 2 (Remove the Existing Dam and Build a New Dam) has the least impact from this sense-of-place perspective, although warm-water fishing would be eliminated. The action alternatives contain proposed mitigation to augment

recreation, including improved camping, hiking, and day-use areas that are not directly water-related. Alternative 4 (Remove Hult Reservoir) also includes the potential addition of a mountain bike trail as well as public outreach to improve recreational opportunities in or near the project area.

Issue 5: Socioeconomics

Comment 21: Given that outdoor recreation is extremely important economically nationwide, the BLM needs to consider the loss in economic benefits if the dam is removed.

Response: As described in the EIS, the BLM does not have accurate estimates of visitation at Hult Reservoir or of economic benefits to the local economy associated with those visits. Nonetheless, the BLM knows those benefits exist and are important to local residents and business owners. All action alternatives would continue providing recreational opportunities in the project area. The BLM would continue managing the area as a Special Recreation Management Area under all alternatives, which emphasizes recreation and its benefits, including economic. However, the analysis cannot be specific about the economic outputs associated with each alternative because it is unknown how many and what type of visitors would be attracted to the new conditions.

Issue 7: Environmental Justice

Comment 22: Biden's Executive Order 13985 (Executive Order on Advancing Racial Equity and Support for Underserved Communities Through the Federal Government) mandates advancing equity for all, including those who have been historically underserved, marginalized, and adversely affected by persistent poverty and inequality. Public land management policies, and motorized travel management policies in particular, harm people with disabilities: The BLM needs to consider that removal of Hult Reservoir would disproportionately harm disabled and marginalized users' ability to access public lands.

Response: As described in Comment Response 34-1, all action alternatives would continue providing recreational opportunities in the project area, and the BLM would manage the area as a Special Recreation Management Area. The BLM would ensure all new facilities under the action alternatives were designed to Architectural Barrier Act standards. Alternatives 2 (Remove the Existing Dam and Build a New Dam) and 3 (Remove Hult Reservoir; Add Little Log Pond) would still provide kayaking and other water-based activities, and shoreline/water access would be improved under each alternative.

Comment 23: The EIS should include impacts to Native American populations in the environmental justice section or reference where this information may be found.

Response: As described in Issue 7 (Environmental Justice), the BLM considers Lane County (where Hult Reservoir is located) to be an environmental justice population due to its proportion of low-income residents. Based on U.S. Census data, it did not identify Native Americans as an environmental justice population in the county because the percentage of Native Americans in the Lane County population (0.8 percent) is lower than the statewide percentage (1.1 percent).

The *Consultation* section in Chapter 4 describes outreach to Tribes and issues of Tribal concern. Issue A-5 (Neighboring Lands), Issue A-6 (Culturally Significant Species), and Issue A-7 (Tribal Sacred Sites) in Appendix A describe why some types of impacts to Tribes were not analyzed in detail.

Comment 24: The BLM should expand the environmental justice analysis to include community cohesion, affordable housing, public health impacts, and public safety.

> **Response:** The BLM addressed public safety in the EIS. The BLM does not have data on community cohesion specific to low-income or other communities. However, the analysis of impacts to low-income populations did conclude that they would be adversely and disproportionately affected due to loss of Hult Reservoir as a recreation setting. The BLM emphasized the resulting impacts to sense of place described by the community. This loss of a shared resource could affect social cohesion, but it would be speculative to attempt to describe this impact in any detail. Public health and housing issues could be applicable to the construction phase when the dam is removed, but details about workforce needs and construction activities necessary to assess those effects are not yet available.

Comment 25: The BLM should apply methods from *Environmental Justice Interagency Working Group's Promising Practices for EJ Methodologies in NEPA Reviews* report (USEPA 2016).

> **Response**: The BLM is following its current policy regarding environmental justice analysis as described in Instruction Memorandum 2022-059 (USDI 2022), which incorporates information from the referenced report. Environmental Justice is addressed in Issue 7.

Comment 26: The BLM should expand the environmental justice analysis identifying environmental justice populations and provide for additional engagement. Specifically, it should use the Environmental Protection Agency (EPA) EJ Screening and Mapping Tool and analyze information for census block groups.

> **Response**: The BLM is following its current direction regarding environmental justice analysis as described in Instruction Memorandum 2022-059 (USDI 2022). The BLM used a sub-county scale (the Middle Siuslaw River-Triangle Lake Census County Division) to identify environmental justice populations in addition to county-level analysis. As described in Issue 7 (environmental justice), the local Census County Division is also an environmental justice population, more so than the county residents as a whole. The BLM does not believe that using a block group scale would identify additional populations or change the analysis of impacts.

Issue 12: Invasive Plants

Comment 27: Prescribed burning used for restoration or invasive plant management will be a big fire risk, because there will be no water to draw from the reservoir if it is drained. What if lives are lost with the fires that may get out of control? Has this been analyzed, and is it worth the risk?

> **Response**: Chapter 2 (*The Alternatives*) describes that under all action alternatives, a BLM interdisciplinary team will prepare an Annual Treatment Plan that includes restoration work and invasive plant treatments in the Hult Reservoir Restoration Area. For more information about the District's invasive plant management and habitat restoration program, as well as about integrated plant management, see the District's *Invasive Plant Management and Habitat Restoration Environmental Assessment* (USDI 2023a).
>
> Prescribed fire is typically only used to treat invasive plants when there is a large area where only weeds are growing, or for pile burning woody plant materials. There are no prescribed burns or burning for restoration work currently planned in the project area. The BLM anticipates weed treatments for patchy infestations of species such as false brome, reed canarygrass, Himalayan blackberry, and Scotch broom. These weeds will likely be treated with manual methods (such as hoeing or brush cutting) or with herbicide spot spraying by hand.
>
> As described in Appendix A, Issue A-1 (Aerial Fire Suppression), the area surrounding Hult Reservoir is primarily classified as FRCC III, which means that fire severity is expected to be low/mixed and fires are

expected every 35 to 200 years. As described in Issue A-1 and Issue A-2 (Ground-based Fire Suppression), Lake Creek will still provide water delivery for fighting fires, and draft sites for fire engines will be available in the project area.

Issue 14: Native Fish

Comment 28: How would pumping water from Hult Reservoir, Little Log Pond, or Lake Creek for firefighting affect juvenile coho salmon?

Response*:* The BLM does not expect firefighting in the project area to affect coho salmon. The time of year water in the area might be used for active fire suppression would be during the warm summer months, which are generally June to October. Adult coho salmon would not be in Lake Creek or the Hult Reservoir or Little Log Pond during that time of year. Juvenile coho salmon may be present in Lake Creek and potentially in the reservoir or Little Log Pond year-round. National Marine Fisheries Service has developed *Measures to Minimize Fire-Suppression Effects* (NMFS 2019) for fire suppression activities where it is near listed fish or Critical Habitat. The BLM assigns resource advisors to sustained fire suppression activities to ensure these measures are being followed. These best management practices include:

- Water chances should be constructed such that they do not inhibit fish passage and should minimize streambed alteration.
- Pump intakes should be screened with 3/32” plate screen (or equivalent) to avoid the intake of juvenile fish and amphibians.
- Where prolonged dipping from natural waterbodies may have large effects on fish, dip from the waterbody until portable water tanks can be filled by pumps, then dip from the tanks.

Comment 29*:* What impacts will the implementation and construction (use of heavy machinery and/or blasting) associated with each action alternative have on coho?

Response*:* As described in Issue 14 (Native Fish), use of heavy equipment during the decommissioning phase of the Hult Pond Dam project will likely create short-term disturbance to fish and habitat downstream from the dam. The BLM will observe the requirements of Clean Water Act permits for the project. These normally require dewatering of the project site and routing of clean streamflow around the disturbed area. This will maintain a turbidity-free zone downstream during project work. After work is completed and the channel is rewatered, a short-term plume of sediment would last several hours[22] until the remaining suspended fine sediment is flushed from the system.

Normal protocols for instream work also require salvage of fish in the vicinity of the disturbed ground. Prior to dewatering, the BLM will install block nets to prevent fish moving into the project area and use nets and electrofishing to remove as many fish from the area as possible further reducing the effect to juvenile coho.

Under Alternative 2 (Remove the Existing Dam and Build a New Dam), construction of the roughened channel may require controlled blasting to remove larger boulders and bedrock in the spillway area. The effects of blasting on coho salmon are summarized in the Alternative 2 section of Issue 14 in Chapter 3.

As noted in the *Consultation* section of Chapter 4, the BLM is required to complete consultation with the National Marine Fisheries Service for effects to fish listed under the Endangered Species Act and to comply with the Essential Fish Habitat under the Magnuson-Stevens Fishery Conservation Act. The resulting biological opinion may include terms and conditions and additional project design criteria that

[22] As described in Issue 14 (Native Fish), following the removal of Hemlock Dam on Trout Creek in Washington, sediment levels returned to background levels within 24 hours (Claeson and Coffin 2015).

would include setback distances and maximum charge sizes consistent with other programmatic consultation. The National Marine Fisheries Service's programmatic 2013 Aquatic Restoration Biological Opinion (ARBO II; NMFS 2013,) addresses restoration activities on BLM-administered lands in Oregon. Consultation with the National Marine Fisheries Service on the effects of the preferred alternative (Alternative 4: Remove Hult Reservoir) on coho salmon is addressed by ARBO II. Other action alternatives would require additional consultation.

Comment 30: How does the BLM intend to reduce the effect of sediment on fish downstream of the project area?

Response*:* As required under ARBO II,[23] the BLM would isolate the work area and complete fish salvage before in-water construction activities (NMFS 2013:14). Prior to dewatering, the BLM would install block nets to prevent fish moving into the project area and use nets and electrofishing to remove as many fish from the area as possible. This will further reduce the effect to native fishes. In-water work permits also require minimizing turbidity exposure for fish downstream. As with other similar projects, the BLM will monitor turbidity levels downstream and modify or stop work if standards are not being met.

ODFW seasonally restricts in-water work in the Siuslaw watershed to the period between July 1 to September 15. In some cases, ODFW will grant extensions to that window depending on flow forecasts and presence of anadromous fish. The purpose is to reduce exposure of spawning adults and buried eggs to sediment and fine silt generated from instream work. See also Comment Response 32-2.

Issue 15: Game Fish

Comment 31: How likely is it that largemouth bass would persist under Alternative 2 (Remove the Existing Dam and Build a New Dam) after the new dam is constructed and the reservoir refilled?

Response: As described in Issue 15 (Game Fish), largemouth bass spawning takes place in spring in silty and muddy conditions found at the bottom of lakes or slower streams. This optimal spawning habitat would not exist under any action alternatives, so any largemouth bass remaining would not be able to reproduce long term. Largemouth bass are generally ambush predators and require dense submerged vegetation to capture fish and crayfish. Their feeding activity is also reduced at temperatures lower than 41 degrees Fahrenheit (USDI 2023c).

Largemouth bass would be eliminated under Alternative 2 because the habitat necessary to sustain them would not be present during the 2 to 3 years while the reservoir is lowered and the dam is deconstructed and rebuilt. Once the reservoir is refilled, there would be no remaining bass to establish a new population.

The BLM would attempt to salvage as many native and non-native fish as possible from the reservoir as it is lowered and ultimately removed. Non-native game fish would be moved down to Triangle Lake. Removing the dam may allow some bass that are not able to be salvaged to enter Lake Creek. However, this would not contribute any additional non-native warm-water game fish to the system, as they are already found in Triangle Lake downstream and potentially Lake Creek just above Triangle Lake during warmer summer months.

[23] Consultation with National Marine Fisheries Service on the effects of the preferred alternative (Alternative 4: Remove Hult Reservoir) on coho salmon is addressed by ARBO II. Other action alternatives would require additional consultation where it is expected that similar measures would be adopted.

Chapter 4: Consultation and Coordination

Comment 32: The EPA encourages BLM to incorporate feedback from Tribes when making decisions regarding the project and recommends the EIS describe the issues raised during government-to-government consultations and how those issues were addressed.

> **Response**: The BLM is working closely with the Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians and the Confederated Tribes of Grand Ronde as cooperating agencies on this project, in part to incorporate their feedback when making decisions. Additional details about government-to-government consultation and the Tribes' concerns have been added to the *Consultation* section in Chapter 4.

Comment 33: Describe the consultation and coordination process with U.S. Fish and Wildlife Service, the National Marine Fisheries Service, and the Oregon Department of Fish and Wildlife.

> **Response**: As described in Chapter 4, the BLM's consultation with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service on the effects of this project on threatened species is covered by the National Marine Fisheries Service and U.S. Fish and Wildlife Service programmatic 2013 *Aquatic Restoration Biological Opinion* (ARBO II, USDI et al. 2013, NMFS 2013). Northern spotted owl, marbled murrelet, Pacific marten, and coho salmon are the threatened wildlife species within the project area that are covered by this consultation.
>
> Prior to implementation, the BLM would report site-specific information for this project to the U.S. Fish and Wildlife Service and National Marine Fisheries Service. If the western pond turtle is federally listed as threatened, the BLM would initiate consultation with the U.S. Fish and Wildlife Service by preparing a biological assessment in following with the requirements of Section 7 of the *Endangered Species Act of 1973*, as amended. The biological assessment would describe and evaluate potential effects of the proposed action on the western pond turtle and its critical habitat. See Chapter 4's *Consultation* section for more details.
>
> The Oregon Department of Fish and Wildlife is a cooperating agency on this project and has provided input and review on this analysis. The BLM is not required to consult or coordinate with ODFW on project activities, but ODFW will be notified of the BLM's actions through the permit issued the BLM by the Oregon Department of State Lands.

Appendices

Appendix A: Issues Considered but Not Presented in Detailed Analysis

Comment 34: The EIS is not clear about whether log trucks would be allowed on the new roads built under the action alternatives.

> **Response**: The BLM is not proposing to build new roads as part of this EIS, although the bridge on Mill Pond Road would be rebuilt under all action alternatives. Issue A-3 (Rights-of-Way) in Appendix A describes that the BLM does not expect logging permit rights-of-way to change under any alternative.

Comment 35: How would each alternative affect the levels of nesting habitat for the marbled murrelet and northern spotted owl? How would each alternative affect northern spotted owl foraging habitat?

> **Response:** Table A-5 in Appendix A, Issue A-12 (Special Status Wildlife) shows that a variety of habitat types are important to species of concern, and that our rarest species use more than one habitat type. As described in Issue A-12, the most important habitats to maintain and restore are those that are used by many species of concern, including mature and old growth (complex late successional vegetation), grass/forb and shrub (complex early successional vegetation), and riparian areas with complex late or early successional vegetation. Alternative 2 (Remove the Existing Dam and Build a New Dam) is not likely to change the current habitat conditions while Alternatives 3 and 4 would increase early successional habitat but could eventually become complex late successional habitat.
>
> Removing the reservoir could increase habitat for marbled murrelet over time by replacing the reservoir with early successional habitat, which could eventually become suitable complex late successional nesting habitat in Alternatives 1.1, 1.2, 3, and 4. Under Alternative 3 (Remove Hult Reservoir; Add Little Log Pond), buffer habitat around a low-quality potential nesting structure tree would be removed where the 5-acre pond would be built. This suitable habitat did not contain murrelets when surveyed in 2002, 2005–2006, or 2020–2021. Under Alternative 2, existing conditions would remain.
>
> Under Alternatives 1.1, 1.2, 3, and 4, removing the reservoir would increase habitat for the northern spotted owl over time by replacing the reservoir with early successional foraging habitat. Early successional ecosystems provide northern spotted owls foraging opportunity due to the increase in variety and density of vegetation. Under Alternative 2, the existing conditions would remain.
>
> The BLM has completed surveys for potential marbled murrelet and northern spotted owl nest trees and found no active nests within the project area. Alternative 4 (Remove Hult Reservoir) would not affect habitat for marbled murrelets, northern spotted owls, or Pacific martens, and is not likely to disrupt nesting individuals.

Comment 36: How would the alternatives reduce the negative impacts from edge effects?

> **Response:** Impacts of edge effects were considered in the EIS's wildlife analysis, but the issue was not analyzed in detail because it does not address the project's purpose and need and is not associated with significant impacts beyond those analyzed in the Final EIS for the 2016 RMP, to which this EIS tiers.
>
> Edge effects occur when there are sharp boundaries between one type of forested stand adjacent to a different type, such as an early successional stand adjacent to mature or structurally complex forest. Edge effects have both positive and negative impacts on plants and animals. While the boundary between area types may be observable and measurable, effects depend on which organism is being considered; what conditions are measured (e.g., microclimate variable); or what type of effect is looked at (e.g., disturbances, increased plant productivity) (Franklin et al. 2018:121). For marbled murrelets, edge effects include nest predation and changes in microclimate (climate differences within a very small area) at the nest site.
>
> The BLM's evaluation of buffer habitat for marbled murrelets in Appendix A, Issue A-12 (Special Status Wildlife) addresses negative effects to murrelets from removing buffer habitat under Alternative 3 (Remove Hult Reservoir; Add Little Log Pond), which is an edge effect. Under Alternative 3, buffer habitat around low-quality marbled murrelet habitat would be removed where the 5-acre pond would be built. Alternative 3 would maintain greater than 40 percent canopy cover post-project around marbled murrelet potential nesting structure trees; canopy removal would occur approximately 0.22 miles from the nearest suitable nesting structure tree.

Under Alternatives 1, 2, 3, and 4, there are two low-quality marbled murrelet potential nesting structure trees along the reservoir edge and one low-quality potential nesting structure tree approximately 350 feet from the reservoir edge. The removal of the reservoir would not lower the canopy cover below 40 percent, as no new opening would be created; the reservoir is creating the current edge effect on the landscape.

In the Final EIS for the 2016 RMP, the BLM assessed habitat connectivity and edge effects by calculating the amount of edge habitat and core habitat for marbled murrelets on BLM managed lands. Core habitat was defined as the interior part of a block of nesting habitat more than 295 feet from non-habitat (USDI 2016b:901). The closest marbled murrelet structure tree under Alternative 3 is a low-quality tree approximately 825 feet from the proposed Little Log Pond, well outside 295 feet.

Comment 37: Why doesn't the EIS include analysis of logging above and around the project area?

Response: Logging above the project area is addressed in Appendix A, Issue A-14 (Logging). The BLM does not expect potentially significant impacts from timber harvest above and around the project area because any timber harvest actions in the area would need to conform to the *Endangered Species Act*, the *Clean Water Act*, and the *Oregon Forest Practices Act*. In addition, for any timber harvest activity on BLM land, the BLM would conform to the 2016 RMP as well as complete a NEPA analysis prior to the action.

Comment 38: The EPA recommends that the EIS further clarify the *Clean Water Act* impaired[24] waterbodies within the project footprint. The draft EIS notes that the Oregon Department of Environmental Quality (ODEQ) has identified Lake Creek below Hult Reservoir as a Category 2 stream, indicating that the waterbody is suspected of being impaired for dissolved oxygen. The EIS describes that Lake Creek above and below Hult Reservoir, in addition to the Reservoir itself, is listed as impaired for excess temperatures (Category 5).

The draft EIS states that "[n]either Lake Creek nor Hult Reservoir is currently listed as impaired." EPA presumes this is specific to the discussion related to the dissolved oxygen WQS criterion. EPA notes that Lake Creek and Hult Reservoir are 303(d) listed with impairments for temperature.

Response: ODEQ lists neither Hult Reservoir nor Lake Creek above or below the reservoir as impaired for dissolved oxygen under Clean Water Act Section 303(d). ODEQ lists both Hult Reservoir and Lake Creek (above and below the reservoir) as 303(d) impaired for temperature. The EIS text in Appendix A, Issue A-18 (Water Quality) has been updated to clarify the impairment criteria and status for these waterbodies.

Comment 39: Because the project area includes waterbodies impaired for temperature and those suspected of dissolved oxygen impairment, the EIS should reference the State's Water Quality Standards antidegradation requirements.

Response: For any activity potentially affecting water quality, the BLM will incorporate ODEQ antidegradation policies for water temperature and dissolved oxygen into its management and monitoring plans. The text in Appendix A Issue A-18 (Water Quality) has been updated to clarify this, and details have been added to Chapter 1's *Conformance with Laws, Land Use Plan, and Other Decisions* section.

Comment 40: Under Alternative 3, does the BLM expect Little Log Pond to contribute to adverse water temperature and quality impacts?

Response: As described in Appendix A, Issue A-18 (Water Quality), Alternative 3 (Remove Hult Reservoir; Add Little Log Pond) would result in warmer temperatures in Lake Creek downstream from Little Log Pond

[24] An impaired waterbody is any body of water that does not meet water quality standards because of pollutants or other factors (such as high temperature or turbidity) that degrade water quality.

due to solar warming. Those temperatures would be lower than those under Alternative 2 (Remove the Existing Dam and Build a New Dam). Alternative 4 (Remove Hult Reservoir) would result in the lowest downstream temperatures. That said, stream temperatures increase with distance of flow, so even under Alternative 4, Lake Creek would likely have some thermal impairment before it reaches Triangle Lake.

The ODEQ has not assessed Lake Creek below the reservoir as impaired for dissolved oxygen, and the BLM does not expect that Little Log Pond would cause any increase in dissolved oxygen downstream.

Comment 41: The draft EIS stated the BLM will do a data gap analysis of the project area in late 2023 or early 2024 to verify the testing and remediation that occurred in the 1990s and do remediation if necessary. The final EIS should:

- Include results from additional sediment sampling data and analyses.
- Describe planned activities to remove contaminated sediments from the site as part of the proposed project.
- List required permits related to removing and disposing of contaminated sediments.
- Describe additional environmental impact monitoring and analysis that may be done to manage contaminated sediments during the project activities.

Response: As described in Appendix A, Issue A-19 (Contaminated Soil), the BLM will do a data gap analysis on soil and sediment contamination in 2024. The BLM does not now expect testing to take place until after completion of the final EIS, but the BLM will make the test results available to the public when possible.

The U.S. Army Corps of Engineers tested sediment in Hult Reservoir in 2018 and determined that there were no contaminated soils in the reservoir. However, this determination expired in 2023. Because the BLM has not used materials that it expects to contribute to contamination of the reservoir, for analysis purposes, the BLM assumes that new testing would return the same results as the 2018 U.S. Army Corps of Engineers sediment testing results. The BLM will do additional testing in order to implement the project.

If testing reveals contaminant remediation and removal is needed, the BLM will determine a course of action and develop a removal and disposal plan. The BLM would complete any required NEPA and describe remediation activities, related permits, and monitoring when those actions have been decided.

Comment 42: The BLM should describe what long-term maintenance would be required to keep waterbodies in the project area from silting in and risking a change to the planned hydrology of the stream and hence the re-establishment of coho salmon habitat.

Response: As described in Appendix A, Issue A-20 (Sediment), considering the amount and placement of sediment in the project area, the BLM does not anticipate a degree of silting in waterbodies that would require long-term maintenance to prevent build up.

Table A-9 and Figure A-3 (Issue A-20) show that, while some fine sediment is expected to mobilize and transport through the project area to Reach 1 (Headwaters of Lake Creek and all tributaries entering Hult Reservoir), Reach 2 (Lake Creek between Hult Pond Dam and Pucker Creek) will trend towards gravel, and Reach 3 (Lake Creek between Pucker Creek and Triangle Lake) will remain unchanged. In recent years, on several occasions, Hult Reservoir has been partially or fully drained for emergency maintenance. In the absence of water, old tree stumps were visible across the reservoir with little to no sediment accumulation near their base, and a defined stream channel for Lake Creek was apparent. Meanwhile, where Lake, Willow, and Sandy Creeks enter Hult Reservoir, sediment continues to deposit before reaching the reservoir, and vegetation continues to stabilize the sites.

The sediment the BLM expects to mobilize and move downstream would come from ground disturbed by construction work and exposed soils not immediately stabilized by instream or streambank restoration structures such as woody debris and riparian vegetation. Loose sediment would move downstream when the site is rewatered or during the first winter floods. This may deposit fine sediment in the first several hundred meters downstream of the dam, reducing the quality of fish spawning gravel over the short term. However, that effect would be limited to the first few years as new vegetation takes root and fine sediment continues to transport downstream to Reach 1.

Design features of Alternative 4 (Remove Hult Reservoir) include adding instream structures (e.g., logs, trees with root wads) following dam removal to assist the natural process of sediment retention and routing. This will allow stored sediment in the reservoir footprint to slowly sort and move through the stream network. Table A-9 summarizes how the alternatives would affect streams and streambeds, including Alternative 4 with mitigation. Although instream structures would require occasional maintenance to ensure their integrity and longevity, sediment found in the stream channel, banks, or uplands of the project area are not expected to be maintained or modified unless needed to protect infrastructure or to accomplish other design features and/or mitigation measures.

See also comment response 32-10.

Comment 43: The BLM should evaluate and disclose the anticipated greenhouse gas emissions associated with the construction of a new dam or reservoir as well as the carbon sequestration potential of the alternatives, including the ecosystem restoration and revegetation measures.

Response: The BLM's analysis evaluates both greenhouse gas emissions and carbon sequestration likely to result from the alternatives. The total estimated carbon emissions for the alternatives and their contributing sources are presented in Table A-10 (Appendix A, Issue 21). Issue A-21 (climate change) describes the effects of the alternatives on climate change by balancing carbon emissions with carbon sequestration. Carbon sequestration is described in Issue A-22 (carbon sequestration). Both issues also address potential effects of proposed ecosystem restoration and revegetation measures.

Comment 44: The BLM should deepen its discussion of climate change impacts as they relate to the proposed alternatives and mitigation measures in the final EIS, particularly as it relates to listed species and water quality and quantity issues.

Response: The BLM looked at the emissions of carbon dioxide and methane from various sources under the alternatives in Appendix A, Issue A-21 (climate change), with and without proposed restoration mitigation measures. Issue A-22 analyzes the sequestration of carbon under the alternatives. The BLM considered emissions resulting from use of heavy equipment in construction, transportation for administrative access of the project site, the production of concrete used for construction, recreation-related fuel burning (campfires and charcoal grilling), and decomposition of organic matter in wetlands and standing water. Additional analysis would be speculative.

Appendix C: Monitoring

Comment 45: The EPA recommends that the project include a monitoring program to ensure compliance with all mitigation measures and assess effectiveness. Additionally, we recommend that the EIS describe a mechanism to consider and implement additional mitigation measures.

Response: The BLM has added a monitoring appendix to the final EIS as Appendix C. As detailed in Chapter 2's description of the alternatives, the BLM plans to use an adaptive management process to maintain a functioning ecosystem in the Hult Reservoir Restoration Area. This would include ongoing planting and non-native invasive plant control, depending on how the terrain evolves and what will grow well in the area. Restoration actions and invasive plant treatments in the Hult Reservoir Restoration Area will be selected and designed as part of an annual treatment plan prepared by a BLM interdisciplinary team. The plan will conform with the District's *Invasive Plant Management and Habitat Restoration Environmental Assessment* (USDI 2023a). This process of planning and prioritization, treatments and restoration, and subsequent monitoring will help determine if management actions are meeting outcomes and, if not, facilitate management changes that will best ensure desired outcomes are met or reevaluated.

Appendix E: Hult Pond Dam Events, Repairs, Upgrades, Engineering Issues, and Reports

Comment 46: The BLM should not illegally breach the dam as Bohemia Inc. did in 1990.

Response: Bohemia Inc.'s drainage[25] of Hult Reservoir in 1990 was not illegal. However, that drainage inadvertently caused a fish kill and Bohemia was fined by the State because of it.

In 1990, Bohemia Inc. drained the reservoir to make necessary repairs to the headgate. The drainage resulted in the death of an unknown number of fish. Sampling by ODFW collected "691 bluegill, 209 largemouth bass, 91 cutthroat trout, 63 black crappie, and a handful of other miscellaneous species including six steelhead" (Eugene Register-Guard 1990b). The state agency fined the company $40,848, including $17,134 for the killed fish, $21,300 for the restoration of the fish population and habitat, and $2,414 for the investigation (Eugene Register-Guard 1991).

The BLM has similarly drawn down (lowered the level of) the reservoir, most recently in 2020, when it was necessary to make repairs after a falling tree damaged the toe drain of the dam. The BLM has conducted these drawdowns such that they minimize adverse impacts to flora and fauna. As with the 1990 Hult Pond Dam event, as well as more recent events at other reservoirs,[26] if the BLM were to inadvertently cause a fish kill, ODFW would investigate and potentially levy fines.

As described in the analysis in Issue 14 (Native Fish), the BLM expects native fish to survive under all of the action alternatives because of how the reservoir would be drained and Lake Creek diverted. Issue 15 (Game Fish) describes that non-native fish would have difficulty surviving the colder temperatures in Lake Creek, so the BLM would make an effort to salvage and remove them. However, some non-native fish would be washed downstream to Triangle Lake (which also has warmer temperatures and a game fish population) and some would be lost to mortality (due to colder stream temperatures than game fish can generally tolerate) or predation.

Under the No Action Alternative, on the other hand, dam failure (Alternative 1.1) or breach of the dam to prevent imminent failure (Alternative 1.2) could result in a fish die-off similar to the 1990 event. The BLM is proposing to remove Hult Pond Dam under all action alternatives to avoid dam failure or breaching the dam to prevent imminent dam failure.

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[25] To the BLM's knowledge, the dam was never breached. Breaching would have decommissioned the dam, and rebuilding the dam after a breach would have taken significant work and money.

[26] For example:

- Oregon Public Broadcasting, October 7, 2023: "Oregon seeks $27.6 million for Winchester Dam work linked to mass death of Pacific lamprey." https://www.opb.org/article/2023/10/07/winchester-dam-pacific-lamprey-mass-death-oregon-lawsuit/
- Salem Statesman Journal, October 9, 2023: "Major kokanee salmon die-off at Foster Reservoir caused by extreme drawdown at dam." https://www.statesmanjournal.com/story/news/local/2023/10/09/foster-lake-kokanee-salmon-die-off-green-peter-dam-reservoir/71123245007/

Miscellaneous

Comment 47: Why wouldn't the BLM take comments at the public open house and virtual meeting?

Response: The BLM took written comments at the draft EIS public open house on November 17, 2023.[27] The public was given comment cards at the open house and invited to submit them there. (Eight comment cards were received at that meeting.) The BLM also had an online public meeting on November 15, 2023, that included a presentation followed by a question and answer session for presentation and EIS clarifications. The questions submitted by the public at this meeting via the Zoom "question" button were not considered public comments: At the meeting, the public was directed to submit their public comments by emailing them to the project email address, using the ePlanning site's submission form, or sending them via mail to the Siuslaw Field Office.

The EIS project team did not take verbal public comments at any point in the process, but requested the attendees write their concerns in their own words to submit them.

Comment 48: The EIS is too technical and should not be using words like "extirpated."

Response: The BLM has made edits to improve the readability of the EIS by clarifying the meaning of some technical terms or substituting plain language. The word "extirpated" has been replaced with "no longer present."

[27] The BLM also took comments from the public at the scoping open house in September 2021 and during the draft Chapters 1 and 2 public comment period in May 2022. See the *Public Involvement* section in Chapter 4.

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