National Park Service **Mount Rainier National Park**
Interior Regions 8, 9, 10 and 12

White River State Route 410 Flood and Erosion Risk Reduction

Environmental Assessment
April 2026

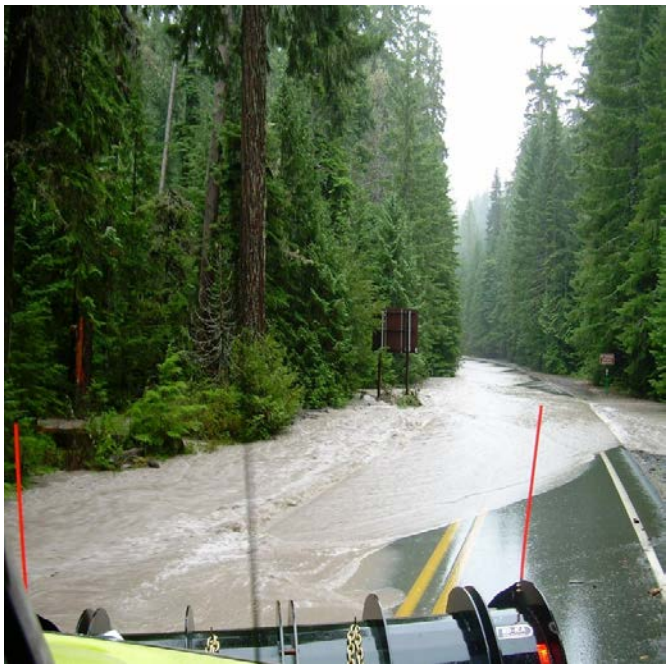

PHOTO SOURCE: (NPS 2012)

As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural and cultural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to assure that their development is in the best interests of all. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

The National Park Service, Mount Rainier National Park in Ashford, Washington, has prepared this environmental assessment (EA) consistent with the National Environmental Policy Act

(NEPA) (42 U.S.C. 4321 et seq.), the Department of the Interior (DOI) NEPA regulations, 43 CFR 46, and the 2026 DOI Handbook of NEPA Implementing Procedures (516 DM 1 Handbook).[1] The unique identification number for this project is 123938.

NOTE TO REVIEWERS

If you wish to comment on this document, you may mail comments to:

Superintendent, Mount Rainier National Park
55210 238th Ave E
Ashford, WA 98304

You may also comment for this project online at https://parkplanning.nps.gov/projectHome.cfm?projectID=123938. Retrieve White River SR 410 Channel Avulsion Risk Reduction to provide comments electronically.

Before including your address, phone number, e-mail address, or other personal identifying information in your comment, be aware that your entire comment – including your personal identifying information – may be made publicly available at any time. You can request to have your personal identifying information withheld from public review but this cannot be guaranteed.

ON THE COVER

Flooding from the White River occupying portions of State Route 410, just south of the north entrance to Mount Rainier National Park. Photo by National Park Service.

[1] Certification related to Page Limits and Deadline: This EA represents the National Park Service's (NPS's) good-faith effort to fulfill the National Environmental Policy Act's (NEPA's) requirements by prioritizing documentation of the most important relevant considerations within the statutorily mandated page limits and timeline. This prioritization reflects the NPS's expert judgment. Any considerations addressed briefly or left unaddressed are, in the NPS's judgment, comparatively non-substantive and would not meaningfully inform the NPS's consideration of environmental effects and the resulting decision. The NPS certifies the EA is substantially complete, thoroughly considered the factors mandated by NEPA, and contains analysis adequate to inform and reasonably explain the NPS's decision to issue a finding of no significant impact regarding the proposed action. The NPS certifies that this EA represents a good-faith effort to fulfill NEPA's requirements within the congressional timeline.

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Chapter 1: Purpose and Need

Introduction

The National Park Service (NPS) is considering a proposal by the Washington State Department of Transportation to construct engineered log structures at two locations in the White River floodplain to address flooding and erosion risks to State Route (SR) 410 within Mount Rainier National Park (Figure 1). The intent of these structures is to address a key section of SR 410 that is threatened by near-term risk of avulsion[2]. The proposed sites for the engineered log structures are adjacent to the SR 410 road corridor and are within congressionally designated wilderness established by the Washington Park Wilderness Act of 1988 (NPS, 2006).

A study area was defined for the project based on recommendations from the site and reach assessment conducted for SR 410 between mileposts 57.7 and 60 (WSDOT 2017). The study area includes locations susceptible to inundation or bank erosion, either from the mainstem river adjacent to the highway or from expanding side channels, as identified in the assessment (Figure 1). Within this study area, two installation areas were delineated to encompass the footprints of a proposed engineered log jam and a headcut fill structure. Additional areas were identified inside and outside of the study area for inclusion in the project area. Collectively, these areas represent the full footprint of all activities associated with the proposed action and are defined in detail in Chapter 2.

Purpose and Need

As the federal agency with jurisdiction of Mount Rainier National Park and the overlapping segment of SR 410, the National Park Service is responding to a project proposal from the Washington State Department of Transportation. The Federal Highway Administration is a Cooperating Agency in the preparation of this Environmental Assessment. The purpose of the proposed project is to reduce the near-term risk of avulsion of the main channel into an identified side channel within Mount Rainier National Park to maintain public and administrative access to the northeast portion of Mount Rainier National Park, including the Mount Rainier Wilderness, and to maintain the existing regional transportation corridor between the greater Seattle/Tacoma area and Eastern Washington areas accessed by SR 410.

The two proposed engineered log structures include an engineered log jam and a headcut fill structure designed to arrest the development of active side channel and headcuts, which currently impact SR 410, and to prevent the White River from establishing new flow paths that could further threaten SR 410. Both structures would be comprised entirely of wood.

Action is needed because SR 410 is adjacent to and within the White River floodplain, making it vulnerable to severe impacts should the river's main channel migrate and intersect the roadway. State Route 410 serves as a gateway to Mount Rainier National Park's east side, including access to multiple popular trailheads and the White River Campground and Sunrise

[2] Avulsion occurs when a river channel suddenly switches course and creates a new channel.

areas. It is a critical transportation corridor connecting the greater Seattle/Tacoma area to the north and west to the greater Yakima area to the east. Eleven miles of SR 410 are located within the boundaries of Mount Rainier National Park and are under the jurisdiction of the NPS.

Based on observed changes happening within the area, risks from flooding are more likely to occur as the number of heavy rainfall events increase and as upstream glaciers continue to shrink and deliver large volumes of rocky sediment to the White River. Flood events have occurred in 2003, 2005, 2006, and 2016, resulting in emergency protection installation to prevent damage to the highway; however, these reoccurring emergency measures are inadequate in addressing the continued development of side channels and headcuts—the most recent of which have formed in 2017. Refer to Appendix A for representative photographs of flooding and past damage in the study area. Because the area experiences recurring floods and the elevation of the White River is higher than SR 410 in some locations, the river could change course—either abruptly by forming a new channel or gradually through lateral migration across the valley floor. If action is not taken, avulsion of the main channel could result in damage or loss to this section of road, which would impact visitor access and threaten the surrounding biological communities.

Damage to SR 410 also has the potential to affect public access to this area by lengthening travel times between the greater Seattle/Tacoma area and Yakima by 1.5 hours or more. If flooding washes out the roadway—especially if the White River shifts course and enters the existing road corridor through identified side channels—restoring access would require lengthy, costly, and potentially environmentally damaging repairs. The Washington State Department of Transportation has received funding from the Federal Highway Administration to help mitigate near-term risks to a key section of the highway from floodplain erosion and has requested approval from the National Park Service to proceed with the proposed action. While relocating or elevating the highway remain viable options under consideration by both agencies to address long-term flooding and erosion risk, development and implementation of such a long-term solution would require substantial planning, design, lengthy environmental review, and construction, and is thus not expected to occur in the near-term. The proposed engineered log jam and headcut fill structure have shorter planning, design, and funding timelines to minimize unnecessary delays to this project, allowing for a near-term solution to reduce the risk of avulsion of the main channel into the identified side channel.

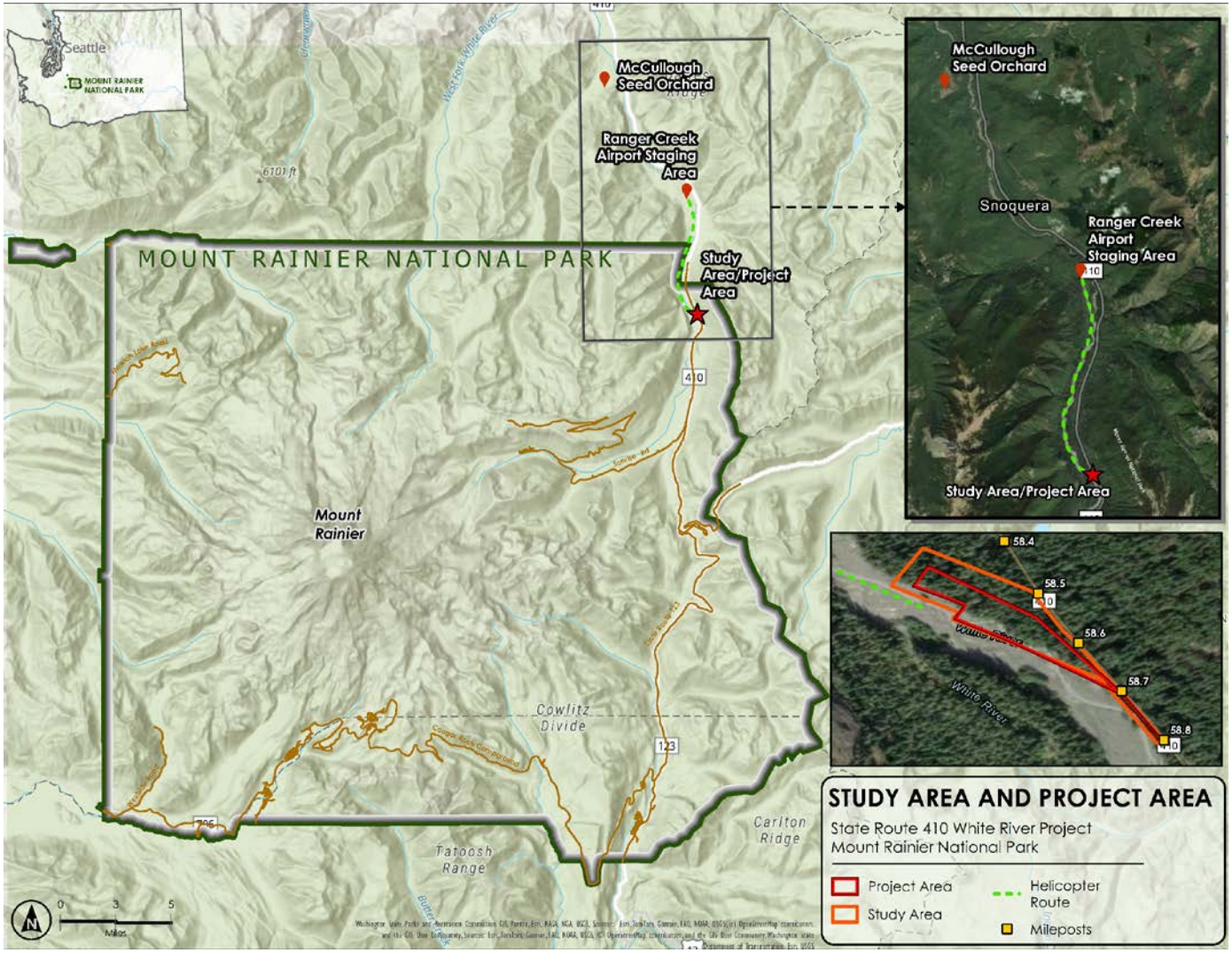

FIGURE 1. LOCATION OF SR 410 WHITE RIVER STUDY AND PROJECT AREA IN MOUNT RAINIER NATIONAL PARK

FIGURE SOURCE: (WSDOT 2025)

Issues

Issues Selected for Detailed Analysis

Chapter 2 describes the alternatives evaluated in the Environmental Assessment as well as those considered but dismissed. The following issues were retained for analysis for each alternative. These issues are addressed in detail in Chapter 3 along with supporting figures.

Soils and Vegetation: Soils were retained for detailed analysis because active erosion in the form of the development of active side channels and headcuts is occurring in the project area and is the focus of the proposed action. Vegetation was retained because construction activities may result in disturbance to or removal of vegetation. These resources are analyzed together due to their close interdependence, and combining them avoids redundancy in explaining overlapping ecological processes.

Hydrology: Hydrology was retained for detailed analysis because the near-term risk of avulsion of the main channel into the identified side channels is driven by hydrological processes. Flooding events have led to high-energy flows which have eroded channel banks. The proposed engineered log structures would locally affect how the water in the river moves and is distributed.

Wetlands and Floodplains: Wetlands and floodplains were retained for detailed analysis because the project area includes five wetland areas and occurs within the White River floodplain. Construction activities would cause direct impacts to one wetland as a result of fill and would indirectly affect other wetlands through temporary disturbance of their buffers.

Fish, Wildlife, and Special Status Species: Fish, wildlife, and special status species were retained for detailed analysis because the project area supports habitat used by multiple fish and wildlife species, including species with special conservation status. Construction activities have the potential to disturb individuals, alter habitat conditions, or affect species' use of the area. Because these species may be sensitive to changes in physical conditions and human activity associated with the proposed action, this resource topic warrants further analysis.

Cultural Landscapes, Archaeology, and Historic Structures: Cultural landscapes, archaeology, and historic structures were retained due to the project area's proximity to and overlap with the Mount Rainier National Historic Landmark District. Established in 1997, the Mount Rainier National Historic Landmark District comprises approximately three percent of the park and includes park roads, historic developed areas, and backcountry structures. Within the park boundaries, SR 410, also known as the Mather Memorial Parkway, is part of the National Historic Landmark District and is identified as a structure contributing to the significance of the National Historic Landmark District; thus, preservation of the road's character-defining features is of particular concern. Similarly, protection of other historic properties and archaeological resources within the area of potential effects (whether presently identified or undiscovered) is an important project consideration. Therefore, this topic has been retained for analysis.

Park Operations and Visitor Use and Experience: Impacts to park operations and visitor services are often considered in NEPA studies to disclose the degree to which proposed actions would change park management strategies and methods as well as what additional costs

(including staffing) are associated with the proposal. Depending on the selected alternative, a variety of impacts to visitor use may occur. Among the impacts that are considered in this section are visitor access, visitor use opportunities, and visitor safety. Because the alternatives could impact Mount Rainier National Park operations and visitor use and experience in the White River area, this topic has been retained for analysis.

Wilderness Character: Wilderness character was retained for detailed analysis because the proposed action includes intentional manipulation of river processes and installation activities within designated wilderness adjacent to the SR 410 corridor. Construction activities would include temporary use of motorized tools (i.e., chainsaw) and heavy-lift helicopter operations to transport and install material. Such installations and the use of mechanized transport and motorized equipment are generally prohibited by the Wilderness Act, except as necessary to meet minimum requirements for the administration of the area as wilderness or as excepted by other laws, and as such, this resource topic warrants further analysis to evaluate the nature and extent of potential effects and to identify appropriate minimization measures.

Issues Considered but Dismissed

The following issues were identified, considered, and dismissed from further analysis:

Soundscapes: Construction activities are expected to temporarily cause noise above existing ambient levels and may disturb visitors and wildlife in the vicinity of the construction. The White River and adjacent forested areas would act as sound buffers, reducing impacts on surrounding forests and visitors. Noise from construction would be limited in duration and addressed through mitigation measures. Noise as it impacts sensitive species, visitor use and experience, and wilderness character is described within those respective sections.

Land Use: Land use would not permanently change as a result of the implementation of the alternatives described herein. The overall land use would remain as parklands and wilderness areas. No impacts to land use are anticipated from the Project, and this topic was dismissed from further analysis.

Public Health and Safety: No activities are proposed that would introduce new risks to human health or safety. Construction would follow standard safety protocols and applicable regulations to minimize hazards to workers and the public. Once operational, the proposed action would not result in increased exposure to unsafe conditions or changes to emergency response access. No impacts to public health and safety are anticipated from the Project and this topic was dismissed from further analysis.

Air Quality: Temporary construction activities and equipment usage would contribute to air pollution emissions. These emissions would be temporary and localized. Placement of logs in the storage and staging areas or helicopter use during construction may generate fugitive dust in the air. Air quality effects from fugitive dust would likewise be localized, and adherence to standard best management practices such as moderation of activities during periods of high wind or covering of stockpiles would minimize effects of fugitive dust. The effects to air quality from equipment emissions and fugitive dust would likely dissipate to background levels within minutes of cessation of equipment use. Detailed analysis of these transitory effects is not

necessary to make a reasoned choice between the alternatives presented in the Environmental Assessment.

Socioeconomics: Potential impacts to socioeconomics are not expected to result in long-term changes to population dynamics, employment, housing, or the local economy. Construction activities would generate only temporary and minor economic effects, such as short-term employment opportunities or the purchase of materials and services. These impacts would be minimal, localized, and consistent with existing conditions in the project area. No full road closures would be anticipated during construction. While the No Action Alternative may result in greater likelihood of road damage and closure, and although socioeconomics are an important consideration related to potential road closures, depending on timing and duration, socioeconomic impacts would be closely tied to visitor access, as discussed under Visitor Use and Experience. Detailed socioeconomic analysis is not necessary to make a reasoned choice between the alternatives presented in the Environmental Assessment.

The National Park Service also considered but dismissed from further analysis other possible resources that do not pertain to the project area, including paleontological resources and coastal resources.

Chapter 2: Alternatives

Alternatives

This section describes the No Action Alternative and the Proposed Action and provides a brief description of alternatives considered but dismissed from further analysis. Neither the No Action Alternative nor the Proposed Action preclude the future relocation or elevation of the highway as a long-term solution to mitigate flood risk to this section of SR 410. However, development and implementation of such a long-term solution would require substantial funding, planning, design, environmental review, and construction, and is not expected to occur in the near-term. Thus, the Proposed Action provides additional time for decision-making on a long-term solution, whereas the No Action Alternative involves taking no steps at all to address the risk.

Alternative 1: No Action

Under the No Action Alternative, there would be no measures taken to directly address the active side channel and headcut along the White River from milepost 57.5 to 60 of SR 410 (Figure 2). No mitigations to reduce flood and erosion risk would take place within wilderness. The elevated risk of avulsion that may cause the White River to occupy SR 410 would continue, likely causing damage in the near-term and potential loss of vulnerable sections of highway in the long-term (WSDOT 2017). The Washington State Department of Transportation may take emergency action within 200 feet of the centerline of the road, outside of wilderness, to address immediate erosion to the highway, but these actions would be reactive and may not preserve continuous use of the highway for automobiles. Emergency actions may also become increasingly necessary as proximity to the active side channel may continuously erode the highway during seasonal periods of high flow, requiring a higher frequency of emergency maintenance. Emergency actions would likely involve riprap installation, which could result in impacts to sensitive areas and habitats and necessitate future mitigation measures. The Washington State Department of Transportation would take practicable measures within the approved boundaries to maintain access of SR 410; however, there may be seasonal or long-term detours depending on the amount of damage, cost, and complexity of repairs.

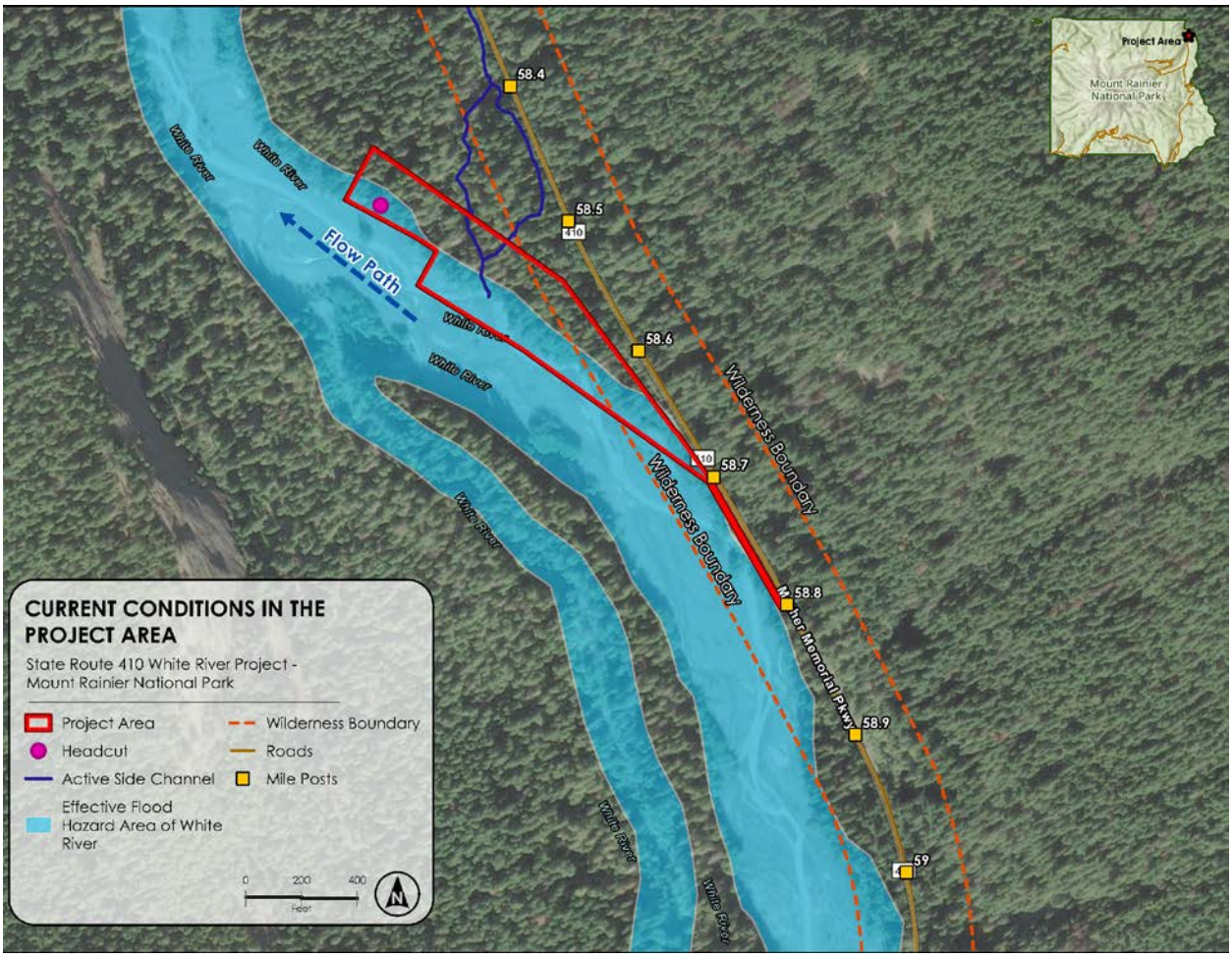

FIGURE 2. CURRENT CONDITIONS OF SR 410 WHITE RIVER PRIMARY PROJECT AREA IN MOUNT RAINIER NATIONAL PARK

FIGURE SOURCE: (WSDOT AND NPS 2025A)

Alternative 2: Install Two Engineered Log Structures (Proposed Action)

Under Alternative 2, the Proposed Action, the Washington State Department of Transportation would install two engineered log structures: an engineered log jam at the new side channel, and a headcut fill structure at the headcut channel (Figure 3). Both sites are located within wilderness and outside the 200-foot road maintenance buffer but pose immediate threats to the highway. The engineered log jam would arrest the development of headcuts and prevent the river from establishing new flow paths aimed directly toward and adjacent to SR 410. The headcut fill structure would stabilize the channel grade and control erosion to prevent the formation or advancement of gullies and headcuts. These activities would occur within the forested floodplain associated with the White River.

The project area for implementation of Alternative 2 includes the full footprint of activities associated with the proposed action as defined below and discussed in more detail in this section:

1. The engineered log jam installation area;
2. The headcut fill structure installation area;
3. A vehicle staging area along an existing shoulder pullout on SR 410 where crews would park vehicles and unload hand tools;
4. A pedestrian access route connecting the vehicle staging area to the two installation areas (not depicted);
5. The interim storage area at the McCullough Seed Orchard where logs would be stored;
6. The Ranger Creek Airport staging area where logs would be prepped and rigged to helicopters; and
7. The helicopter flight path between the Ranger Creek staging area and the installation areas.

The first four components above are considered the primary project area.

The Washington State Department of Transportation would source logs and woody material used for the installation of the engineered log structures from within Mount Rainier National Park. Approximately six miles upstream, the Fryingpan Creek Bridge Project will occur at a tributary to the White River (Figure 4). Tree removal for the Fryingpan Creek Bridge Project will occur in October 2026 as part of site clearing for the bridge replacement included in the project, several months before this project is planned to occur. The removed trees will be transported by truck to McCullough Seed Orchard for storage, requiring approximately five trips over two days. Large woody material planned to be removed from the Fryingpan Creek Bridge Project would be repurposed for the proposed engineered log jam and headcut fill structure.

The McCullough Seed Orchard is a secure U.S. Forest Service (USFS) facility approximately five miles north of the Ranger Creek airport. The large woody material (logs) would be stored there until needed for construction of the engineered log structures (Figure 4). The logs would be transported from the McCullough Seed Orchard to a staging area at the Ranger Creek airport, located approximately two miles north of the primary project area, by truck along designated USFS roads and SR 410 in advance of helicopter operations; log transport would require approximately five trips over two days. Activities that may occur at either, or both, the McCullough Seed Orchard and the Ranger Creek airport staging areas include root wad cleaning to remove excess soil and debarking of logs to prevent infestation by Douglas-fir beetles (*Dendroctonus pseudotsugae*). Additional motorized equipment may be used to complete these activities and to prepare the downed trees for transport and placement. A heavy-lift helicopter, such as a Chinook, would then be used to transport the large woody material by external longline to the installation areas from the Ranger Creek airport.

The following subsections discuss the engineered log jam and headcut fill structure installation in detail, along with overall construction phasing and methodology.

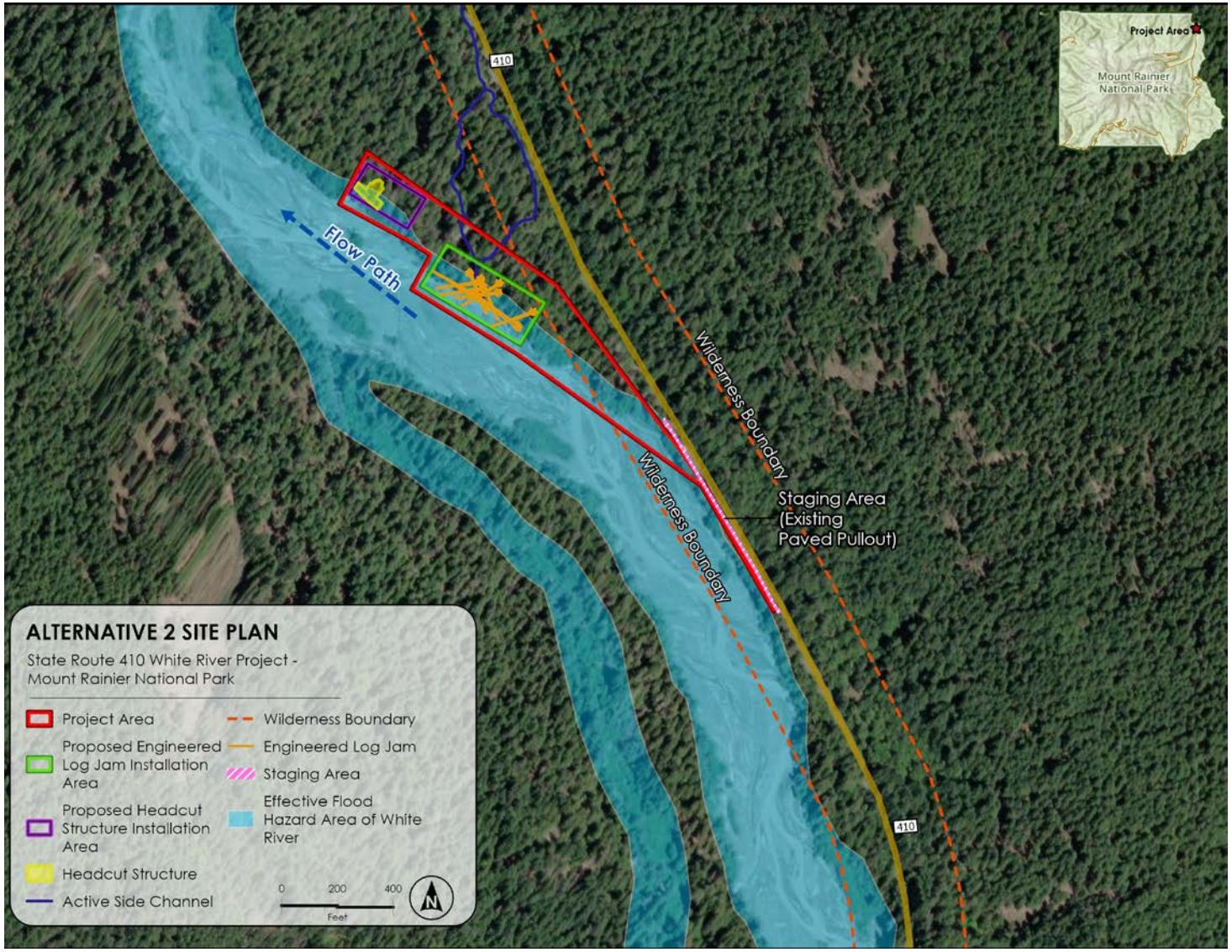

FIGURE 3. ALTERNATIVE 2 SITE PLAN SHOWING THE PRIMARY PROJECT AREA AND INSTALLATION AREAS FOR THE SR 410 WHITE RIVER PROJECT

FIGURE SOURCE: (WSDOT 2025)

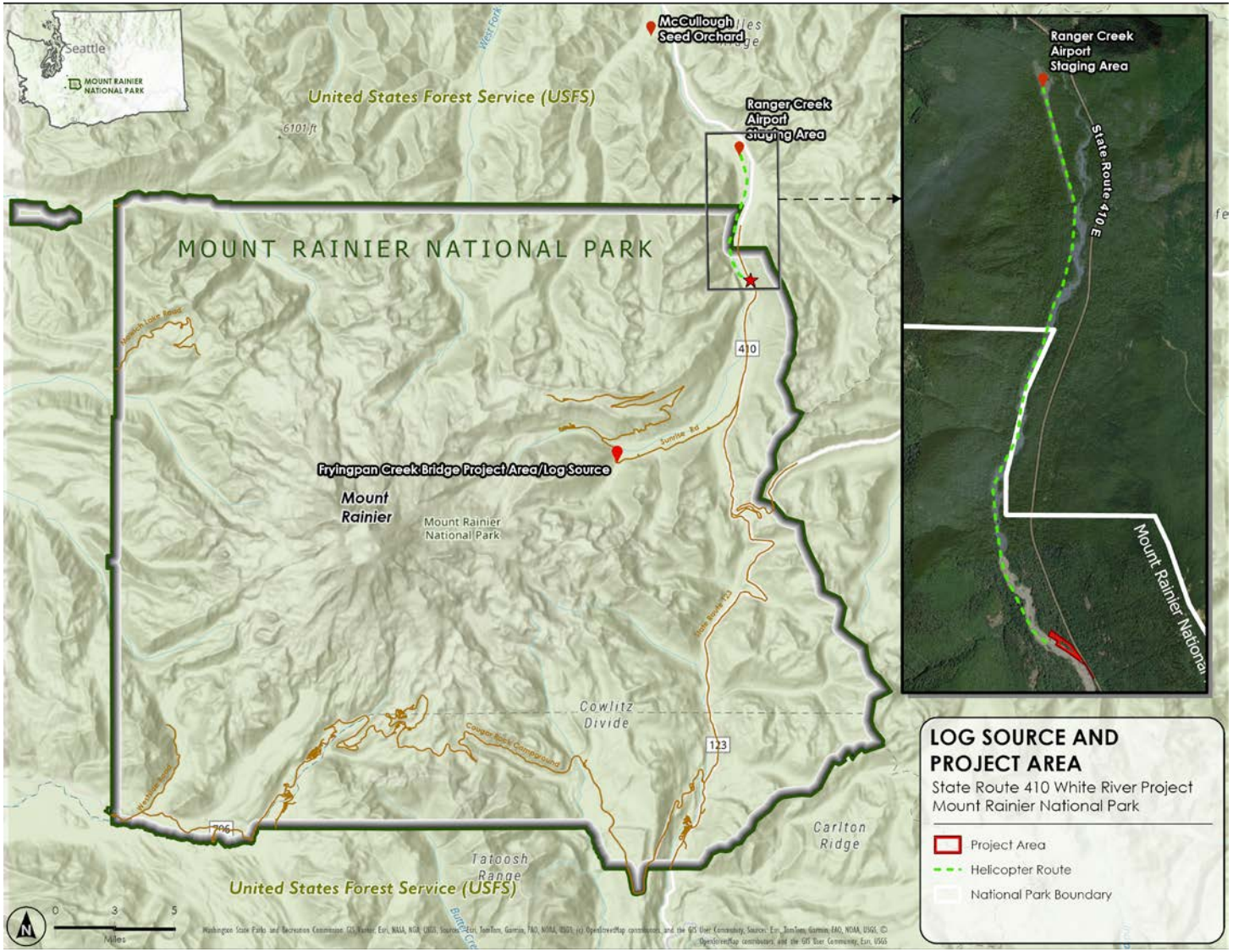

FIGURE 4. LOCATIONS OF THE FRYINGPAN CREEK LOG SOURCE, SR 410 WHITE RIVER PROJECT AREA, AND RANGER CREEK AIRPORT LOG STAGING AREA

FIGURE SOURCE: (WSDOT 2025)

Engineered Log Jam Description

The engineered log jam would arrest the development of headcuts and prevent the river from establishing new flow paths aimed directly toward and adjacent to SR 410. The engineered log jam would consist of approximately 8 to 12 logs ranging from 60 to 120 feet in length with diameters at breast height of 24 to 36 inches. The logs repurposed for the engineered log jam would have intact root wads to promote the buildup of the streambed through sediment settling and accumulation. The large woody material would be transported by helicopter on a longline and lowered into place.

Up to 12 conifer trees within the installation area may be damaged during the helicopter placement of the logs, including damage to tops, trunks, or branches. These potentially impacted trees consist of coniferous species ranging from 6 to 18 inches diameter at breast height. Work will be performed within the bird nesting period; biologists will confirm there is no active nesting before trees are potentially altered. Figure 5 depicts the general footprint of the engineered log jam; not all existing trees shown would be impacted.

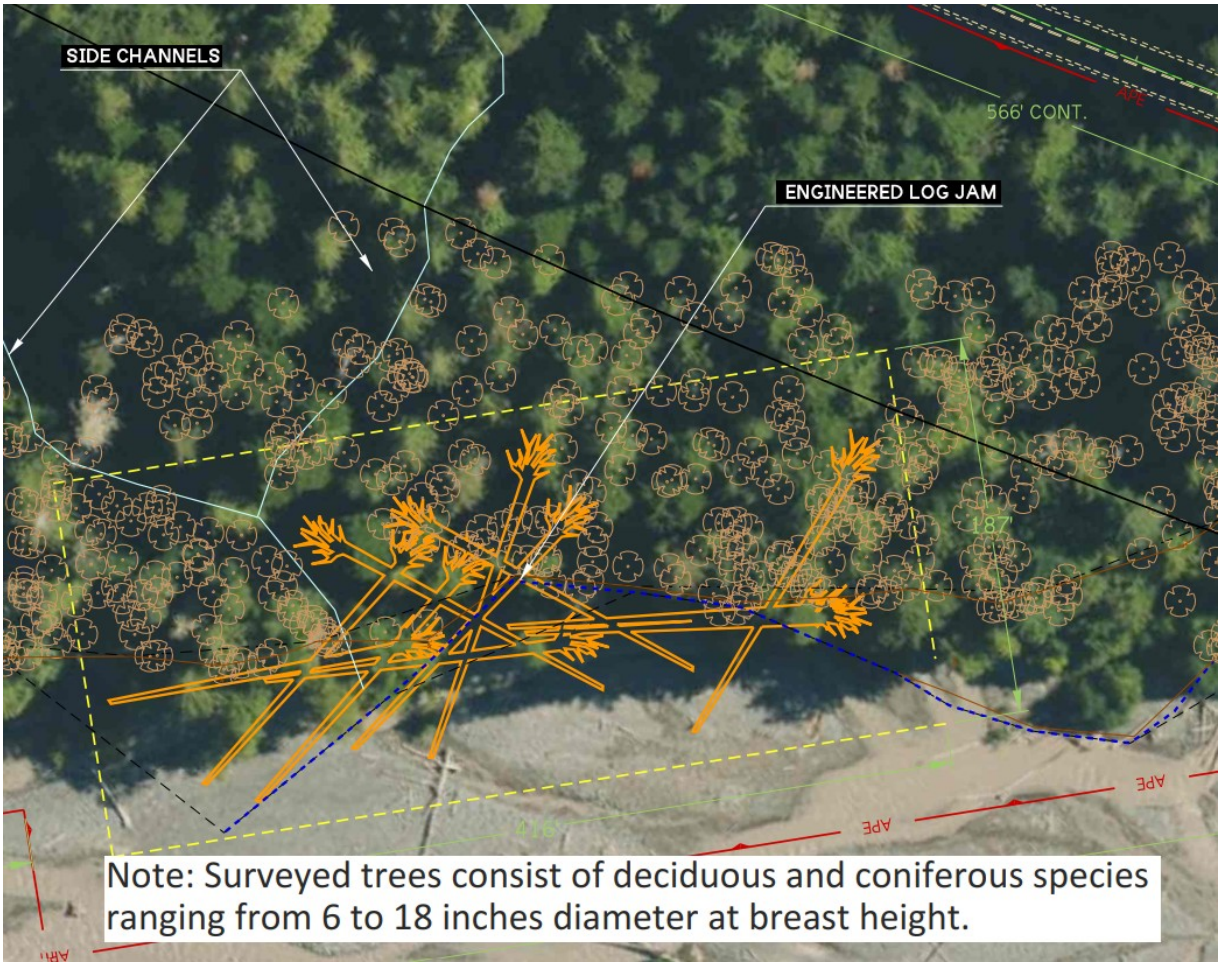

FIGURE 5. TREES SURVEYED SURROUNDING PROPOSED ENGINEERED LOG JAM

FIGURE SOURCE: (WSDOT 2025)

If the active channel is aligned along the bank during installation of the engineered log jam, measures will be taken to minimize impacts to listed fish species that may be present. Personnel may enter the river to encourage fish to migrate out of the installation area before installing construction elements. Fish herding, such as walking through the area with seine or block netting, should be attempted before more invasive fish capture and handling methods are deployed (hand or dip-nets, low-voltage electrofishing). Refer to the Mitigation Measures and Best Management Practices listed under Special Status Species for additional information regarding fish exclusion and qualifications for biologists performing the fish exclusion, if needed.

A total installation work area of approximately 1.78 acres has been identified for the engineered log jam, of which 1.61 acres would be temporarily impacted during installation, and 0.17 acres comprising the engineered log jam footprint would be permanently modified.

HEADCUT FILL STRUCTURE DESCRIPTION

The headcut fill structure would stabilize the channel grade and control erosion to prevent the formation or advance of gullies and headcuts. It would be constructed downstream from the engineered log jam structure at the side channel inlet and would be approximately 140 feet in length. The headcut fill structure logs would be de-limbed as part of the Fryingpan Creek Bridge Project, stored at the McCullough Seed Orchard interim storage area, and transferred to the staging area at the Ranger Creek airport. Logs would be cut to fit the structure plan outlined in Figure 6 at either McCullough Seed Orchard or Ranger Creek airport. One 10-inch diameter at breast height conifer and two 12-inch snags would be removed just southeast of the headcut structure site to create a material drop zone for helicopter operations and material staging. These trees would be flush cut. Existing trees surrounding the material drop zone are depicted in Figure 6. Limited and sustained chainsaw use may be required to field-fit the logs for the headcut fill structure based on site conditions, to remove trees for safety clearance, and to create the drop zone area.

The removed tree and snags would be repurposed as part of the structure. Minor excavation, to be completed with hand tools such as shovels, would create a level surface to place the logs and nestle them into place. The removed soil would be placed on top of the structure to facilitate plant growth for long-term stabilization. Approximately 85 logs ranging from 10 to 25 feet, and 12 to 24 inches in diameter at breast height, would be used. Trees surrounding the structure site could sustain damage from helicopter longline operations consisting of branch breakage, but the structure would be field-fitted around existing trees and downed logs to the extent practicable. Onsite materials such as slash, branches, and limbs may be gathered to increase roughness around the headcut fill structure; specifically, such material would be used to fill the upper surface and interstitial spaces of the structure.

The headcut fill structure installation area is unlikely to have stream water during construction. However, if the installation area is wet during construction and if practicable, fish species will be encouraged to migrate out of the work installation area before installing construction elements. Fish herding, such as walking through the area with seine or block netting, should be attempted before more invasive fish capture methods are deployed (hand or dip-nets, low-voltage electrofishing). Refer to the Mitigation Measures and Best Management Practices list

under Special Status Species for additional information regarding fish exclusion and qualifications for biologists performing the fish exclusion activities, if needed. A total installation work area of approximately 0.71 acres has been identified for the headcut fill structure, of which 0.59 acres would be temporarily impacted, and approximately 0.12 acres would be permanently impacted as a result of the permanent footprint of the headcut fill structure.

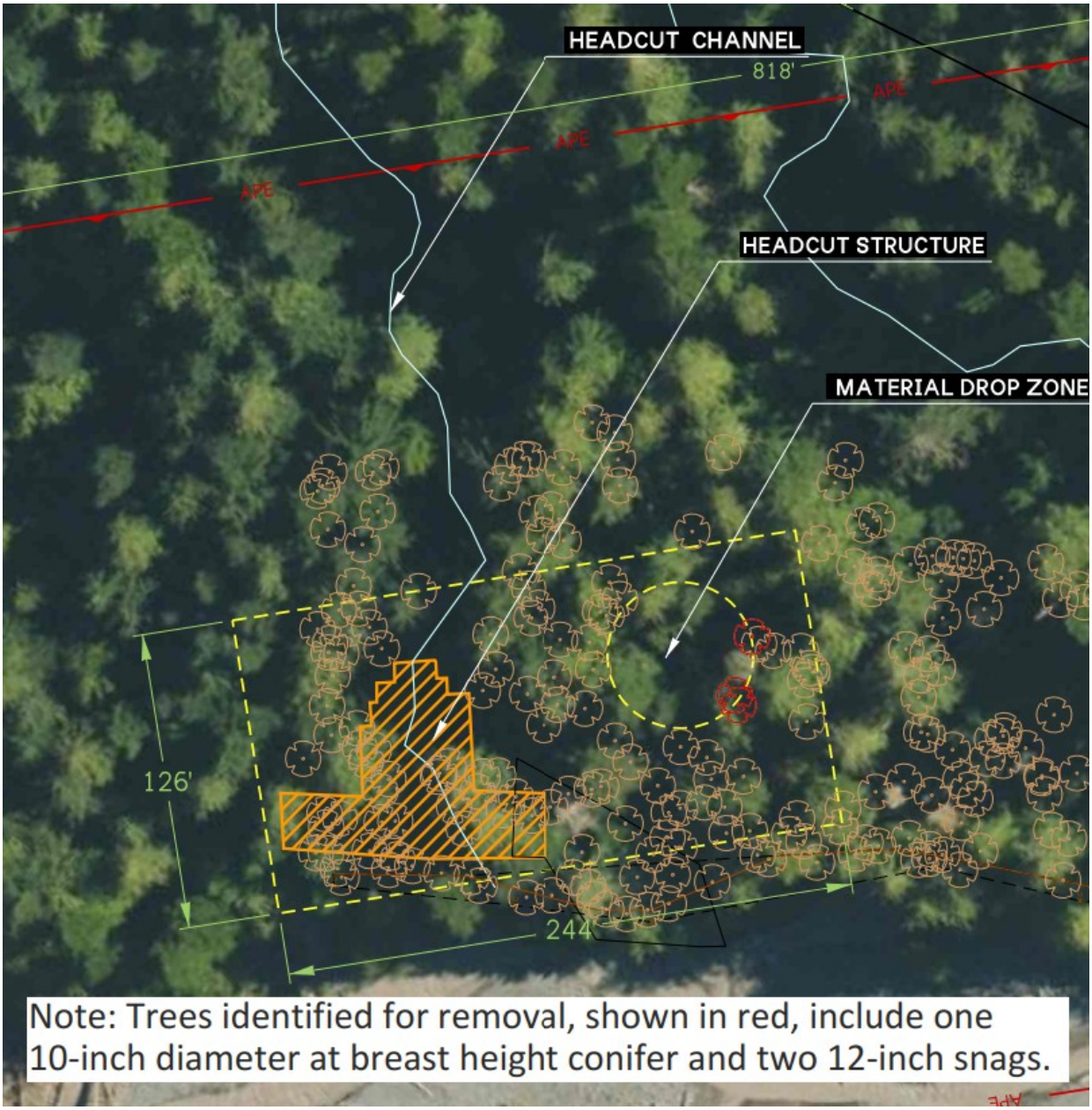

FIGURE 6. TREES SURVEYED SURROUNDING PROPOSED HEADCUT FILL STRUCTURE

FIGURE SOURCE: (WSDOT 2025)

Alternative 2: Construction Phasing and Methodology

Implementation of the Proposed Action is anticipated to occur in 2027. The construction phase of the proposed action is currently planned to occur from mid-June to mid-August. Staging and preparation of logs at the Ranger Creek airport staging area would occur from June 15 to July 16. Helicopter transportation of logs to the installation areas and construction of the headcut structure would take place during the Washington Department of Fish and Wildlife published in-water work window (July 16 through August 15). The total footprint of the installation areas would be approximately 2.49 acres (areas identified by the rectangular boxes on Figure 3). This area includes temporary and permanent footprints associated with work at both the engineered log jam and headcut fill structure.

The sequence of construction activities would be conducted as follows:

- **Pre-Construction – Log Procurement:** Logs for the engineered log jam and headcut fill structure would be sourced from the Fryingpan Creek Bridge Project where the effects of tree removal have already been analyzed as a part of the 2023 Fryingpan Creek Bridge Environmental Assessment and 2024 Fryingpan Creek Bridge Replacement Finding of No Significant Impact (NPS 2023; NPS 2024a).
- **Construction – Transport and Placement of Logs, Staging, and Access:** Logs removed from the procurement site at the Fryingpan Creek Bridge would be transported by truck to the interim storage area at McCullough Seed Orchard then later transported by truck to the staging area at the Ranger Creek airport before being delivered to the installation areas via helicopter. The helicopter would fly from Ranger Creek over the White River floodplain to the installation areas and back.
    - **Engineered Log Jam**: A heavy-lift helicopter with sufficient external payload capacity, such as a Chinook or Skycrane/Aircrane, would be used to transport up to 12 logs with intact root wads to the engineered log jam installation area. The logs would be transported one at a time by external longline and lowered into place. Ranger Creek airport is approximately two miles from the installation area, with an estimated roundtrip flight cycle of up to 15 minutes, including up to two minutes of hover time at the pickup point (Ranger Creek airport) and up to five minutes at the drop site (installation area). Up to three hours of total flight time over the course of one or two days would be needed to construct the engineered log jam, including a total of up to 30 minutes of cumulative hover time at Ranger Creek Airstrip and up to 60 minutes of cumulative hover time at the engineered log jam installation area. The helicopter would hover at a height of 100 to 200 feet above the staging area at the Ranger Creek airport and at the same height above the installation area.
    - **Headcut Fill Structure**: Depending on log size, a medium-lift or light-lift helicopter, such as a K-MAX or A-star, would be used to transport up to 85 logs to the headcut fill structure drop zone. Contingent on helicopter type and log size and weight, logs may be bundled, resulting in fewer trips, or flown individually. Assuming an average of two logs per load, an estimated 43 trips

would be needed, for up to 11 hours of total flight time over the course of two to four days, including a total of up to 90 minutes of cumulative hover time at the Ranger Creek airport and up to four hours of cumulative hover time at the headcut fill structure installation area. The helicopter would hover at the same heights as referenced above for the engineered log jam.

The installation areas would be accessed by crew members on foot via a temporary access route where the White River is adjacent to the SR 410 road corridor. A vehicle staging area would be located just south or upstream of the installation areas along a shoulder pullout (Figure 3). This vehicle staging area would be used to park vehicles and unload hand tools, which crews would transport by foot to the installation areas. Limited and sustained chainsaw use may be required to modify the logs for the headcut fill structure based on site conditions. Potential construction equipment anticipated for the Proposed Action is included in Appendix B.

- **Post-Construction–Maintenance:** The installation sites would be monitored as part of regular road inspections. Future floods may damage or displace the log structures, potentially reducing their effectiveness. If damage occurs, the appropriate course of action would be determined based on the extent and nature of the damage, coupled with floodplain conditions and the feasibility and efficacy of further action.

Table 1 provides a summary of the proposed elements of Alternative 2. It does not include the pre-construction log procurement to be completed as part of the separate Fryingpan Creek Bridge Project.

Alternative 2: Additional Considerations

Flight paths are within suitable habitat for northern spotted owl and marbled murrelet and depending on helicopter type, would maintain an operating altitude of at least 2,650 feet above forested canopy while maintaining aviation safety. That altitude would be maintained except during hover operations.

Installation of the engineered log jam and headcut fill structure would be subject to several timing restrictions and measures to protect listed aquatic and terrestrial species and other species of concern. Because installation of the structures requires work in an active stream channel, all in-water work would be limited to the Washington Department of Fish and Wildlife in-water work window (July 16 through August 15), and because work would occur during the nesting season for marbled murrelet (defined as April 1 to September 23), daily limited operating periods would apply.

TABLE 1. ALTERNATIVE 2 SUMMARY

Alternative 2 Element	Brief Description	Work Area	Equipment Needed and Duration
Log transport to, staging, and winter storage at the interim storage area at McCullough Seed Orchard	Logs removed from the Fryingpan Creek Bridge Project area would be transported by truck to the interim storage area for the winter where activities may include cutting to size, root wad cleaning, and log debarking.	McCullough Seed Orchard, designated USFS roads, and SR 410	Trucks, chainsaws, and power washers; estimated seven-month storage
Staging at Ranger Creek airport and transport to the installation areas	Logs would be trucked from McCullough Seed Orchard to Ranger Creek airport and prepared for transport to the installation areas. Activities here may include cutting to size, root wad cleaning, and log debarking.	Ranger Creek airport	Trucks, chainsaws, and power washers; up to 26 working days
Installation of the engineered log jam	Logs would be rigged to helicopters, flown to the installation area, and lowered into place.	Ranger Creek airport staging area, flight path above White River Floodplain, 1.78-acre engineered log jam installation area	Up to two days of work
Installation of the headcut fill structure	Logs would be rigged to helicopters, flown to the installation area, and lowered into place. Minor excavation with hand tools such as shovels would create a level surface to place the logs and nestle them in place. Chainsaws would be used to remove trees in the material drop zone and to field-fit logs before placement.	Ranger Creek airport staging area, 2-mile flight path above the White River Floodplain, 0.71-acre headcut fill structure installation area	Up to four days of helicopter use and work; approximately three weeks for structure construction

Alternatives Considered but Dismissed

This section includes those alternatives listed in WSDOT's preliminary alternatives document submitted to the National Park Service during pre-NEPA planning.

The National Park Service and Washington State Department of Transportation developed several preliminary alternatives early in the planning process that were not carried forward for further analysis for the following reasons:

- Technical or economic infeasibility
- Inability to resolve the purpose and need for taking action (particularly the imminent risk of erosion to the highway)
- Duplication with other, less environmentally harmful, or less expensive alternatives

Raise the Highway on Piers

This alternative would involve elevation of the highway on piers to separate the highway grade from the White River channel migration zone and the areas subject to erosion from the current and future potential active side channels. The elevated portions would span from milepost 57.7 to 60 and would likely require extensive buildup in advance of both mileposts to meet safety standards of the highway grade.

Rationale for Dismissal

This alternative was evaluated alongside other long-term solutions to the highway erosion risk (described below), each of which would require extensive planning and design that would not meet the Purpose and Need regarding the near-term imminent threat of highway avulsion from the active side channel or priority headcut. Therefore, while this alternative remains a reasonable option for consideration as part of future long-term planning efforts, it was dismissed from further analysis for the purposes of this NEPA document because it does not meet the short-term need.

Raise the Highway Embankment (Buildup)

This alternative would involve the complete buildup of the existing SR 410 to provide a similar grade separation as that of the Raised Highway on Pier alternative. It would also require extensive earthwork and soil disturbance to both raise the highway to a sufficient point and to safeguard the embankment against erosion from the active side channel and priority headcut.

Rationale for Dismissal

As with the pier alternative discussed above, this long-term solution would require extensive planning and design, and thus fails to address the immediate near-term Purpose and Need. Therefore, this alternative was dismissed from further analysis.

Construct Additional Emergency Flood and Erosion Protection Measures

This alternative includes several alternative emergency flood and erosion protection measures that were considered alongside the engineered log structures under the Proposed Action. Such potential alternative flood and erosion protection measures included:

- A log cribwall along the mainstem of the White River

- Buried log and rock toe structures
- New culverts under and along SR 410
- A sheet pile wall
- An earthen or reinforced dike or levees and dredging
- A mechanically stabilized earthen flood wall
- Additional headcut fill structures to those proposed in the Proposed Action

Rationale for Dismissal

The log cribwall and buried log and rock toe structures would achieve a similar result to the log structures proposed under the Proposed Action and would be similarly placed within wilderness; however, the size and positioning of these structures would increase ground disturbance within the White River channel and would require more maintenance and monitoring.

New culverts along SR 410 would not arrest erosion of the active side channel or priority headcut. While new culverts would provide further capacity for the roadway to handle flooding events, erosion would continue to increase to the point where additional culverts are also overwhelmed.

Structures such as the earthen or reinforced dike, levee, or the flood wall would have extensive environmental effects like those described above for the highway embankment alternative, while only serving as a near-term solution that would eventually need further action. Additionally, dredging does not prevent future flooding issues and would adversely affect federally listed fish species and in-water habitat. Channel deepening through dredging has a limited impact during major floods and may disconnect the river from its floodplain.

Additional headcut fill structures align with the Proposed Action, but they would not have commensurate benefits to erosion and flooding to justify the additional costs or work proposed within the wilderness area. The active side channel and priority headcut are considered the most at-risk locations, while the additional headcut locations are far enough away from SR 410 to not pose the same degree of near-term risk, allowing the Washington State Department of Transportation to put available funding toward exploration of a long-term solution.

The measures described above were dismissed from further evaluation for the reasons noted for each. In general, these options would either result in greater disturbance than the proposed structures, fail to address erosion of the side channel or headcut, lead to increased environmental impacts, or incur higher costs while providing fewer benefits.

Relocate the Highway

This alternative would involve the complete relocation of the SR 410 alignment to the east, outside of the White River channel migration zone. A range of alignments could be considered, including inside or outside of designated wilderness, and potentially outside of park boundaries.

Rationale for Dismissal

This long-term alternative includes similar planning/design time constraints and costs in line with the alternatives to raise the highway on piers or on an embankment. Further, relocation of the highway would require extensive clearing of upland forested habitat, potentially within designated wilderness. Construction of a new highway alignment and removal and rehabilitation of the abandoned section of road would also be costly. Due to the extensive planning time horizon and cost for this alternative, and the failure to meet the immediate, near-term need for action, relocation of the highway was dismissed from further evaluation in this Environmental Assessment.

Mitigation Measures and Best Management Practices

Floodplains and Wetlands

- Wetlands will be avoided to the extent possible.
- Logs for the structures will be sourced from the Fryingpan Creek Bridge Project.
- Turbidity will be monitored during installation of the structures. Work will be stopped if the turbidity exceeds the limits set by permitting requirements.
- All work in the White River will occur during the in-water work window between July 16 and August 15.
- All equipment will be cleaned to prevent introductions of non-native species.
- A Spill Prevention, Control, and Countermeasure Plan will be prepared and spill kits will be kept onsite.
- All requirements of subsequent permits will be implemented as required pursuant to the Clean Water Act and other legal and regulatory requirements associated with the project.
- A small pedestrian bridge comprised of a steel plate with wood dunnage beneath will be temporarily placed to allow crews to cross the side channel near SR 410.

Vegetation

- Structures will be field-fitted to avoid removing live trees, snags, and downed logs as much as practicable.
- All mechanized equipment will be inspected and cleaned before transportation to and from the primary project area to prevent introduction and spread of noxious plants/organisms.
- Existing vegetation will be retained to the extent possible.
- To minimize vegetation disturbance and to prevent a new opening in the floodplain forest, a designated temporary path originating from the west side of SR 410 will be utilized for foot access to the installation areas for both the engineered log jam and headcut fill structure. Once work is complete, the temporary path will be allowed to naturally revegetate.
- Small woody material/organic debris generated from project activities may be dispersed along the temporary foot path to facilitate natural recovery if there is excess available following installation of the headcut fill structure.

- A small number of trees will be removed to allow for safe helicopter operations at the installation area. Shrubs and small trees will be cut to ground level to preserve the root system and to minimize soil erosion. Whenever possible and when not in conflict with worker safety, dead trees and snags will be left standing.
- Critical tree root zones will be protected to the extent possible.
- Select live, standing trees will be used as anchor points during the installation and placement of the log structures. Tree guards will be installed on the anchor trees to prevent damage and girdling. Anchor straps must meet or exceed the safe working load of the rope or wire used for winching.
- All material sources incorporated into the installation area will be certified to be free from noxious weeds, invasive plants, and other deleterious materials by a federal, state, or local public agency. Commercial certifications may be acceptable if materials have been certified through the North American Weed Free Forage Program standard or a similarly recognized certification process. Certifications must include comprehensive lists of introduced plant species located at the material source site. All certifications will be evaluated by park vegetation specialists for approval.
- Log sources from the Fryingpan Creek Bridge Project would be inspected and evaluated by the National Park Service, and pest control measures would be implemented as needed (e.g., 2–3 years of Douglas-fir beetle control) to consist of the use of anti-aggregation pheromone packets.
- The McCullough Seed Orchard (i.e., log interim storage area) will be surveyed and treated for noxious weeds and beetles before and during use, and additional measures will be implemented if needed. Logs and rootwads will be free of soil and noxious weeds prior to transport to the installation areas. This may be accomplished by pressure washing and bark removal or other effective means. Any treatment completed on the logs will be appropriate for log placement in an aquatic habitat.

Special Status Species

In addition to the measures listed below, additional conservation measures will be incorporated based on the Endangered Species Act consultation.

- Regarding terrestrial species, the U.S Fish and Wildlife Service is to be notified within three working days upon locating a dead, injured or sick endangered or threatened species specimen. All operations would cease and consultation with the U.S. Fish and Wildlife Service will be conducted as appropriate. No work will resume until it is approved by U.S. Fish and Wildlife Service.
- Construction workers and supervisors will be informed of the occurrence and status of federally listed terrestrial species and will be advised of the potential impacts on the species and potential penalties for taking or harming a federally listed terrestrial species. Contract provisions will require the cessation of construction activities if a federally listed terrestrial species is discovered in the project area and until park staff reevaluate the project. This will allow modification of the contract to include protection measures determined necessary to protect the discovery.

- Turbidity will be monitored during installation of the structures. Work will be stopped if the turbidity exceeds the limits set by permitting requirements.
- In-water work will be limited to July 16 – August 15.
- If practicable, encourage fish species to migrate out of the work area before installing construction elements. Fish herding, such as walking through the area with seine or block netting, should be attempted before more invasive fish capture methods are deployed (hand or dip-nets, low-voltage electrofishing). Fish exclusion efforts will be supervised by a qualified fisheries biologist, with experience in work area isolation and fish capture and handling. Conduct fish herding techniques, followed by exclusion with seine and hand nets if practical, and then electrofishing only if necessary. Electrofishing should only be employed if conditions are conducive and other methods prove ineffective or impractical. Temperature and conductivity will be monitored through the whole fish exclusion effort to ensure safe conditions. See Appendix C for WSDOT's detailed Fish Exclusion – Protocol and Standards.
- Qualified biologists will document all salmonids and other fishes encountered during fish capture and removal operations, in accordance with the permitting requirements.
- Captured fish will be kept in cool, aerated, and shaded water during relocation activities and relocated as soon as possible.
- Any salmonid injuries will be reported to the appropriate agency (National Marine Fisheries Service or U.S. Fish and Wildlife Service) within 24 hours.
- All in-water work will be conducted in compliance with the designated in-water work window for bull trout. In-water work will follow all avoidance, minimization, and conservation measures resulting from U.S. Fish and Wildlife Service and National Marine Fisheries Service Endangered Species Act consultation to minimize effects to bull trout, Puget Sound steelhead trout, Puget Sound Chinook salmon, pink salmon, and coho salmon. Timing of construction activities will be coordinated to avoid disturbance to spawning activities of bull trout (including the disturbance of salmonid eggs and fry incubating within stream gravels) to the extent possible.
- To the extent possible, current year spotted owl surveys using Autonomous Recording Units will be performed and preliminary results provided in early June of that year. Active owl territories are based on the most recent information available and may change during a season as new information is obtained.
- If northern spotted owl or marbled murrelet activity is discovered in the project area during project activities, construction work will stop and consultation with the U.S. Fish and Wildlife Service will be reinitiated.
- Aircraft will maintain a minimum altitude of 0.5 miles (Chinook) or 0.25 miles (K-MAX, A-Star) above canopy in forested areas within suitable spotted owl or marbled murrelet habitat other than during take-off and landing, longline operations, or as required for aviation safety.
- Biologists will check for nesting prior to tree removal.
- If gray wolf dens or rendezvous areas are documented (e.g., through Washington Department of Fish and Wildlife tracking, NPS surveys, or confirmed wildlife sighting reports) within one mile of the project area during the years prior to or during project

implementation, the National Park Service will reinitiate consultation with the U.S. Fish and Wildlife Service to determine whether additional conservation measures are needed and if formal consultation is required.

- If an active gray wolf den or rendezvous site becomes established, no ground-disturbing work will occur within 0.25 miles, until wolves are no longer using the area for denning or as a rendezvous site or as determined through consultation with the U.S. Fish and Wildlife Service.
- Daily timing restrictions for marbled murrelets will be observed for all construction activities as the work would take place during the murrelet nesting season (April 1 to September 23) and adjacent to suitable murrelet habitat. Construction activities would be restricted to start no earlier than two hours after sunrise and end no later than two hours before sunset. Hauling along existing roads would not be subject to these timing restrictions.
- The contractor will be required to keep all waste and contaminants contained and remove them daily from the work site. Food and other wildlife attractants will be contained to minimize risk of attracting nest predators (i.e., corvids). Other mitigation measures to prevent human-wildlife conflict will include the following: feeding or approaching wildlife will be prohibited; a litter control program will be implemented during construction to eliminate the accumulation of trash; and all food items will be stored inside vehicles, trailers, or wildlife resistant receptacles except during actual use to prevent attracting wildlife.
- At the end of each day, the active installation areas will be left in a state that minimizes the obstruction of wildlife movement through the area (i.e., covering holes) and avoids unintentionally attracting wildlife.

Archaeological Resources

- To minimize the amount of ground disturbance, vehicle staging will be in the paved pullout on SR 410, away from visitor use areas to the extent possible.
- A project-specific Unanticipated Discovery Plan will be developed and followed for archaeological discoveries that are not subject to the Native American Graves Protection and Repatriation Act. Should construction unearth previously undiscovered cultural resources, work will be stopped around the discovery and the park will consult with the State Historic Preservation Office (SHPO) and the Advisory Council on Historic Preservation, as necessary, according to 36 CFR 800.13, Post Review Discoveries. In the unlikely event that human remains are discovered during construction, provisions outlined in the Native American Graves Protection and Repatriation Act and Mount Rainier National Park Inadvertent Discovery Plan will be followed.
- The National Park Service will ensure that all contractors and subcontractors are informed of the penalties for illegally collecting artifacts or intentionally damaging paleontological materials, archaeological sites, or historic properties. Contractors and subcontractors will also be instructed on procedures to follow in case previously unknown paleontological or archaeological resources are uncovered during construction.

Visitor Use and Experience

- SR 410 will remain open during construction, so visitors can continue to access the facilities and recreational amenities at the Sunrise area. Short-term traffic delays (up to 30 minutes) may be necessary during specific construction activities. Closures will be kept to a minimum and only implemented as necessary.
- The National Park Service and the Washington State Department of Transportation will coordinate and communicate the construction schedule through press releases, the park website, and other appropriate means to inform visitors of construction activities and short- and longer-term closures.
- During construction activities, safety measures to protect visitors will be implemented. These will include restricting visitors from active work areas.
- The construction contractor will use traffic safety signs and flaggers to inform and manage traffic on affected roads during construction activities.

Chapter 3: Affected Environment & Environmental Consequences

General Methods for Analyzing Impacts

This chapter describes the affected environment and the environmental consequences for resources retained for analysis that could be impacted by implementing either of the alternatives. The affected environment discussion for each resource precedes the impact analysis and describes the baseline conditions within the project area.

An initial 14.85-acre study area was defined based on recommendations from the site and reach assessment conducted for SR 410 between mileposts 57.7 and 60. The study area includes locations susceptible to inundation and/or bank erosion, either from the mainstem river adjacent to the highway or from expanding side channels, as identified in the assessment.

Within this study area, two installation areas were delineated to encompass the footprints of the proposed engineered log jam and the headcut fill structure. Additional areas were identified inside and outside of the study area for inclusion in the project area. Collectively, these areas represent the full footprint of all activities associated with the proposed action and are identified below:

1. The engineered log jam installation area;
2. The headcut fill structure installation area;
3. A vehicle staging area along an existing shoulder pullout on SR 410 where crews would park vehicles and unload hand tools;
4. A pedestrian access route connecting the vehicle staging area to the two installation areas;
5. The interim storage area at the McCullough Seed Orchard where logs would be stored;
6. The Ranger Creek Airport staging area where logs would be prepped and rigged to helicopters; and
7. The helicopter flight path between the Ranger Creek staging area and the installation areas.

The first four components above are considered the primary project area, comprising an area of approximately 8 acres. That 8-acre primary project area is located within the initial, larger study area.

The resources described in this chapter are soils and vegetation; hydrology; wetlands and floodplains; fish, wildlife, and special status species; cultural landscapes and historic structures; park and highway operations; visitor/traveler use and experience; and wilderness. This chapter is organized by resource topic so that the No Action and Proposed Action can be compared to each other. An area of analysis, or the geographic area within which impacts on a particular resource are analyzed, is defined for each resource.

The mitigation measures and best management practices described in Chapter 2 are considered part of the alternatives. Where appropriate, mitigation measures and/or best management practices for adverse impacts are also described and incorporated into the evaluation of impacts.

The impact analyses and conclusions are generally based on a review of existing literature, studies, and research performed by park staff; information provided by experts within the National Park Service, Washington State Department of Transportation, and other agencies and institutions; professional judgment; park staff expertise and insights; and public input (refer to Chapter 4).

Context for Analyzing the Incremental Effects of the Action

The impact analysis addresses the effects on the environment that result from the reasonably foreseeable incremental effects of the action within the context of past, present, and reasonably foreseeable trends and planned actions in or near the project area. Past, present, and reasonably foreseeable projects considered in the analysis are presented in Appendix D.

Impact Topic: Soils and Vegetation

Soils and vegetation depend on each other ecologically and share common regulatory considerations, impacts, and mitigation measures. Therefore, they will be discussed in the same section to avoid duplication and provide a more holistic understanding of these resources. The area of analysis for soils and vegetation focuses on the primary project area within the context of SR 410.

Affected Environment

Soils

The primary project area has a diverse suite of soils largely driven by extreme topography, variable parent material, and volcanic activity. Three soil map units occur within the primary project area — Flett-Narada complex (0 to 25% slopes), Vantrump-Laughingwater-Longmire complex (0 to 35% slopes), and Riverwash-Flett complex (0 to 25% slopes) (Figure 7; NRCS 2019).

The Flett-Narada and Vantrump-Laughingwater-Longmire complexes are mapped in the upland portions of the primary project area. These soils develop in a mixture of volcanic ash and andesite-derived alluvium or colluvium and generally contain shallow organic layers. These soils tend to be moderately to excessively well drained and experience low frequency flooding.

The Riverwash-Flett complex occurs within floodplains and terraces; these soils are located immediately adjacent to the White River within the primary project area. Flooding within this complex ranges from rare to frequent but brief (NRCS 2019). Alluvial soils such as these occur in major river valleys, along streams, wet benches, and alluvial slopes and fans. They consist of coarse undifferentiated fine or very fine sands. Alluvial deposits are of varying thickness and texture (NPS 2010). The consistency and dispersal of soils within the primary project area are informed by aggradation that is caused by seasonal snowpack thawing and high flows of the White River.

Environmental Trends for Soils: The soils of the roadside areas have been disturbed by human activities, such as construction and maintenance of the road as well as cars moving off the pavement onto the unpaved shoulder while driving and for parking. Beyond the road corridor, soils are undisturbed by humans and support healthy, relatively stable coniferous forests. A substantial cause of this can be attributed to wilderness restrictions which prohibit off-road vehicles and other construction, thus preserving the natural state of soils beyond roadside areas. However, aggradation caused by the shifting channel morphology of the White River has likely altered topsoil within the primary project area over years of channel migration.

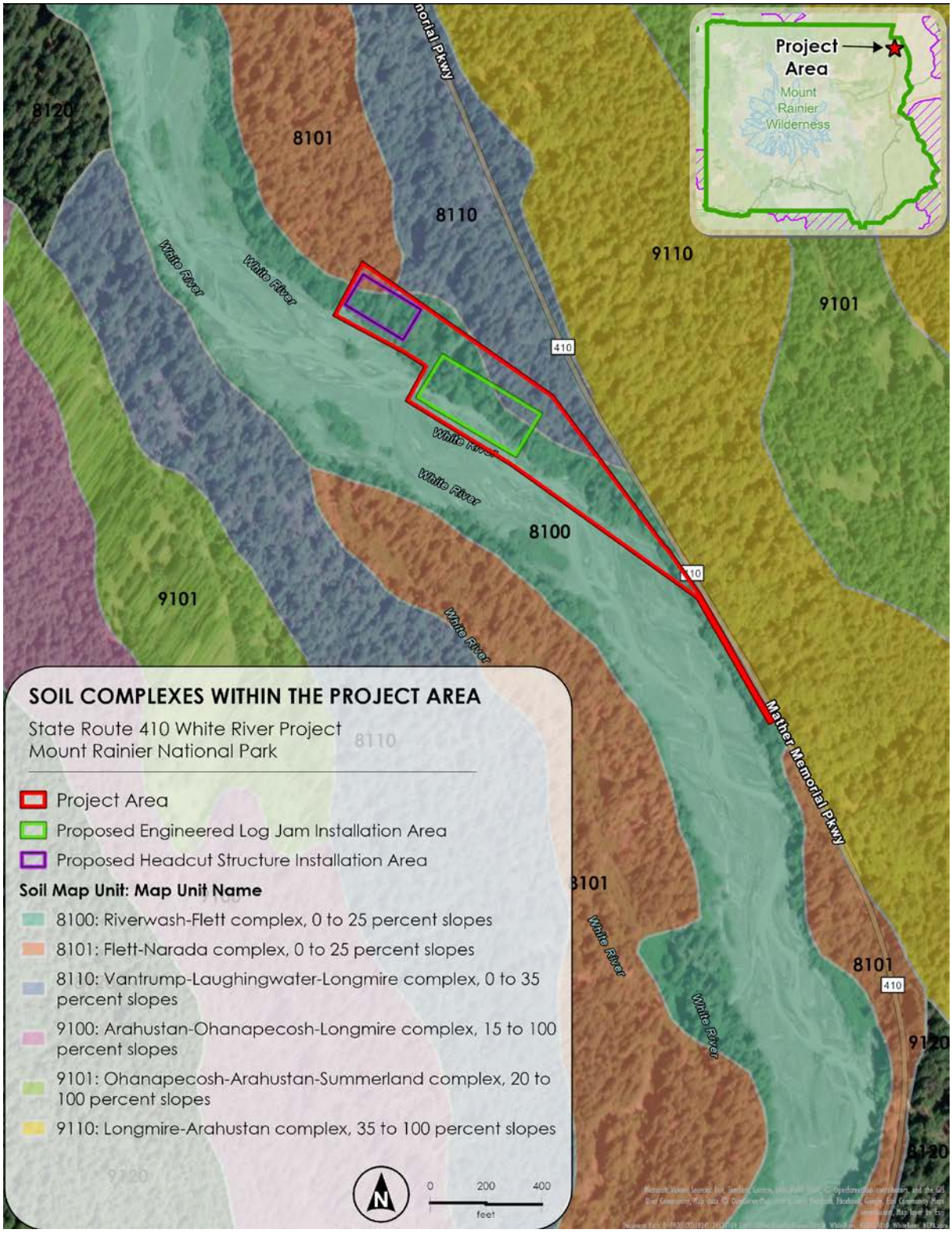

FIGURE 7. SOIL COMPLEXES WITHIN THE PRIMARY PROJECT AREA

FIGURE SOURCE: (NRCS 2019)

Average annual air temperatures in the northwestern United States (the region consisting of Oregon, Washington, and Idaho) have increased by nearly two degrees Fahrenheit since 1900. Warmer winter temperatures impact snowpack and are projected to cause more winter precipitation to fall as rain rather than snow. Summer precipitation is anticipated to decrease. The combination of changes to winter and summer precipitation are projected to contribute to droughts that are more frequent, longer in duration, and more severe, which would impact soil characteristics. Rising average temperatures and reduced snowpack accelerate glacier melt, which in turn increases the amount of rock and sediment released into the river and along nearby banks.

Vegetation

Park vegetation is diverse, encompassing three ecological zones: the alpine zone, the subalpine zone, and the forested zone. The primary project area is in the forested zone (Figure 8 and Figure 9). The forested zone blankets the lower elevations of the mountain flanks, occupying 58% of the park, and is dominated by the following evergreen trees: western hemlock (*Tsuga heterophylla*), Douglas-fir (*Pseudotsuga menziesii)*, western red cedar (*Thuja plicata*), Pacific silver fir (*Abies amabilis*), mountain hemlock (*Tsuga mertensiana*), Noble fir (*Abies procera*), subalpine fir (*Abies lasiocarpa*), Alaska yellow cedar (*Chamaecyparis nootkatensis*), Engelmann spruce (*Picea engelmannii*), western white pine (*Pinus monticola*), and lodgepole pine (*Pinus contorta*). Deciduous trees include bigleaf maple (*Acer macrophyllum*), red alder (*Alnus rubra*), and black cottonwood (*Populus trichocarpa*). As noted in Figure 8, the project area is mapped as moist western hemlock, Douglas-fir and foamflower forest as well as broadleaf riparian and swamp forest.

A tree count was performed to characterize tree species and sizes within the study area, as defined at the beginning of Chapter 3. Details of the tree count are provided in Appendix E; discussions in this section are specific to the engineered log jam installation area and headcut fill structure footprint. The engineered log jam installation area contains 211 trees; of these, 171 were recorded as conifers, 25 as deciduous, and 15 as unidentified dead individuals. A total of 26 trees fall within the headcut fill structure footprint; 25 of these individuals were identified as living conifers, while the remaining one was recorded as being an unidentified dead tree. Among the living trees mapped and recorded within the headcut footprint, diameter at breast height measurements ranged from 6 inches to 66 inches (Appendix E).

Environmental Trends of Vegetation: Aggradation caused by the shifting channel morphology of the White River has likely altered topsoil and root structures of vegetation within the primary project area over years of channel migration. Increasing average annual temperatures and decreased snowpack increase the rate at which glaciers melt, increasing rock and sediment deposit into the river and nearby banks. Additionally, erosion is occurring along stream banks, removing organic soils and plant litter. When severe, this loss in soil leads to tree and understory vegetation mortality. In its natural state, this mortality in the primary project area is reciprocated by areas of aggradation and stabilization. The trends to vegetation caused by changes in stream morphology are a natural process.

Additionally, the drought conditions brought on by changes in temperature and weather patterns can lead to increased plant stress, changes in species composition, reduced productivity, and higher susceptibility to pests, disease, and wildfire, all of which can significantly alter vegetation communities.

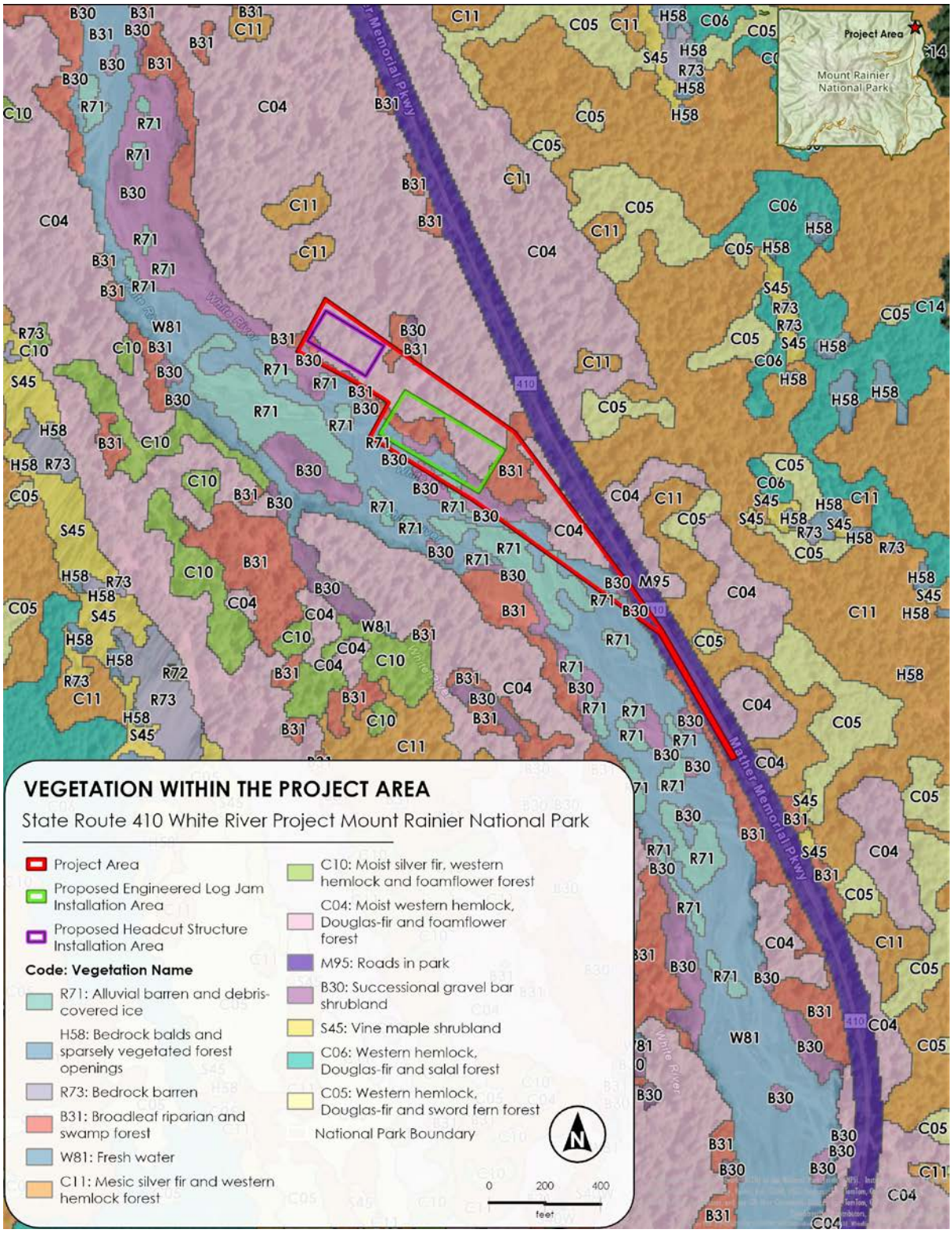

FIGURE 8. VEGETATION WITHIN THE PRIMARY PROJECT AREA

FIGURE SOURCE: (NPS 2025A)

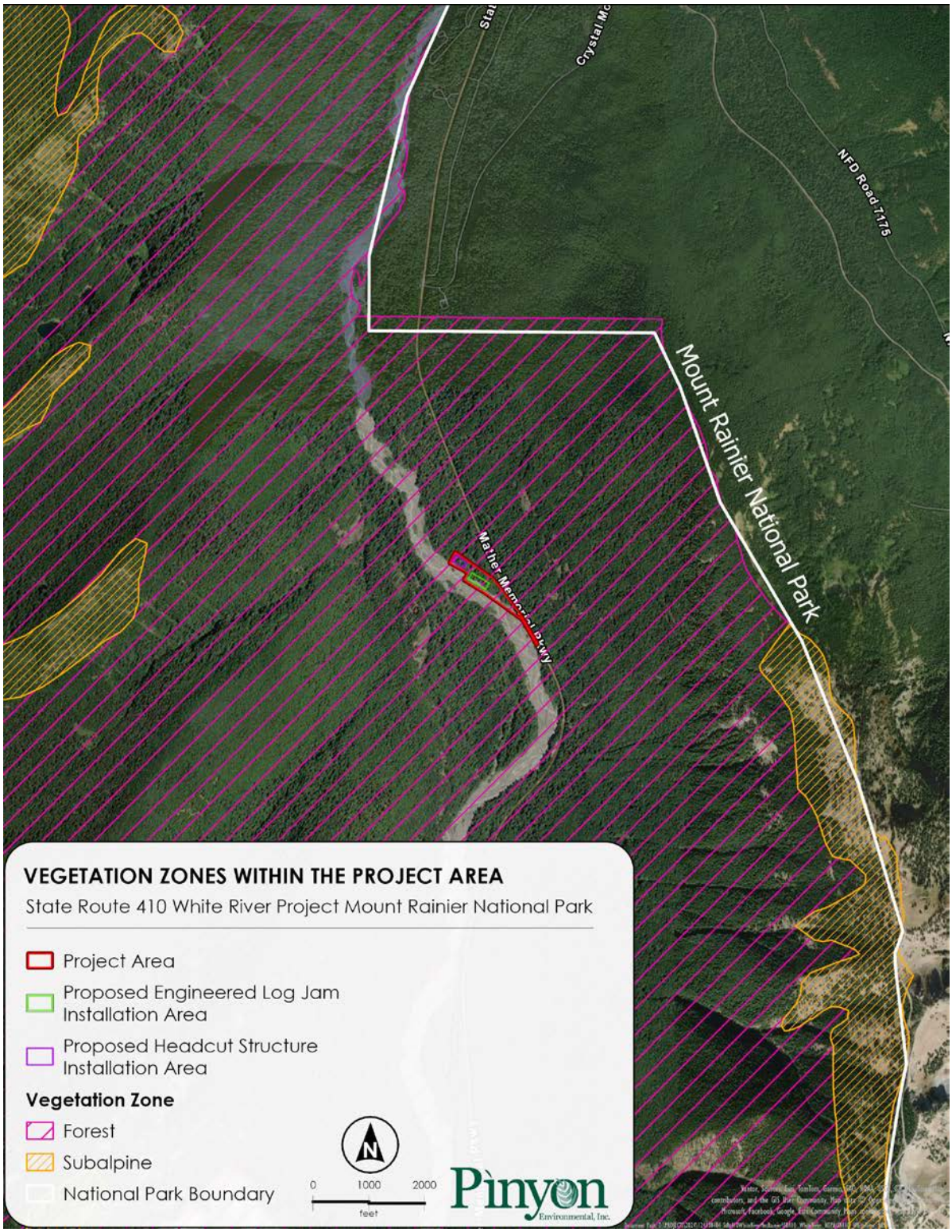

FIGURE 9. VEGETATION ZONES WITHIN THE PRIMARY PROJECT AREA

FIGURE SOURCE: (NPS 2025A)

Impact Assessment for Soils and Vegetation

Impacts of No Action Alternative

Under the No Action Alternative, the existing soils and vegetation would remain undisturbed by human action and there would be no erosion mitigation controls put in place along the White River. The primary project area would experience natural impacts on vegetation and soils due to continuing aggradation and channel migration. As a result, soils and vegetation within the primary project area would continue to be eroded, inundated, and transported. It is also possible that the No Action Alternative would lead to a catastrophic failure of the road from eventual avulsion of the main channel of the river, resulting in the displacement of asphalt into floodplain soils and vegetation.

Impacts of Proposed Action

Under the Proposed Action, the engineered log jam would reduce flow entering the side channel and distribute that flow more broadly across the adjacent floodplain. This would decrease shear stress and limit further channel incision within the side channel, helping to stabilize existing soils in that area. In the main channel, concentrating flow may increase localized shear stress and could result in limited, site-specific scour or deposition; however, the project is not expected to substantially alter the broader aggrading behavior of the White River. The headcut fill structure would stabilize the existing channel grade and reduce the potential for continued upstream migration of headcuts. While this action would not directly improve soil properties, it would help prevent additional soil loss associated with continued channel incision.

Minor impacts due to compaction in the material drop zone are likely; however, they would be short-term. Due to the limited foot traffic required during installation, impacts to soils in the form of compaction are not anticipated.

Up to 12 trees are expected to be directly impacted by helicopter operations during the installation of the engineered log jam, including damage to tops, trunks, or branches. These trees would consist of coniferous species ranging from 6 to 18 inches diameter at breast height. Within the installation area for the headcut fill structure, one conifer and two snags of less than 18 inches diameter at breast height would be cut down at the stump to create the material drop zone and create a small staging area just southeast of the structure site. These trees would be cut down immediately prior to log installation.

There is also the potential impact of sling loads, such as the risk of damage to trees (broken or stressed branches) during insertion of the logs by helicopter longline. Additionally, use of a helicopter would cause temporary high-speed winds due to rotor wash while the helicopter hovers over the log structure installation areas and Ranger Creek airport staging area. These high-speed winds may temporarily affect vegetation through physical damage like broken stems or leaves.

Lastly, during post-construction maintenance, impacts on vegetation may occur in the form of branch breakage during required maintenance. However, because these structures are intended to mimic natural conditions, maintenance needs would be identified only as needed.

INCREMENTAL EFFECTS OF THE ACTION

Within the project area, past, present, and reasonably foreseeable future actions include the original construction of McClellan Pass Highway (now called SR 410), the continued maintenance of SR 410, ongoing park operations, and foreseeable long-term solutions to erosion risk to SR 410 (i.e., relocation,

elevation of the highway, etc.). The construction of SR 410 constituted a permanent impervious surface that interrupted what would otherwise be unbroken, continuous floodplain forest without the original highway construction. Construction required the removal of vegetation and the compaction of soil to build the roadway subgrade. The permanent but localized impacts to vegetation under the Proposed Action would not spatially overlap with impacts from the original construction of SR 410 or ongoing maintenance or natural resource management. Additionally, the impacts to vegetation under the Proposed Action would be easily recovered by the natural ecosystem due to their limited spatial extent.

The Washington State Department of Transportation is evaluating a long-term solution to erosion and flooding risk for SR 410, as a reasonably foreseeable future action. This action may include elevation of the highway on piers or embankments, or the complete relocation of the highway away from the White River channel migration zone. While the details of this action are unknown at this time, there would be long-term impacts to vegetation and soils. However, a long-term solution would have the benefit of removing the need for frequent, smaller actions to protect the highway from erosion and flooding.

Impact Topic: Hydrology

Affected Environment for Hydrology

The impact topic of hydrology concerns the science that encompasses the occurrence, distribution, movement, and properties of water – both on and below the earth's surface. The area of analysis for hydrology includes the White River adjacent to the primary project and areas immediately up- and downstream. Over 80 percent of the annual precipitation in western Washington falls between October and April, though local storm and precipitation patterns are strongly influenced by Mount Rainier (WSDOT 2017). Most of the annual precipitation falls as snow from November to February above an elevation of approximately 3,000 feet. The hydrology of the White River reflects these precipitation patterns, as flooding from Mount Rainier occurs most often in fall and winter, primarily November through January. The months of November through March see the greatest number of annual peak flow events. Flooding of SR 410 between mileposts 57.7 to 60 occurs when high water overtops the active channel of the White River and flows into side channels adjacent to the highway. Although the side channels carry only a small portion of the White River's flow, they readily flood SR 410 because the highway sits at a lower elevation than the river's active channel.

Rivers in the park, including the White River, undergo a process called aggradation. Unlike erosion, in which rivers erode the floodplain beneath them (such as the Colorado River which erodes the Grand Canyon), aggradation results in the deposition of sediment and rocks within the floodplain, raising the riverbed above historic levels. Aggradation occurs because the glaciers that feed the rivers in the park supply more rocks than the rivers are capable of transporting, resulting in rocks and sediment settling out of the water column and onto the riverbed. Historically, aggradation in much of the park occurs at a rate of three feet per decade, though this average includes cyclic and nonlinear rates, which complicate exact predictions of river behavior (NPS 2018). Aggradation in the rivers of the park is not uniform, however, occurring at different locations of the floodplain depending on the orientation of the river. Increasing annual temperatures increase the rate at which the glaciers in the park melt, increasing the volume of rocks and sediment that are deposited into glacier-fed rivers.

While the main channel of the White River has not experienced significant lateral migration, aggradation and flood events have led to the creation and sustainment of side channels. These side channels, which convey only a fraction of the total flow in the river, have steep gradients caused in part by aggradation of the main channel, and bring flows away from the main channel. These flows threaten SR 410 through bank erosion and inundation of the road prism.

Environmental Trends of Hydrology: Hydrologic patterns are affected by climatic changes occurring in the Pacific Northwest and elsewhere. These changes are characterized by drier drought periods and more frequent large storms. Precipitation trends are changing throughout the region, with a reduction in summer precipitation and an increase in winter and spring precipitation. More winter precipitation is falling as rain than snow due to warmer temperatures and this affects snowpack. Larger atmospheric rivers, defined as thick bands of air that transport large amounts of moisture north from the tropics, have caused increased flooding and heavy winds (USDA 2026). Recurring large storms create higher flow events that occur with greater frequency. More frequently occurring high discharge events then increase the frequency of overbank flow into adjacent low-lying floodplains and increase the risk of headcutting side channels forming (WSDOT 2017).

Impact Assessment for Hydrology

Impacts of No Action Alternative

Under the No Action Alternative, flood events would continue to occur and the erosive flows in the White River would continue to occur, undeflected. These erosive flows would result in changes to the channel morphology, including additional headcuts and avulsions. The elevation of the White River locally exceeds the elevation of SR 410, which suggests that channel avulsions or lateral migration of the White River across the floodplain valley bottom are possible (WSDOT 2017). Thus, it is possible that the No Action Alternative would lead to a catastrophic failure of the road from eventual avulsion of the main channel of the river.

Impacts of Proposed Action

Under the Proposed Action, the engineered log jam and headcut fill structures would reduce the velocity of the water, especially in the near-bank area, and deflect flow away from the banks. Specifically, the headcut fill structure would increase erosion resistance and dissipate energy as flow is directed over the structure. The engineered log jam would function similarly in increasing erosion resistance and would dissipate flow over, around, and through the structure. This would protect SR 410 from bank erosion and additional channel avulsions.

INCREMENTAL EFFECTS OF THE ACTION

Within the area of analysis for hydrology, past, present, and reasonably foreseeable future actions include the original construction of the highway and foreseeable long-term solutions to erosion risk to SR 410 (i.e., relocation, elevation of the highway, etc.). Highway construction altered local hydrology by increasing both the velocity and volume of surface water runoff and encroached on the floodplain. The highly localized impacts of the engineered log structures are not expected to affect overall hydrological processes.

Impact Topic: Wetlands and Floodplains

Affected Environment for Wetlands and Floodplains

Wetlands

For this Environmental Assessment and compliance with Executive Order 11990, "Protection of Wetlands," the National Park Service uses Classification of Wetlands and Deepwater Habitats of the United States (Cowardin et al. 1979) as the standard for defining, classifying, and inventorying wetlands. Habitats addressed for this analysis include wetlands, navigable waters, lakes, ponds, small streams, and some ditches. The area of analysis for wetlands is limited to the primary project area.

Publicly available data shows three riverine wetland types within the primary project area. Two riverine wetlands are mapped on the USFWS's National Wetland Inventory Mapper within the installation area of the engineered log jam (USFWS 2025a). Both wetlands are classified as riverine systems, upper perennial subsystems. The wetland type mapped near the center of the White River channel is classified as an unconsolidated bottom class and a permanently flooded water regime. The wetland type mapped west of the center of the White River channel is classified as an unconsolidated shore class and a seasonally flooded water regime.

A stream and wetland delineation was conducted in May 2025 (Hamer 2026) to map potential Waters of the U.S. (e.g., the White River, streams, and ditches) in the primary project area and larger study area ("survey area"). In addition to the White River, four unnamed intermittent streams, 10 wetlands, and one potentially jurisdictional ditch were identified (Figure 10 and Figure 11). The wetland delineation only mapped features classified as wetlands or those that were potentially jurisdictional. When analyzing impacts on wetlands and riparian areas, the State of Washington typically requires the analysis to also include potential impacts on wetland buffers. While state-required wetland buffers do not apply to the National Park Service, because Washington State Department of Transportation is implementing the project within the park, the buffers are included here for their compliance requirements. The regulated wetlands, riparian areas, and associated buffers within the survey and primary project areas are summarized below in Table 2. Wetlands within the primary project area are in bold. Wetland E is described further below the table as it is the only wetland that would be directly impacted by the project.

TABLE 2. SUMMARY OF WETLANDS WITHIN THE STUDY AREA

Critical Area	Hydrogeomorphic Class	Type or Category[1]	Size (Acre)	Buffer Width (ft)[2]
Wetland A	Riverine	III	0.03	150
Wetland B	Riverine	III	0.01	150
Wetland C	Riverine	III	0.00	150
Wetland D	Riverine	III	0.00	150
Wetland E	Riverine	III	0.00	150
Wetland F	Riverine	II	0.13	300
Wetland G	Slope/Depressional	II	0.03	300

Critical Area	Hydrogeomorphic Class	Type or Category[1]	Size (Acre)	Buffer Width (ft) [2]
Wetland H	Riverine/Depressional	II	0.08	300
Wetland I	Riverine	II	0.01	300
Wetland J	Slope/Depressional	II	0.03	300
White River	N/A	F	N/A	175
Unnamed Streams	N/A	Ns	N/A	100

Source: Hamer 2026 Wetland and Stream Delineation Report.

[1]Wetlands rated according to Ecology (Hruby & Yahnke 2023) and the County code. Other waterbody types per Pierce County Code.

[2]Buffer widths applied per Pierce County Code.

Wetland E is a small riverine wetland located along the bank of the easternmost stream (side channel), where the headcut structure is proposed. The wetland was saturated at the time of the site visit but also receives overbank flooding from the stream. The herbaceous layer observed in this wetland includes a variety of mosses, Siberian miner's lettuce (*Claytonia sibirica*), stream violet (*Viola glabella*), piggyback plant (*Tolmiea menziesii*), foamflower (*Tiarella trifoliata*), wall lettuce (*Lactuca muralis*), and Cooley's hedge nettle (*Stachys cooleyae*).

Floodplains

Floodplains are generally defined as inclusive of the river channel itself (the floodway) as well as the relatively flat areas near the river that include historic and potential meanders of the river (active floodplain). Floodplains contribute much to their ecosystems, including through abiotic factors such as groundwater recharge, water quality maintenance, and erosion control. Biotic contributions of floodplains to the environment include support of wetlands, increased biological productivity, fish and wildlife habitats, and recreational opportunities. The area of analysis for floodplains is limited to the primary project area.

The White River is a glacial tributary to the Puyallup River, beginning at the terminus of the Emmons Glacier on Mount Rainier. The upper White River flows through a deep, U-shaped glacial valley and receives runoff from the Emmons Glacier, Inter Fork White River, Fryingpan Creek, Shaw Creek, Klickitat Creek, Deadwood Creek, and Crystal Creek. The primary project area is within a low gradient reach of the White River within the channel migration zone. In the primary project area, the floodplain of the White River is bounded to the west by Sunrise Ridge. To the east, the floodplain extends toward Crystal Mountain and includes SR 410 (Figure 9). The White River floodplain is unstable and dynamic, influenced by aggradation and floods that are increasingly frequent and severe, exacerbated by climate change.

Aggradation in the White River occurs from higher sediment loads than the river has the capacity to transport. Higher amounts of sediment on top of the Emmons Glacier, deposited by the 1962 rock fall of Tahoma Peak and other more recent rock fall events, combined with an increase in the rate of glacier melt, results in deposition of sediment within the active channel as sediment falls out of the water column. This aggradation results in an increasing channel base elevation, causing high potential for the creation of side channels, such as those that currently threaten SR 410. Because of the protections afforded by the National Park and Wilderness designations, the river channel is lined by an

old-growth forested floodplain. The well-developed root systems of the old-growth forest and frictional resistance offered by the trees themselves have an inhibitory effect on the river's lateral expansion due to floods and aggradation and may provide some protection to the SR 410 road prism. However, this protection is insufficient to prevent all road damage (particularly that which is a result of side channel expansion) and changes to the channel would eventually result in mortality to the adjacent forested areas (WSDOT 2017).

The White River has a wide, braided active channel lined on both sides by old-growth forest in the riparian area. The channel includes unvegetated channel bars, which are inundated during high flows. Multiple side channels connected to the main channel have formed over time and bring flows closer to SR410. While these flows are relatively small compared to those in the main channel, they bring a high risk of catastrophic damage to the SR 410 road prism via bank erosion and inundation resulting from main channel avulsions (WSDOT 2017).

Floods in the park can occur any time of year from precipitation events, glacial outbursts, and rapid melting of snow and ice. Floods from melted glacial ice typically occur during the summer and fall, and precipitation-induced flooding occurs most frequently in late fall and early winter. Glacial outburst-generated floods are from a sudden release of water from a glacier and are known to occur in the summer and fall (NPS 2012). Notable floods have occurred in the primary project area in 2003, 2005, 2006, and 2016 and required emergency maintenance on the SR 410 roadway.

Environmental Trends of Wetlands and Floodplains: Severe drought conditions brought on by changes in temperature and weather patterns decrease water availability to wetlands as well as increase the risk of wildfire (EPA 2024). Wildfires can impact wetlands through burning wetland vegetation as well as impacting water flows and quality post-fire through a reduction in the upstream vegetation that slows stream flow and contributes to soil and bank instability.

Wetlands are considered highly sensitive to changes in temperature and seasonal flow rates. Shifts in the timing of snowfall and snowmelt, soil moisture stress, and recharge are already occurring and could result in systemic changes in the timing and duration of water available to wetland wildlife and plants. Data collected from Mount Rainier National Park, Olympic National Park, Willamette National Forest (Oregon), Deschutes National Forest (Oregon), and Trinity Alps Wilderness (California) indicate that these changes in temperature and seasonal flowrates for montane wetlands are likely to result in earlier and faster drawdown (lower water levels resulting from extended dry periods) in Pacific Northwest montane wetlands, leading to systemic reductions in water levels, shortened wetland hydroperiods (the length of time and portion of the year the wetland holds ponded water), and increased probability of drying (Lee et al. 2015). Increased intensity of drought and precipitation cycles is expected to gradually change the floodplain behaviors from continuous sediment transport and modest bankfull events into more stochastic (i.e., randomly determined) water inputs resulting in more intense sediment transport behaviors. Changes will likely lead to decreased flood resistance without any changes to the health and stability of the floodplain margins.

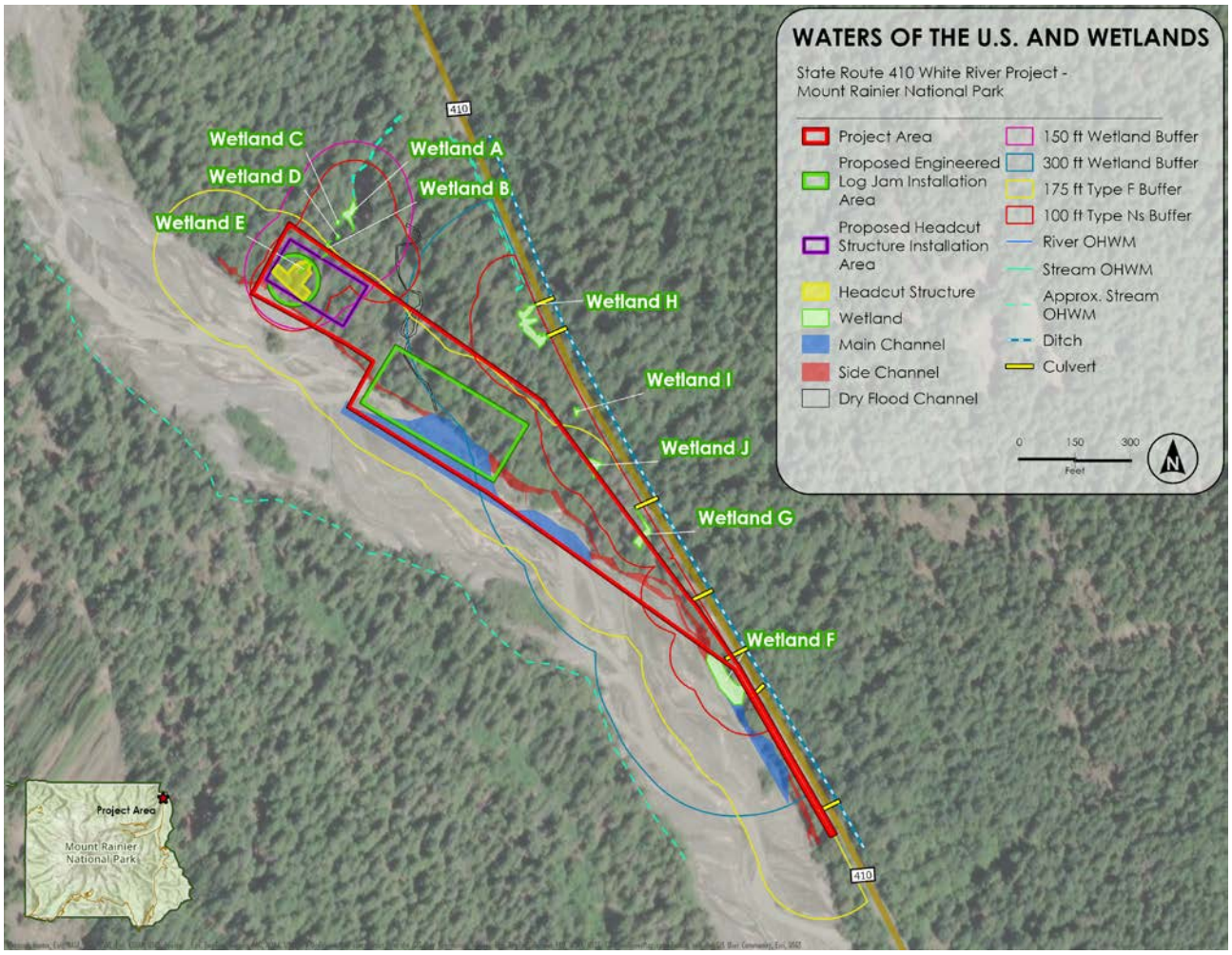

FIGURE 10. WATERS OF THE U.S. AND WETLANDS WITHIN THE PRIMARY PROJECT AREA

FIGURE SOURCE: (HAMER 2025)

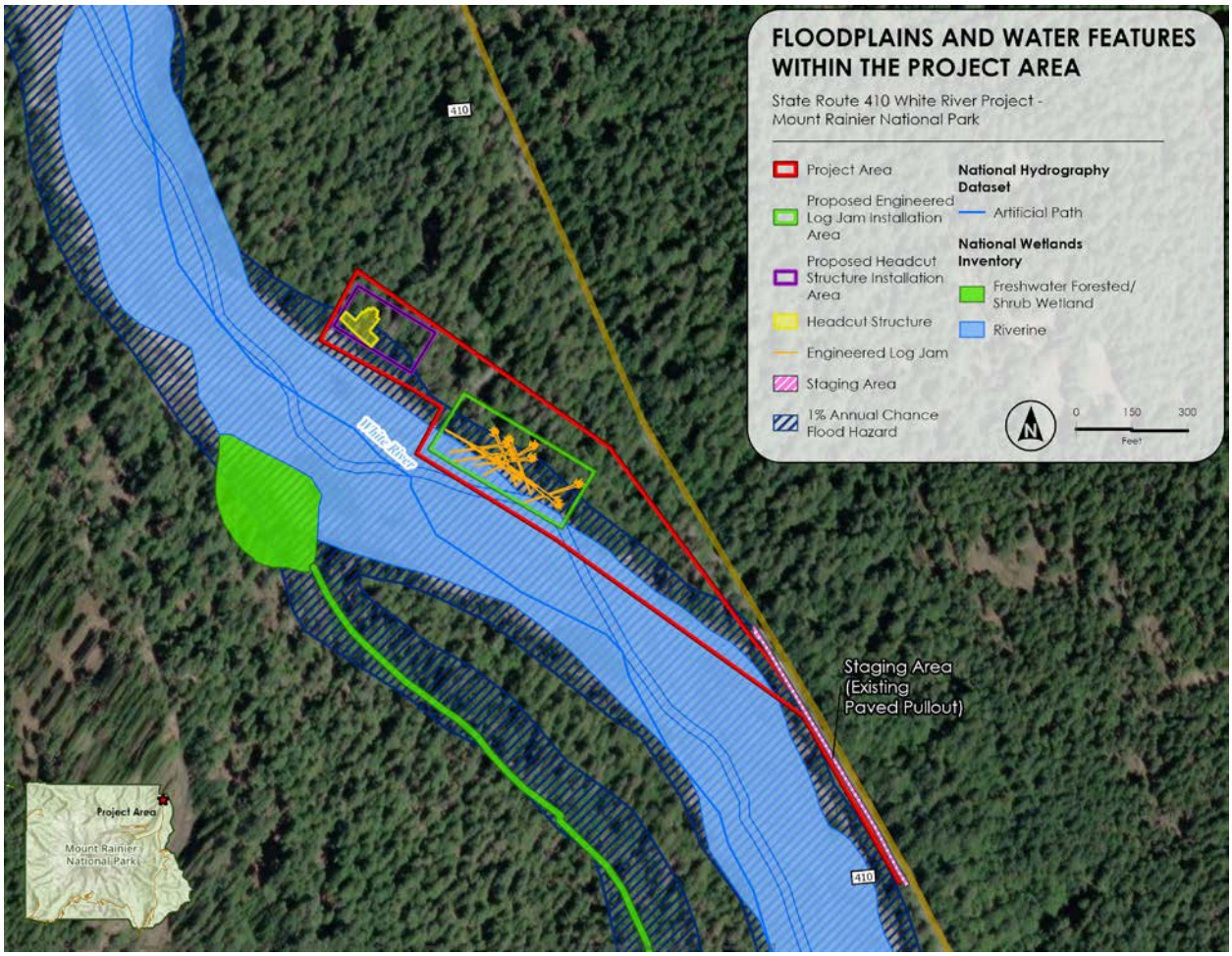

FIGURE 11. FLOODPLAINS AND WATER FEATURES WITHIN THE PRIMARY PROJECT AREA

FIGURE SOURCE: (NPS 2025A)

Impact Assessment for Wetlands and Floodplains

Impacts of No Action Alternative

Under the No Action Alternative, the Washington State Department of Transportation would not install additional treatments for flood inundation and would continue to manage periodic flooding by addressing flood damage to the road as funding allows. Bank erosion from side channels and the main stem White River would be treated on an emergency basis with road repairs using emergency funds. Emergency actions may include the placement of rip rap or other hardening within the channel and floodplain, which is likely to disrupt natural river processes.

As channel morphology of the White River continues to change, water quality would be affected in the absence of management. Flooding of the highway, bank erosion, and avulsion that leads to destruction of the SR 410 roadway would negatively impact water quality through the introduction of sediment and road material.

While channel migration would likely be part of either the No Action or the Proposed Action, sediment and road material eroded from SR 410 if the No Action Alternative is selected may result in sediment entering wetlands adjacent to the roadway. In present conditions, the most at-risk wetlands include

Wetlands H, I, and J, because those are nearest to both the roadway and the approximate active side channel alignment.

Impacts of Proposed Action

WETLANDS AND WETLAND BUFFERS

Under the Proposed Action, temporary construction activities would have impacts on wetlands and wetland buffers within the primary project area. Permanent impacts to one wetland, Wetland E, would be necessary to install the headcut fill structure, along with permanent impacts to wetland buffers for Wetlands A through E and the intermittent stream between them. Impacts associated with the installation of the headcut fill structure would include fill placement in Wetland E, completely filling it, as well as impacts to the wetland buffers for Wetlands A through E. Permanent wetland impacts to Wetland E due to fill would be 0.002 acre. Additionally, temporary impacts to the wetland buffers for Wetlands A through D would occur due to the material drop zone. No wetland impacts are anticipated related to installation of the engineered log jam, but permanent impacts to wetland buffers of Wetlands H through J would occur within the footprint of the log jam. The wetland buffer analysis is presented in Appendix F.

Although designs would avoid wetlands to the greatest extent possible, resource protection measures would be used to reduce impacts on areas that cannot feasibly be avoided. The full list of protection measures is described in detail in the Mitigation Measures and Best Management Practices section of this Environmental Assessment. Other adverse impacts to wetlands may occur from erosion and sediment built up from construction, and from increased human activity in the area disturbing habitat. These impacts would be limited to Wetland B, located on the northern edge of the headcut fill structure installation area, and would be possible due to activity in that area including within the material drop zone. Measures to mitigate these impacts include development of an erosion control and pollution prevention plan and implementation of erosion and pollution control measures.

The permanent impacts to the wetland buffers from the Proposed Action are not anticipated to change the functions of the wetlands onsite due to the nature of the impact. While the headcut structure and engineered log jam are long-term installations, they mimic natural conditions, and the natural materials would degrade and become part of the environment over time. The structures would not add impervious surface to the wetland buffers, and are not predicted to alter the general flow of precipitation on the surface as it flows into the wetlands. River side channels and adjacent streams would continue to function naturally as overflow during high water events and not alter the floodplain the wetlands reside in. Additionally, the development of an erosion control and pollution prevention plan and implementation of erosion and pollution control measures will protect wetland functions. The project will follow all regulatory and legal requirements for protection of wetlands, including Executive Order 11990: Protection of Wetlands and any conditions or mitigation required under the Clean Water Act.

WHITE RIVER FLOODPLAIN

The Proposed Action would impact the river and its riparian buffer, which is located along the southern edge of the primary project area. Construction activities associated with the headcut fill structure and engineered log jam—specifically vegetation removal and log placement—would impact the riparian area, which is comprised of mature coniferous forest with a sparse understory. Construction activities would have long-term effects on approximately 0.2 acre of the 175-foot buffer for the White River, and temporarily impact approximately 1.47 acre of the buffer. Additionally, approximately 0.09 acre of the

river channel below the Ordinary High Water Mark would be modified with the placement of the headcut fill structure and engineered log jam (Table 3). The engineered log structures are proposed to arrest channel avulsion and/or channel migration, which are natural channel/floodplain processes, resulting in incremental effects on floodplain processes. Given the small area of impact, minimal vegetation removal, and the use of large woody materials to mimic natural floodplain conditions, the project is not expected to result in overall impacts to the floodplain.

The project will follow all regulatory and legal requirements for protection of floodplains, including Executive Order 11988: Floodplain Management.

STREAM AT HEADCUT (SIDE CHANNEL)

The active side channel where the headcut fill structure is proposed conveys water seasonally. The Proposed Action would impact this stream (side channel) by temporarily reducing the size of the channel migration zone available upstream (east) of the new structures. Construction activities associated with the headcut fill structure—specifically log placement and removal of one ten-inch diameter at breast height and two twelve-inch snags—would impact the riparian area, which is comprised of mature coniferous forest with a sparse understory. Additionally, an estimated 12 trees are anticipated to be impacted during installation of large woody material for the engineered log jam, as a result of damage from helicopter placement of the logs, including damage to tops, trunks, or branches. Construction activities would permanently impact approximately 0.11 acre and temporarily impact 0.44 acre of the 100-foot stream buffer with the placement of the headcut fill structure (Table 3). Approximately 0.01 acre of the stream below the Ordinary High Water Mark would be permanently impacted by the placement of the headcut fill structure. The stream may be impacted by a loss or reduction of hydrology as a result of filling the inlet of the stream and further separating the stream channel from the channel of the White River. No impacts would be anticipated on the stream (side channel) during annual monitoring activities.

TABLE 3. SUMMARY OF STREAM, RIVER, AND RIPARIAN BUFFER IMPACTS

Waterbody	River/Stream Impacts Temporary	River/Stream Impacts Permanent	Riparian Buffer Impacts Temporary	Riparian Buffer Impacts Permanent
White River	0.68 acre	0.09 acre	1.47 acres	0.20 acre
Stream	0.01 acre	0.01 acre	0.44 acre	0.11 acre

INCREMENTAL EFFECTS OF THE ACTION

The Proposed Action would include permanent but localized impacts to wetlands and floodplains. It may also cause temporary impacts to water quality with the potential to impact sedimentation further downstream of the primary project area. Like the soils and vegetation assessment above, the localized impacts to wetlands and floodplains are considered in combination with the original construction of SR 410, the continued maintenance of SR 410, and reasonably foreseeable long-term solutions to erosion risk to SR 410 (i.e., relocation, elevation of the highway, etc.).

The immediate footprint of wetland impact under the Proposed Action would not overlap with maintenance and resource management activities along SR 410. At the time of original construction of SR 410, there was limited information available on the presence of wetlands within the highway alignment; however, wetlands appear to have formed along the drainage ditch of SR 410 and along the

approximate alignment of the active side channel within the floodplain forest. It can be assumed that the original construction of SR 410 permanently impacted wetlands, although any wetland function lost seems to have recovered with the formation of new wetlands alongside the highway. The 0.01-acre permanent impact to the stream (side channel) at the headcut, the 0.09-acre permanent impact to the White River channel, and the 0.002-acre permanent impact to wetlands under the Proposed Action would be easily recovered by the natural ecosystem in the same way wetland function has returned and adapted to the SR 410 alignment. Depending on the details of a long-term highway solution, wetlands and floodplains may benefit from the complete removal of the highway from its current at-risk location.

Impacts for water quality consider the downstream actions and activities that may further increase sedimentation and turbidity in combination with the Proposed Action's temporary impacts. These actions and activities include maintenance of SR 410 both within and outside of park boundaries, along with dispersed recreation and camping to the north of the primary project area on U.S. Forest Service land. Maintenance of the SR 410 roadway prism would generally employ erosion protection measures in accordance with the state Construction General Permit, preventing sediment from escaping into the White River. Dispersed recreation/camping may contribute sedimentation and turbidity to the White River due to boat launching, washing and cleaning of equipment in the river, and general human activity along the shores of the river. In general, the timing of the Proposed Action during low-flow periods and the magnitude of annual streamflow of the White River (median 2,922 cubic feet per second; Collins 2004) indicate that sediment and turbidity impacts would be quickly recovered within approximately 0.5 miles downstream.

Impact Topic: Fish, Wildlife, and Special Status Species

Affected Environment

The impact topic of fish, wildlife, and special status species concerns general aquatic and terrestrial wildlife, as well as state and federally sensitive species, that may occur in the project area. As a federal agency, the National Park Service must comply with Section 7 of the Endangered Species Act of 1973, which designates a framework of consultation with the United States Fish and Wildlife Service for the conservation of federally listed threatened and endangered species. Other applicable federal regulations include the Migratory Bird Treaty Act; the Bald and Golden Eagle Protection Act; and the Magnuson-Stevens Fishery Conservation and Management Act, which established Essential Fish Habitat as part of considerations for federal undertakings. Actions of the National Park Service are also guided by Mount Rainier National Park's Specific guidelines on fishing within the park and prohibitions of trapping and hunting. The area of analysis for fish, wildlife, and special status species is defined separately. For fish, the aquatic area of analysis includes the primary project area and a segment of the White River extending 0.5 mile downstream of the primary project area. The area of analysis for terrestrial wildlife and special status species is the project area and an additional 0.5-mile noise disturbance buffer.

Mount Rainier National Park is home to a wide variety of aquatic and terrestrial species and their habitats. The USFWS Information for Planning and Consultation database and the National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) Essential Fish Habitat Mapper database were used to generate this list of species listed or proposed for listing as threatened and endangered under the Endangered Species Act that may potentially occur in or near the project area (USFWS 2025b; NOAA Fish 2025). The Washington Department of Fish and Wildlife's (WDFW)

Priority Habitat Species mapping tool was also used to identify state-listed sensitive species that may occur in or near the project area (WDFW 2025). Twelve ESA-listed or proposed fish and wildlife species and their critical habitats are suspected to occur within or near the project area: bull trout (*Salvelinus confluentus*), Puget Sound steelhead trout (*Oncorhynchus mykiss*), Puget Sound Chinook salmon (*Oncorhynchus tshawytscha*), gray wolf (*Canis lupus*), marbled murrelet (*Brachyramphus marmoratus*), monarch butterfly (*Danaus plexippus*), Mount Rainier white-tailed ptarmigan (*Lagopus leucura rainierensis*), North American wolverine (*Gulo gulo luscus*), northern spotted owl (*Strix occidentalis caurina*), Suckley's cuckoo bumble bee (*Bombus suckleyi*), yellow-billed cuckoo (*Coccyzus americanus*), and whitebark pine (*Pinus albicaulis*). In addition to these ESA-listed and proposed species, the project area also includes essential fish habitat for Chinook salmon, coho salmon (*Oncorhynchus kisutch*), and pink salmon (*Oncorhynchus gorbuscha*). Based on habitat conditions in the project area, species' occupied ranges, and the nature of the Proposed Action, the Proposed Action would have no effect on the following species: monarch butterfly, Mount Rainier white-tailed ptarmigan, Suckley's cuckoo bumble bee, yellow-billed cuckoo, and whitebark pine. These species are not discussed further.

Due to the variable conditions in which the remaining species and their habitat occur, each species is described below.

Federally Listed Aquatic Species and Associated Habitat

BULL TROUT

Bull trout were listed as a threatened species by the U.S. Fish and Wildlife Service on November 1, 1999. Bull trout are also a state candidate species in Washington. Bull trout are frequent inhabitants of the White River. Bull trout critical habitat spans the entire length of the project area and known populations exist both up and downstream of the project area. This species is likely to be present year-round in the White River.

PUGET SOUND STEELHEAD TROUT

Puget Sound steelhead trout, a distinct population of steelhead trout, was federally listed as a threatened species in 2007, with a revision in 2014 to include the White River Winter Supplementation Program (Federal Register 2014). The Puget Sound steelhead trout has not been documented within the park or the project area, though suitable habitat exists within its boundaries. Critical habitat is found within the north end of the project area, encompassing approximately 0.85 mile of open waters in the project area. The potential presence of Puget Sound steelhead trout in the project area is unlikely but cannot be discounted.

Unlike other salmonid species, individuals of the Puget Sound steelhead trout distinct population segment spend more time in streams before they migrate to Puget Sound, making them susceptible to water quality and quantity stressors, including low flows and warm temperatures in summer.

PUGET SOUND CHINOOK SALMON

The Puget Sound evolutionary significant unit (ESU) of Puget Sound Chinook salmon was originally ESA-listed as threatened in 1999, and in 2014, the ESU's status was updated to include 26 different artificial propagation programs, like the White River (NOAA Fisheries 2025). Puget Sound Chinook salmon critical habitat is designated in the Upper White River to a point approximately 2.25 miles downstream of the project area. Though no occurrences of Chinook salmon have been recorded within the project area, it is likely that Chinook salmon occur within the project area given habitat suitability and connectivity with stream reaches where the species is known to occur.

Further, while most documented spawning of Puget Sound Chinook salmon occurs in mid-sized to larger tributaries such as Huckleberry Creek and the Greenwater and Clearwater Rivers, spawning of Puget Sound Chinook salmon has been documented throughout the upper mainstem of White River by Puyallup Tribal Fisheries biologists via radio telemetry studies and observations made during annual spawning ground surveys (Puyallup Tribal Fisheries 2024). In an inventory of fishes in the park, the National Park Service (Mount Rainier National Park 2020) report juvenile Puget Sound Chinook salmon have been documented in the Upper White River near the park boundary.

ESSENTIAL FISH HABITAT

Essential fish habitat is defined as those waters and substrate necessary to fish spawning, breeding, feeding, or growth to maturity. The Pacific Fishery Management Council, established by Congress in 1976, was tasked with designating essential fish habitat for the Pacific salmon fishery (NOAA 2017). The portion of the White River within the project area is included in the Puyallup Watershed's 17110014 hydrologic unit, as identified by U.S. Geological Survey, which includes essential fish habitat for Puget Sound Chinook salmon, coho salmon, and pink salmon, which are protected under the Magnuson-Stevens Fishery Conservation and Management Act (Pacific Fishery Management Council 1999).

Puget Sound Chinook salmon are not discussed further in this section as the species is described previously. Below is further information on the presence of coho salmon and pink salmon within the project area and vicinity.

Coho Salmon: Coho salmon are frequently observed spawning in the Upper White River. Spawning has been documented at Silver Springs (River Mile 60.5), approximately three miles downstream of the project area (Marks et al. 2024). Coho spawning has also been documented further upstream of the project area near Hidden Springs (Marks et al. 2023).

Pink Salmon: Pink salmon have had increased returns to the White River in recent years, leading to pinks being transported above Mud Mountain Dam to spawn in the Upper White River (Marks et al. 2024). This has led to large numbers of pink salmon observed spawning at Silver Springs (River Mile 60.5) and a small number seen at Sunrise Creek (River Mile 63), which is just downstream of the project area (Marks et al. 2024).

Federally Listed Terrestrial Species and Associated Habitat

GRAY WOLF

The gray wolf was listed as a federally endangered species on March 9, 1978 (43 Federal Register 9607; Federal Register 1978). Gray wolves have federal protections and are listed as endangered in certain areas of the United States, including the western two-thirds of Washington state, within the project area. Gray wolves are adaptable predators and are recolonizing the southern Cascades and other provinces of Washington. Grey wolves are not wilderness dependent but rely on availability of cover and avoidance of humans (Fritts et al. 2003; Carroll et al. 2003). Their habitat depends on distribution of prey, which includes medium and large-hooved mammals (elk, white-tailed deer, mule deer, etc.) and smaller mammals (beavers, rodents, hares, etc.).

While there are no recently confirmed wolf packs or sightings in the park, there have been several unconfirmed sightings reported near White Pass, which is approximately 22 miles from the project area. The Teanaway pack resides approximately 32 miles northeast of the project area, and dispersing males are known to travel large distances in search of a mate for establishing their own pack.

Therefore, the potential presence of the gray wolf in the project area cannot be discounted, despite being unlikely.

MARBLED MURRELET

The marbled murrelet (murrelet) was listed as threatened under the Endangered Species Act in 1992 and is state listed as endangered under the Washington State Endangered Species Act. Critical habitat is designated in Washington, and the project area is within this critical habitat (USFWS 2024). Marbled murrelets forage in marine waters and fly inland to nest in mature and old growth conifer forests, up to 89 kilometers (55 miles) inland (Raphael et al. 2018). Murrelet pairs do not construct nests but instead lay their single egg on naturally occurring nesting platforms in large, older-aged trees (Nelson 1997). Murrelet populations have declined in recent years, with the removal of old-growth forests where murrelets nest being one of the main contributors to population losses (USFWS 1992). Between the years of 2001 to 2016 in the Puget Sound and Strait of Juan de Fuca in Washington State Conservation Zone 1, marbled murrelet monitoring has indicated a statistically significant decline of 4.9% in an already reduced population (Lynch et al. 2017). Because of these declines, activities that reduce nesting success and/or adult survivorship are especially consequential to the overall population (Falxa et al. 2009). In Washington, all suitable habitat within 55 miles of marine waters is considered potentially usable by marbled murrelets (Raphael et al 2006). Because of this, nearly all the forested drainages of the park, including the project area, are located within the potential range of marbled murrelets. Marbled murrelets are known to occur within the park, and surveys conducted between 1994 and 2011 confirmed murrelet presence within the Carbon, Mowich, Puyallup, and Nisqually River basins (NPS 2011). The nearest known occupied nest site is more than 12 miles to the northeast of the project area. The project area overlaps with 425.7 acres of critical murrelet habitat; this 425.7 acres includes the Ranger Creek airport staging area, the helicopter flight path, and associated 0.5-mile noise disturbance buffer.

NORTH AMERICAN WOLVERINE

The North American wolverine is federally listed as a threatened species and a state candidate species. On November 30, 2023, the U.S. Fish and Wildlife Service announced its final rule to list the distinct population segment of the North American wolverine occurring in the contiguous United States as a threatened species under the Endangered Species Act (USFWS 2023). Wolverines are carnivores; their diet varies depending on the season, year, and geographical region, but may include ungulates (e.g., deer, elk), hares, ground squirrels, hoary marmot, ptarmigan, and other mammals and birds. Wolverines are opportunistic and obtain food through both hunting and scavenging (USFWS 2018). Carrion is a dominant food source for wolverines, and access to ungulate carrion could be even more important than a particular habitat type for wolverines (Cardinal 2004, p. 20; as cited in UFWS 2013). Wolverines are known to cache food in both summer and winter to regulate food availability when resources become scarcer (Inman et al. 2012; USFWS 2018). The denning season for wolverines in this area runs from January through May.

Wolverine sightings have recently increased in the state of Washington. Many of the recent sightings have been captured by trail cameras associated with the Cascades Carnivore Project (2022), in conjunction with Mount Rainier National Park and the U.S. Forest Service. In 2020 and 2021, documented wolverine reproduction was observed, marking the only known successful denning of wolverines in the park within the last century (Cascades Carnivore Project 2022). However, due to the

proximity of SR 410, wolverines would likely avoid utilizing potential habitat within the project area due to human disturbance (WDFW n.d.).

NORTHERN SPOTTED OWL

In 1990, the northern spotted owl was federally listed as threatened under the Endangered Species Act and listed as endangered at the state level. The northern spotted owl is a nocturnal species and resident of structurally complex forests. It prefers old-growth forest or forests with old-growth characteristics like high-canopy closure and complex canopy structure. Preferred forest habitat generally consists of grand fir and Douglas-fir forested plant associations in dry and mesic forests, and western hemlock in moist forest associations (Buchanan 2005). The project area contains old-growth forest that would provide suitable habitat for northern spotted owl.

Although no critical habitat is found within the park boundaries, the project area overlaps with 419.7 acres of northern spotted owl critical habitat on adjacent USFS lands, which includes the Ranger Creek airport staging area, the helicopter flight path, and associated 0.5-mile noise disturbance buffer. Surveys have been conducted within the park to assess the presence of spotted owls since 1997 as part of an ongoing demography study. More recently, autonomous recording units have been deployed within the park to monitor the presence of spotted owls (2025a). In 2021, only a single spotted owl male was detected within the park, at an owl site located southwest of Mount Rainier. In 2022 a single spotted owl (sex unknown) was detected in the park southeast of Mount Rainier (WDFW 2022). A northern spotted owl was detected by an autonomous recording unit south of the project area in 2023, so their presence may be possible during construction. The detection in 2023 is the most recent spotted owl detected in the vicinity of the project area.

State-listed Sensitive Species

The Washington Fish and Wildlife Commission independently monitors a variety of sensitive species specific to the State of Washington. While a species may not be considered threatened or endangered at a national level, the state may find that the presence of a species has declined to the point where its existence within the state is threatened, endangered, or vulnerable to decline.

Except for those outlined in the federally listed sections above, there are no state-sensitive species that have had documented occurrences within the project area, nor does the project area contain suitable habitat within the range of these other state-sensitive species. Of those federally listed species referenced above, the state recognizes the gray wolf, marbled murrelet, and northern spotted owl on its most recent state species list (WDFW 2024).

Other General Wildlife

Other wildlife within the project area may vary depending on the season and are generally moderated by the proximity to SR 410. In addition to a variety of rabbits, hares, and rodents, hoofed mammals such as black-tailed deer (*Odocoileus hemionus*) and elk (*Cervus canadensis*) have the potential to pass through the project area. According to the Washington Department of Fish and Wildlife Priority Habitats and Species (PHS) mapping tool, portions of the project area just outside of park boundaries are designated as migratory elk concentration areas, which are used by elk during seasonal migration as they move from lower elevations in the fall to higher elevations in the spring (WDFW 2025). The PHS mapping tool also identifies mountain goat (*Oreamnos americanus*) summer range that overlaps the project area. Because mountain goats typically inhabit subalpine and alpine regions, they are highly unlikely to be present in the project area during the time of construction.

Environmental Trends for Fish, Wildlife, and Special Status Species: Federally and state-listed species have experienced some degree of decline from historic conditions. These declines have generally been attributable to human activity, whether by hunting, fishing, or general encroachment on suitable habitat. Today, factors related to increasing temperatures, decreasing snowpack, and increasing wildfire risk each continue to impact the viability of various sensitive species. Marbled murrelets and northern spotted owls have experienced continued nesting habitat loss due to increasing wildfire frequency and severity across dry and mesic mixed conifer forests throughout the Pacific Northwest. Another major threat to the northern spotted owl is displacement by barred owls. Additionally, wolverines have experienced decreases in denning habitat due to decreased snowpack from increasing annual temperatures.

Alternatively, some species such as moose (*Alces alces*) have seen degrees of natural and man-made reintroduction to the state of Washington. While not present in the project area—nor historically found in Mount Rainier National Park—the first recorded moose sighting in the park occurred in 2022 (NPS 2025b). The project area presently provides suitable habitat for moose, should they persist in the park and their range expand.

Impact Assessment for Fish, Wildlife, and Special Status Species

Impacts of No Action Alternative

Under the No Action Alternative, no immediate impacts to ESA-listed and sensitive species would occur due to the lack of action taken to address erosion in the active side channel or priority headcut and channel avulsion. Over the near-term, sedimentation due to highway erosion and temporary noise/visual disturbances of increased emergency actions would constitute adverse impacts that would be relatively short-term (i.e., matter of days during the flooding event). For aquatic special status species, the primary risk of emergency actions would be disturbance of spawning beds. In addition to the potential need for immediate emergency actions to protect or limit damage to SR 410, it is possible that a flooding event would still require later repairs that may require weeks or months of construction.

Over time, adverse impacts may occur due to frequent flooding of the forested area between the current river channel and SR 410. This may result in a loss of forested habitat and prey availability for listed and sensitive species. The river channel itself may migrate into the forested floodplain, leading to catastrophic failure of the road from eventual avulsion of the main channel. Water quality may also be negatively impacted due to added sedimentation. The potential adverse impacts due to loss of forested area from flooding or channel migration would be considered part of the natural ecosystem processes of the White River, resulting in wildlife using other available suitable habitat, which is extensive within the park and adjacent protected areas. Additionally, adverse impacts from channel migration are likely to be offset by corresponding habitat growth and reclamation on the other side of the river.

Impacts of Proposed Action

The Proposed Action would temporarily impact fish, wildlife, and their habitats due to equipment noise, visual disturbances, vegetation and soil disturbances, minor habitat loss/alteration, and a short-term reduction in water quality. Temporary visual and noise disturbance would result from the helicopter used for transfer of logs from the Ranger Creek airport staging area to the installation areas, and the placement of the logs to construct the proposed log structures. Use of a helicopter would also

cause temporary high-speed winds due to rotor wash while the helicopter hovers over the log structure installation areas and staging area. Additionally, helicopter use may also cause impacts to trees from insertion of sling loads down through narrow openings in the canopy and from site prep (tree clearing in the drop zone).

Overall, impacts to aquatic species are primarily short-term. Aquatic species, including fish or amphibians, could be present in or adjacent to the installation areas at the time of construction. Displacement and aversion to the installation areas due to noise and movement during the in-water work window is possible. Although not expected, aquatic species may be present, and fish or amphibian capture, handling, and removal may be needed to exclude them from the installation areas prior to the placement of the log structures. The installation is scheduled to take place during lower flows, but logs placed during the installation of the engineered log structure would be embedded within the wetted main channel. The headcut fill structure installation area is not likely to have water present during construction. However, if the installation area is wet and if practicable, fish species will be encouraged to migrate out of the work installation area before installing construction elements. Fish herding, such as walking through the area with seine or block netting, should be attempted before more invasive fish capture methods are deployed (hand or dip-nets, low-voltage electrofishing). If aquatic eggs are present during installation, they may be disturbed or smothered within the wetted portion of the main channel; that potential also exists for the side channel should there be water.

Additional impacts to aquatic species include increased turbidity and sedimentation in the aquatic area of analysis. During the installation and placement of the engineered log jam and headcut fill structure and general construction activity, sediment could be discharged to downstream habitat, resulting in a potential impairment to water quality and temporary adverse effects on aquatic species critical habitat. Increased turbidity and sedimentation also have the potential to result in a temporary disruption of the food chain.

Terrestrial species may be impacted through the temporary visual and noise disturbances from the use of the helicopter and the presence of construction crews onsite. These visual and noise disturbances may have a negative impact on avian species in the terrestrial area of analysis, as the timing of construction overlaps with the nesting season. Ground vegetation and soils may also be disturbed during construction, which could result in a temporary reduction in denning habitat and displacement of prey species during construction. However, impacts to denning species is expected to be minimal as the timing of construction does not overlap with denning season. These impacts would primarily be short-term, with few lingering effects to fish, wildlife, or associated habitat within the project area; the project area would return to its natural state once construction is complete. As the Proposed Action proposes to introduce permanent structures to the project area, there is potential for long-term adverse impacts; however, potential impacts of the permanent structures would be mitigated by the use of naturally compatible log material that would not deter wildlife from utilizing the project area once construction is complete. As such, general adverse impacts to fish, wildlife, and habitat are considered to be short-term and the net effect from the project would be beneficial.

INCREMENTAL EFFECTS OF THE ACTION

Localized, primarily short-term impacts to fish, wildlife, and sensitive species and their habitats from the proposed project are considered in combination with the original construction of SR 410, the continued maintenance and use of SR 410, and foreseeable long-term solutions to erosion risk to SR 410 (i.e., relocation, elevation of the highway, etc.). Ongoing effects to wildlife include noise and visual

disturbance along with disturbances to habitat. Construction of SR 410 imposed continual wildlife disturbance due to vehicles regularly travelling along the highway, maintenance activities, and habitat loss. Depending on the details of a long-term highway solution, additional short- and long-term impacts to wildlife and habitat would be expected from construction activities and habitat modification. The additive audio-visual and habitat effects associated with the Proposed Action would be temporary and are not expected to measurably change existing effects to wildlife and habitat.

Impact Topic: Cultural Landscapes, Archaeology and Historic Structures

Affected Environment

The impact topic of cultural resources concerns both the built environment and historic/prehistoric archaeological features within the area of potential effects. The National Park Service adheres to the NPS DO-28: Cultural Resource Management Guideline, which informs procedures for the research, planning, and stewardship of cultural resources management on National Park Service land (NPS 1998). Further, as a federal agency, the National Park Service is subject to Section 106 of the National Historic Preservation Act, which designates a framework of consultation with the appropriate State Historic Preservation Office to take into account the effects of federal actions on historic properties.

The area of potential effects is a term used under Section 106 of the National Historic Preservation Act that refers specifically to the area in which historic properties may be impacted by activities proposed by an undertaking, and may or may not be the same as the project area. Such impacts for an area of potential effects include physical and visual disturbances that may affect qualities of historic properties or may affect a person's ability to enjoy said historic properties, if those resources have visual qualities that contribute to their value. The area of potential effects for historic properties is limited to the primary project area and SR 410 adjacent to it. The proposed use of the existing SR 410 roadway to transport logs from the McCullough Seed Orchard to the staging area at the Ranger Creek airport and the temporary nature of the proposed helicopter activities associated with log transport would not cause any ground disturbance or permanent visual impacts; therefore, the area of potential effects does not include the helicopter flight path, McCullough Seed Orchard, or Ranger Creek State airport.

The area of potential effects falls within the boundaries of the Mount Rainier National Historic Landmark District, designated in 1997. The National Historic Landmark District encompasses most of the roads, historic developed areas, and historic backcountry structures in the park and forms a semicontiguous corridor that overlies the road prisms within the park, including the portion of SR 410 that falls adjacent to the primary project area (NPS 2024b). Within the area of potential effects, there are no other roads, developed areas, backcountry structures, or recorded archaeological features that contribute to the National Historic Landmark District. As such, discussions of the National Historic Landmark District as it pertains to the Proposed Action focus solely on SR 410, also named the Mather Memorial Parkway.

Mather Memorial Parkway (SR 410)

The Mather Memorial Parkway (SR 410) in Mount Rainier National Park is an 11.6-mile segment of a much larger 53-mile state route that passes through surrounding public lands. The road segment within the park is a linear landscape that was designed by landscape architects and civil engineers as a scenic drive through Mount Rainier National Park. Today, SR 410 also serves as a national scenic byway, from Enumclaw to Yakima. SR 410 is an important contributing element to the National Historic Landmark District and has significance for its design style—incorporating naturalistic landscape

architecture—and for its association with the first National Park Service master plan initiated in 1926. The historic character of SR 410 is evident in the remaining landscape characteristics and features: spatial organization; natural systems and features; circulation; topography; land use; buildings and structures; small scale features; views and vistas; vegetation; and archaeology. These landscape characteristics and their associated features still convey the physical character of the road as it was designed and constructed between 1919 and 1940. These characteristics and features have been evaluated in cultural landscape inventories, the most recent of which was conducted by the National Park Service in 2007 (Owens 2007). The inventory for cultural resources makes references to the specifics of these characteristics and qualities in relation to the No Action and Proposed Action.

Archaeological Resources within the Area of Potential Effects

The National Park Service will conduct an archaeological survey of the area of potential effects in summer 2026.

The nearest documented archaeological sites to the area of potential effects include the Chinook Pass Trail, the historic grade of Highway SR 410, a historic maintenance area for SR 410, the former White River Entrance Road, and the Tipsoo Lake Comfort Station Foundation. These archaeological sites are recorded as contributing features to the National Historic Landmark District, all of which are outside of the area of potential effects.

Beyond recorded and documented archaeological sites or potential archaeological occurrences, the area of potential effects may contain unanticipated and undocumented archaeological sites that may be encountered during earthwork and soil disturbance. This possibility has the same likelihood as with other locations in the park, state, and nation that have histories of settlement by native peoples.

Environmental Trends for Cultural Resources: Cultural resources and landscapes within the park are mostly informed by prehistoric contexts, as the ancestors of the Yakama people developed and used what is now the Chinook Pass Trail for east-west travel over Chinook Pass at the Cascade Crest. Since that time, due to the establishment of the national park and the prohibition of hunting in the park, the influence of the Yakama people has diminished; however, remnants of their past activities remain to various degrees. Over time, trail and road development have altered features of the prehistoric cultural landscape that may have been considered to have cultural value; however, the National Park Service's general approach to naturalistic designs and architecture at the time of SR 410's construction sought to preserve cultural landscape values to the greatest degree practicable, while still providing necessary access through the park. Archaeological resources have generally been preserved, subject to natural changes in the White River channel migration zone that may have exposed or further buried recorded and unrecorded archaeological sites. Further, while the cultural landscape within the area of potential effects has certainly been altered from its prehistoric conditions, maintenance approaches on the scenic highway, along with the general limitations imposed by the Wilderness Act, have preserved landscape characteristics and features in the same condition as that of initial road construction in the 1920s.

Impact Assessment for Cultural Landscapes, Archaeology, and Historic Structures

Impacts of No Action Alternative

Under the No Action Alternative, implementation of protection measures to arrest the development of side channels would not occur, and channel migration—to a predictable, worsening degree—would impact SR 410 and the accessibility of the road. The eventual avulsion of the river toward the road

would adversely affect landscape characteristics and features attributable to SR 410, such as its spatial organization (the direct alignment of the road), circulation (accessibility to visitor and travelers as a scenic highway), and associated structures and small-scale features, such as culverts, headwalls, and directional signage that contribute to the integrity of the National Historic Landmark District. These impacts of the No Action Alternative would also affect views and vistas, as visitor access to such views and vistas would be eliminated due to the inaccessibility of the highway. Further, the No Action Alternative may affect vegetation as a major character-defining feature of SR 410, specifically specimen trees that have been retained throughout past road construction to become natural attractions along the route. Sediment, debris, and general erosion from the highway may adversely impact specimen trees and vegetation of character. Overall, the No Action Alternative would result in direct and indirect, temporary (and potentially permanent) adverse impacts on cultural landscapes. These impacts would affect several vital cultural landscape features and characteristics of SR 410.

Due to the general absence of archaeological sites immediately within the area of potential effects, the No Action Alternative would not impact recorded archaeological resources. Previously unrecorded archaeological sites within the area of potential effects may be impacted by continued erosion of the active side channel and headcut; however, these impacts would potentially occur in either alternative, should the White River itself eventually migrate and expose previously unrecorded archaeological sites.

Impacts of Proposed Action

Under the Proposed Action, the construction of the engineered log structures would require minor excavation (with shovels) to embed logs in a suitable position that would withstand erosion and not be easily carried off by flood events. While there are no recorded archaeological sites in the area of potential effects, there remains the risk that previously undocumented archaeological sites may be encountered during minor excavation activities. To mitigate this risk, the Washington State Department of Transportation would include provisions for unanticipated discoveries of historic properties, wherein work activities would stop if archaeological resources are encountered and would not restart until the National Park Service consults with the State Historic Preservation Office and affected Traditionally Associated Tribes to develop a plan for work to proceed. The National Park Service would provide an archaeological monitor during ground disturbing work to ensure that 1) known archaeological sites adjacent to, or within the area of potential effects are avoided; 2) unanticipated discoveries of archaeological resources are assessed for significance by the National Park Service archaeologist in an expeditious manner; and 3) the Mount Rainier National Park Inadvertent Discovery Plan (NPS 2025c) stipulations are followed. Due to these mitigation measures, the Proposed Action would have no adverse effect on archaeological resources.

The proposed engineered log structures would introduce new features to the area of potential effects and therefore alter visual aspects of the cultural landscape. In accordance with the characteristics and features outlined in the NPS's 2007 cultural landscape inventory, these visual aspects would pertain to Natural Systems and Features, Buildings and Structures, and Views and Vistas (Owens 2007). In general, the proposed engineered log structures would not be visible to travelers along SR 410, and there are no trails or formal viewpoints in the area. However, to mitigate impacts on the visual aspects of Natural Systems and Features within the cultural landscape, log placement for the engineered log jam would mimic a natural log jam and would blend in with the look of the surrounding natural floodplain forest vegetation. The headcut fill structure would consist of an organized array of layered

logs and would be less natural in appearance, but would be constructed of natural materials that would gradually decompose and become obscured by vegetation. The profile of the headcut fill structure would be low enough to not impact qualities of views and vistas. Given the design profile and measures to maximize compatibility with the natural landscape, the Proposed Action would have no adverse effect on cultural landscapes.

Temporary activities associated with construction, including log sourcing, helicopter operation, staging along the paved shoulder of SR 410, and other work activities within the installation areas, may temporarily limit visitors' and travelers' opportunities to enjoy the natural conditions, views, and vistas of the cultural landscape along SR 410. These temporary impacts would pertain to specific features and characteristics of the cultural landscape, such as views and vistas; natural systems and features; and spatial organization. Once construction is complete, these temporary activities would cease and the functions of these landscape features and characteristics would return to their pre-construction condition. As such, these temporary impacts to cultural landscape features would have no adverse effect.

INCREMENTAL EFFECTS OF THE ACTION

Due to the planned mitigation measures identified above, the Proposed Action is not expected to adversely affect Cultural Landscapes, Archaeology, and Historic Structures.

Impact Topic: Park and Highway Operations

Affected Environment

The impact topic of park and highway operations includes activities conducted by the National Park Service to protect and maintain natural qualities of Mount Rainier National Park and to facilitate visitor use and enjoyment of the park, consistent with the Mount Rainier National Park General Management Plan (NPS 2002), the 1992 Mount Rainier National Park Wilderness Plan, the 2005 Fire Management Plan (NPS 2005), and laws, regulations, and policies established for the park. Within the primary project area, park and highway operations include road maintenance and snow removal, historic preservation, natural and cultural resource management, and protection of adjacent resources and wilderness. Other than the highway, no designated visitor facilities or services, such as trails or campgrounds, are present within the primary project area.

The park and highway operations area of analysis extends beyond the project footprint to include areas where park or highway operational functions may be affected. It also includes affected portions of SR 410, park facilities, access points served by SR 410, and locations where maintenance activities, traffic management, or safety procedures could change due to the project.

The section of SR 410 within Mount Rainier National Park is under the jurisdiction of the National Park Service. The National Park Service and the Washington State Department of Transportation share management responsibilities for SR 410 within the park, including routine road maintenance (U.S. Department of Transportation 1996). Outside of the park, Washington State Department of Transportation manages SR 410, and the U.S. Forest Service manages Mount Baker-Snoqualmie National Forest, which surrounds the road outside the park. During winter months, sections of SR 410 in the park are closed to vehicle traffic (NPS 2025d) due to heavy snowfall and hazardous conditions. SR 410 is typically open to vehicles during the summer season and spring and fall shoulder seasons, from late May through November. Exact opening and closing dates of SR 410 can vary based on weather conditions, snow accumulation, and avalanche risks (NPS 2022).

The south end of the primary project area along SR 410 provides access to the Sunrise area of Mount Rainier National Park. The White River Wilderness Information Center is the closest ranger station to the primary project area. The ranger station is on the Sunrise Road, which intersects SR 410 south of the primary project area. Generally, the ranger station is open late May through mid-October (NPS 2025e), and provides services such as wilderness permits, trail condition updates, and restrooms. Ranger staff patrol area roads, trails, and campgrounds in the project vicinity on a regular basis when SR 410 is open.

Environmental Trends of Park and Highway Operations: Over the lifetime of SR 410, patterns of highway maintenance have adjusted in response to changes in environmental conditions, age of infrastructure, and transportation demands. Originally constructed to accommodate lower traffic volumes, SR 410 has since required more frequent and intensive maintenance activities, particularly in response to increased visitor use, changes in seasonal weather patterns, and weather-related damage.

Impact Assessment for Park and Highway Operations

Impacts of No Action Alternative

Under the No Action Alternative, increasing risk of channel migration and eventual avulsion of the river's main channel would place continued stress on park operations, as staff would need to respond to flood-related damage. The magnitude of these impacts would range in severity, depending on the scale of the event. Should an avulsion occur along land adjacent to the highway, complete closure of SR 410 may result, and park operations would be adversely impacted by increasing travel times for operational access to recreational facilities accessed by SR 410. Park personnel stationed north of the entrance would lose the most direct access to White River and Sunrise, requiring a lengthy detour of 60 miles and travel time of 1.5 hours. Vehicle access from the south would be cut off, causing delayed response times from White River or Sunrise stations should assistance be needed north of the closure. These impacts may be confined to seasonal periods of flooding or may continue for longer-term periods depending on the severity of damage and the type and extent of repairs needed.

Impacts of Proposed Action

The Proposed Action is not expected to require lengthy traffic closures along SR 410; however, some degree of traffic control may be required while the helicopter transports logs from the staging area to the log structure installation areas. Potential traffic control would be short-term and mitigated by advanced planning and allowance for passage of emergency vehicles. Constructing the engineered log jam and headcut fill structure would provide long-term benefits to park operations by reducing the risk to SR 410 from avulsion of the main channel into the side channels.

INCREMENTAL EFFECTS OF THE ACTION

The original construction of SR 410 provided vehicular access to the northeast section of the park. The Proposed Action would not change existing access.

Impact Topic: Visitor/Traveler Use and Experience

Affected Environment

The impact topic of visitor/traveler use and experience pertains to the qualities of the public's enjoyment of the park, its recreational opportunities, and its natural ecosystems, along with the regional access that SR 410 provides. The visitor/traveler use and experience area of analysis extends beyond the project footprint to include areas where visitors or travelers may experience changes to

access, movement, recreational use, or setting. This includes affected portions of SR 410, associated park facilities, trailheads and trails, and campgrounds or day-use areas connected to or served by these locations.

Within the visitor/traveler use and experience area of analysis, visitors and travelers utilize SR 410 for access to the park and for travel between the Seattle-Tacoma area and the greater Yakima area. Average Daily Traffic is recorded by Washington State Department of Transportation for SR 410 at two locations, one on each side of the primary project area. Table 4 shows the average daily traffic at those locations from 2019 through 2023 (WSDOT 2025).

TABLE 4. SR 410 AVERAGE DAILY TRAFFIC FROM 2019-2023

Location	2019	2020	2021	2022	2023
SR 410, S/O Crystal Mountain Blvd Intersection (North of primary project area)	1,271	1,096	1,238	1,190	1,204
SR 410, N/O SR 123 Wye Connection (South of primary project area	1,089	939	1,061	1,020	1,032

Source: WSDOT 2025

As a scenic highway, SR 410 provides scenic views of Mount Rainier and access to the Crystal Mountain Ski Area. In addition, SR 410 provides access to over 200 miles of trails for hiking, biking, and horseback riding (NPS 2024c). There are also three USFS campgrounds accessible directly by SR 410—Dalles, Ranger Creek, and Silver Springs—each with distinct amenities and nature-based activities including hiking, fishing, and nature viewing (U.S. Forest Service n.d). Due to adverse road conditions and avalanche risk, sections of SR 410 are closed annually during the winter months.

South of the primary project area, SR 410 provides access to the Sunrise area of Mount Rainier National Park. As the highest elevation accessible by vehicle in the national park, the Sunrise area boasts stunning views of Mount Rainier and Emmons Glacier on clear days. The White River/Sunrise area contains several recreation and education opportunities, including hiking trails, backcountry camps, Sunrise Visitor Center, and White River Campground. The Sunrise Visitor Center is open July through September and provides informational and interpretive programs to help educate visitors on the park's history, present, and future. The White River Campground is open yearly from June to September and provides 88 individual tent-only campsites (NPS 2025d).

The two primary trail systems accessible directly from SR 410 are the Naches Peak Loop Trail and the Crystal Lakes Trail. The Naches Peak Loop Trail is a 3.5-mile beginner's loop and starts at scenic Tipsoo Lake. It contains a section of the historic Pacific Crest Trail, a trail that runs from Mexico to Canada, passing through sections of California, Oregon, and Washington. The trail also contains views of Mount Rainier and the Chinook Entrance Arch (NPS 2024d). The Crystal Lakes Trail is a more difficult hike, with a series of steep switchbacks leading to a peak at Crystal Lake. The 6-mile out-and-back hike starts near the side of SR 410 at Crystal Creek, and contains views of Mount Rainier, Crystal Peak, and finally the Lower and Upper Crystal Lakes (NPS 2024e).

Environmental Trends of Visitor/Traveler Use and Experience: Since the establishment of Mount Rainier National Park, human activity has increased proportional to regional population growth in the

State of Washington. The National Park Service records and publishes annual visitor use statistics, which started in 1979. Table 5 below displays annual averages of a variety of visitor use data from the last four decades, to provide a consistent timeframe of comparison.

TABLE 5. VISITOR USE DATA FOR MOUNT RAINIER NATIONAL PARK FROM 1985-2024

Decade Interval	Recreation Visits[1]	Non-Recreation Visits[2]	Vehicles
2015-2024	1,477,764	703,330	877,484
2005-2014	1,134,204	541,040	593,753
1995-2004	1,317,458	584,178	654,901
1985-1994	1,355,607	648,027	692,212

Source: Visitor Use Data - Social Science (U.S. National Park Service)

[1]This value represents visitors who entered park boundaries and also passed through recreation area entrances, implying an intent to recreate at the park.

[2]This value represents visitors who entered park boundaries but did not pass through a recreation area entrance, implying travel through the park.

As demonstrated in the table above, the park has experienced its highest level of visits and vehicle passage over the last decade from 2015 to 2024, an approximate 40% increase in visitation over the last 10 years (NPS 2025e). The construction of SR 410 and subsequent construction of access roads from the highway have increased visitor and traveler use of the highway for both park and regional access. In recent years, increases in water temperature and flow rates have led to increasing flood risk of the highway, which at times has impacted visitor and traveler use when road closures prevent access.

Impact Assessment for Visitor Use and Experience

Impacts of No Action Alternative

Under the No Action Alternative, visitors would continue to experience disruptions when flood events cause road closures and damage infrastructure. These unplanned closures may limit access from the north to recreational areas, such as Crystal Lakes trailhead and associated hiking trails, and the White River Wilderness Information Center, and intermittently reduce the overall quality of the visitor experience. Additionally, ongoing repair work in response to main channel avulsion could result in prolonged construction-related disturbances, such as noise and visual impacts, further diminishing the enjoyment and accessibility of the area for park visitors.

As described in the park and highway operations section above, access throughout the park would generally be maintained despite potential closure of SR 410 along the primary project area; however, travel times for visitors that would normally enter or exit the park through the north park boundary entrance in the northeastern portion of the park would experience delays of 1.5 hours or more, depending on their specific destination. Further, regional travel from the Seattle/Tacoma area to the greater Yakima area would experience delays of up to three hours through alternate routes around the west and south side of the park. These travel and access impacts may persist over the long-term, depending on the extent of road damage or loss.

Impacts of Proposed Action

Under the Proposed Action, the risk of flood damage to the road resulting in road closures would be reduced, and access to the recreational and natural resources that are serviced by SR 410 would be maintained. The Proposed Action would avoid potential travel delays that are likely under the No Action Alternative by reducing the threat of disruptions to SR 410, and maintaining visitor use and regional travel access for travelers and residents of the state.

The Proposed Action may cause temporary impacts to visitor experience from intermittent traffic delays on SR 410 during up to six days of helicopter activity within the primary project area. Additionally, helicopter operations would be visible and audible to visitors over a wide area, which may disrupt some visitors' experience of natural quiet.

INCREMENTAL EFFECTS OF THE ACTION

Within the project area of analysis for visitor use and experience, ongoing and reasonably foreseeable future actions that may overlap in timing with the Proposed Action include routine road maintenance and the planned Fryingpan Creek Bridge replacement project on the Sunrise Road. These actions, together with the short-term traffic/travel delays, noise, and visual disturbance of the Proposed Action, would not have lasting effects on visitor use and experience within the SR 410 corridor.

Impact Topic: Wilderness

Affected Environment

The Wilderness Act of 1964 established the National Wilderness Preservation System, which designated federally owned lands as "wilderness areas" to be protected and managed for their natural state and for the use and enjoyment of the American people (NPS 2024f). The primary mandate of the Wilderness Act is given in Section 4(b) and states that "*each agency administering any area designated as wilderness shall be responsible for preserving the wilderness character of the area.*"

The Mount Rainier Wilderness currently encompasses approximately 228,400 acres, or 97% of Mount Rainier National Park. It was congressionally designated as wilderness on November 16, 1988 by Title III of the Washington Park Wilderness Act, which required that the land be protected and managed in accordance with the Wilderness Act of 1964. The wilderness area of analysis includes the portions of the project area that are designated as wilderness areas – the primary project area and the helicopter flight path.

The park's outstanding wilderness values, natural and cultural resources, and remarkable scenic characteristics were and continue to be its signature features. The Wilderness Act directs the National Park Service to protect and manage wilderness so that it "generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable," and so that it "has outstanding opportunities for solitude, or a primitive and unconfined type of recreation." Maintaining wilderness values are key to visitors' experiences and to the management of the park.

Wilderness character encompasses the five qualities that are described in the definition of wilderness from Section 2(c) of the Wilderness Act. Together, these five qualities can be used to describe how stewardship actions, impacts from modernization, and other changes occurring inside and outside of a given wilderness area affect wilderness over time. Descriptions of these qualities as derived from Section 2(c) of the Wilderness Act are below.

- **Untrammeled:** Wilderness is "…an area where the earth and its community of life are untrammeled by man." Wilderness ecological systems are essentially unhindered and free from the actions of modern human control or manipulation when the untrammeled quality is preserved.
- **Natural**: Wilderness "…is protected and managed so as to preserve its natural conditions." Wilderness ecological systems are substantially free from the effects of modern civilization.
- **Undeveloped:** Wilderness "… is essentially without permanent improvements or the sights and sounds of modern human occupation.
- **Solitude or Primitive and Unconfined Recreation:** Wilderness "…has outstanding opportunities for solitude or a primitive and unconfined type of recreation."
- **Other Features of Value:** Wilderness "…may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value."

Designated wilderness borders both sides of SR 410 adjacent to the primary project area and includes a portion of the helicopter flight path. As such, each of the qualities of wilderness character are discussed below, in the context of the wilderness area of analysis.

Untrammeled: This quality of wilderness refers to free and unconfined natural processes and the absence of intentional efforts to control or restrict nature. Sculpted by powerful meteorological and geological forces, the Mount Rainier Wilderness is fundamentally untrammeled and shaped by the forces of nature.

This quality is enhanced when managers exercise restraint, even in the face of "destructive" natural processes such as wildfire, flooding, and ecological change. This quality is degraded by intentional actions to control, contain, or mitigate the effects of natural processes, even when the intent is to address anthropogenic influences. Examples include suppression of naturally ignited wildfire, riverbank stabilization, and habitat restoration.

In the wilderness area of analysis, the White River floodplain behaves as a natural glacial river valley, with periods of aggradation and incision causing the active channel of the river to frequently change course, continually reshaping the landscape.

Natural Quality: The natural quality of the Mount Rainier Wilderness is distinguished by its ever-evolving community of life. Home to diverse plants, animals, and ecological processes, the wilderness is a vital sanctuary with clean air and water. The wilderness is bordered by heavily developed and logged lands and the protection it offers is indispensable to the Cascade Range. However, the extirpation of native species, introduction of non-native species, acceleration of disturbance regimes, and presence of pollutants degrade the natural quality. Anthropogenic climate change continues to pose a threat as warming temperatures irreversibly alter ecological communities and processes.

Within the wilderness area of analysis, stands of old growth cedar, Douglas fir, and hemlock share the river bed with early successional forests and river channels. These habitats support many native terrestrial and aquatic animal populations, including species recognized as threatened under the Endangered Species Act.

Undeveloped Quality: The Mount Rainier Wilderness remains predominantly free from permanent improvement in the form of structures and installations, as well as the use of motor vehicles, motorized equipment, and mechanical transport. This quality is degraded by administrative infrastructure as well as the use of motorized tools and aircraft even when authorized through the minimum requirement analysis process.

Solitude or Primitive and Unconfined Recreation Quality: The Mount Rainier Wilderness is a refuge not only for wildlife but also for visitors, offering a respite from modern civilization. The wilderness offers ample opportunities for solitude and primitive recreation and provides remoteness from modern human activity occurring both inside and outside the wilderness boundaries. The experience of solitude is subjective and unique to each individual. Nevertheless, wilderness promotes solitude in a number of ways. The network of constructed trails and established routes allows visitors to travel deeply into the wilderness, on trips lasting up to two weeks and covering more than 100 miles. The wilderness also provides opportunities for exploration without the aid of recreational developments.

Within the area of analysis, there are no developed trails or designated campsites. The area receives little to no overnight recreational use as it is zoned for day-use only due to proximity to the road. Nevertheless, opportunities for solitude are excellent, as the lack of recreational development, rugged and varied topography, dense forest, and changeable river environment isolate visitors from encounters with other individuals.

Other Features of Value Quality: No specific, tangible features have been identified in the wilderness area of analysis.

Environmental Trends of Wilderness: Since the establishment of the Wilderness Act of 1964 and the park's designation of wilderness area in 1988, trends specific to wilderness within the wilderness area of analysis have generally remained static, likely due to the consistent limitations set by the park's rules and regulations regarding permitted activities. Recent increases in average annual temperatures and flowrates of the White River due to earlier snowpack melt have influenced general wilderness character in the project vicinity, although specific trends for wilderness in the immediate wilderness area of analysis generally cannot be quantified.

Qualities of wilderness within the wilderness area of analysis have also been modified over time by changes to visitor recreation, as advances in equipment, thermal protection, and gear may have increased accessibility of recreational activities to a broader user group. This trend has not influenced the specific wilderness character qualities within the wilderness area of analysis but rather added to the ways in which these qualities are experienced by visitors.

Impact Assessment for Wilderness

Impacts of No Action Alternative

Under the No Action Alternative, wilderness character would initially remain largely unaffected; however, over time, the untrammeled and undeveloped qualities of wilderness could be negatively impacted as manipulation of natural processes and use of mechanized or motorized tools or equipment is needed. As channel migration, and eventual main channel avulsion, continue to threaten SR 410, repeated emergency repairs would likely be required, potentially resulting in increasingly intensive and reactive actions within wilderness, including motorized equipment use and construction of barriers to dewater an avulsion channel.

The natural quality would experience potentially adverse impacts, with potential short- and long-term impacts to terrestrial and aquatic habitat from impacts of road washout, emergency repairs, and long-term changes to the floodplain to restore vehicle access.

Impacts of Proposed Action

The Proposed Action would result in negative, localized impacts to wilderness character due to construction activities. The untrammeled quality would experience a long-term but limited adverse effect as the project would intentionally manipulate natural processes. The river would still behave mostly naturally during floods by spreading into side channels and spreading flood water into adjacent forested areas, but natural bank erosion and headcut development would be arrested at the installation sites. The undeveloped quality would be negatively impacted due to the use of helicopters and motorized equipment, delivery of materials by helicopter during structure installation, and the presence of engineered log structures. The negative impact of the engineered log structures would decrease over time as the natural materials degrade and become part of the environment.

Natural conditions would experience short-term adverse impacts during construction from work in the floodplain, and use of equipment, including helicopter support. However, by reducing risk of channel avulsion, the Proposed Action would support long-term preservation of regionally rare habitat for endangered species. Short-term impacts would be negative due to the sights and sounds of construction activities and the visibility of engineered log structures post-construction. The Draft Minimum Requirements Analysis Framework Workbook used to make these determinations is found in Appendix G.

INCREMENTAL EFFECTS OF THE ACTION

The Proposed Action would have both beneficial and adverse effects on wilderness character in the short- and long-term. Adverse impacts include minor disturbances to the area's untrammeled quality, temporary effects on natural character during construction, and small-scale, long-term changes resulting from the presence of man-made structures in an otherwise undeveloped setting. Conversely, beneficial impacts include protection of habitat for endangered species (preserving the natural quality).

Park operations, including monitoring and recovery of wildlife, conducting restoration projects, and monitoring forest processes and landscape change, would provide an additive benefit to the natural quality, and an additive adverse impact to untrammeled and undeveloped qualities, when considered with the Proposed Action. Actions involving foreseeable erosion-control measures—such as relocating or elevating the highway—would result in long-term adverse effects on wilderness character if those actions would occur in wilderness. In contrast, the long-term effects of the Proposed Action would be largely beneficial and therefore would not compound or contribute to the impacts of these future measures. Additionally, the Proposed Action could establish a precedent for constructing similar features in other areas if new side channels form, until a long-term, non-wilderness solution is ultimately implemented.

Chapter 4: Consultation and Coordination

Public Outreach

Internal Scoping

Prior to Washington Department of Transportation's formal proposal to the National Park Service, they completed a Site and Reach Assessment in 2017, which evaluated existing conditions within the project vicinity pertaining to hydrology, floodplains, and general feasibility of action along the White River active channel and priority headcut. As part of the proposal process, the Washington State Department of Transportation and the National Park Service conducted pre-NEPA planning efforts throughout 2024 to assess potential alternatives from an engineering and cost feasibility standpoint. These efforts developed a variety of alternatives as discussed in Chapter 2 of this Environmental Assessment.

In May 2024, the agencies completed an environmental screening form to consider potential issues and impacts across environmental resources. The resources evaluated included air quality; biological resources (wildlife, species of special concern, vegetation); cultural resources; geology; lightscapes; human health and safety; socioeconomics; viewsheds and visitor use experience; floodplains/wetlands; water quality; and wilderness. From this list, resources with relevancy to the project area and proposed action were designated for further preliminary evaluation.

Once general environmental topics of concern were outlined across alternatives, the agencies convened in an interagency workshop in November 2024 to review engineering and feasibility criteria across alternatives and to arrive at a selection of alternatives to carry forward into civic engagement, based on these criteria. Based on the established Purpose and Need, and the feasibility criteria informed by WSDOT's design team, the interagency project team eliminated all but one action alternative—the Proposed Action provided in this Environmental Assessment.

Civic Engagement

As part of standard NPS planning procedure, the National Park Service conducted civic engagement for the project from March 12 to April 11, 2025. The National Park Service notified the public of civic engagement for the project via News Release and posting on the Mount Rainier National Park Facebook Page. The NPS's Planning, Environment, and Public Comment website was activated for the public to submit comments. One virtual open house was held during the comment period on March 19, 2025. At the meeting, the National Park Service and Washington State Department of Transportation shared information on the background of the WSDOT proposal; proposed purpose and need for the project; proposed plan objectives; potential impact topics; National Environmental Policy Act process; commonly asked questions; and information on how to comment, directing comments to the Planning, Environment, and Public Comment website. This information was supported using the online Story Map.

Eighteen correspondences were submitted by stakeholders using the NPS's Planning, Environment, and Public Comment website, from which 54 unique comments were derived. Each comment was assigned a code to identify the general content of the comment and to group similar comments, and concern statements were developed to summarize the content of comments assigned to each code. These concern statements were used to inform the impact topics applicable to the alternatives under evaluation and to assist the project team in assessing if other alternatives should be carried forward for examination in this Environmental Assessment.

Public Comment Period on Environmental Assessment

The National Park Service will make this Environmental Assessment available for public review and comment. The public comment period will provide interested individuals, agencies, Tribes, and organizations an opportunity to review the alternatives and analyses and submit comments. Public comments received during the comment period will be considered in the preparation of the decision document.

Agency Consultation

Consultation under Section 7 of the Endangered Species Act

The National Park Service initiated consultation with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service under Section 7 of the Endangered Species Act regarding impacts to both aquatic and terrestrial federally listed species under the jurisdiction of each agency. This consultation included a Biological Assessment with a detailed description of the Proposed Action and a comprehensive assessment of effects to each federally listed species with the potential to occur within the project area.

At the time of the public review of this Environmental Assessment, the National Park Service will still be under consultation with the agencies; therefore, the resulting Biological Opinions will be added to the decision file for the project prior to a decision being made.

Consultation under Section 106 of the National Historic Preservation Act

The National Park Service initiated consultation with the State Historic Preservation Office under Section 106 of the National Historic Preservation Act regarding impacts to cultural resources within the project area, including the National Historic Landmark District as it applies to SR 410 and the general cultural landscape. Results from the archaeological survey to be completed for the project's area of potential effects will be provided to the State Historic Preservation Office to support continued consultation.

Tribal Consultation

As an integral part of Section 106 compliance and cultural resource stewardship, consultation was initiated with the appropriate tribes applicable to the project area. This consultation included a description of the proposed action and offered the opportunity for the tribes consulted to provide their input into recorded (or previously unrecorded) cultural resources that pertain to the project's APE. The National Park Service consults with tribes that have tribal lands within or adjacent to Mount Rainier National Park, and with Tribes that attach historic and cultural significance to resources within the park. The following tribes were consulted:

- Cowlitz Indian Tribe
- Muckleshoot Indian Tribe
- Nisqually Indian Tribe
- Puyallup Tribe of Indians
- Squaxin Island Tribe
- Yakama Nation

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Appendix A. Photo Log

Photo 1: Flooding 2006

SOURCE: (NPS 2010)

Photo 2: Flooding 2006

SOURCE: (NPS 2010)

Photo 3: Flooding 2006

SOURCE: (NPS 2010)

Photo 4: Flooding 2003

Source: (HERRERA ENVIRONMENTAL CONSULTANTS, INC. 2007)

Photo 5: Activated Side Channel 2017

SOURCE: (CYGNIA RAPP AND GARRETT JACKSON, GEOMORPHOLOGISTS 2017)

Appendix B. Construction Equipment

Table B-1 presents mechanized construction equipment that could be used during construction and demolition activities under the proposed action, as well as the noise that each piece of equipment would generate at a distance of 50 feet.

TABLE B-1. MECHANIZED EQUIPMENT THAT MAY BE USED DURING CONSTRUCTION ACTIVITIES AND ESTIMATED NOISE GENERATED

Mechanized Equipment	Activities Equipment Used For	Lmax[1] Noise Limit at 50 ft
Chainsaw	Tree clearing to create temporary drop zone; Field-fitting logs	84 dBA
Pickup Truck (driving)	Transporting work crews and hand tools	75 dBA
Dump Truck[2]	Transporting logs	76 dBA
Helicopter S-61 (large, single rotor, loaded)[3]	Transporting logs; Lowering logs into place	112 dBA

Source: (U.S. Fish and Wildlife Service 2020, Federal Highway Administration 2006)

[1] The Lmax, or maximum sound level, is the highest sound level measured during a single noise event, such as a vehicle passing by a visitor, in which the sound level changes value as time goes on. The maximum sound level is important in judging the interference caused by a noise event with common activities. In cases where data sources provided different values, the more consistent value was used.

[2]A dump truck is a similar heavy-load truck to a logging truck.

[3]The S-61 is a similar heavy-lift helicopter to the Chinook.

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Appendix C. WSDOT Fish Exclusion - Protocol and Standards

FISH EXCLUSION – PROTOCOL AND STANDARDS
Washington State Department of Transportation

Introduction

The Washington State Department of Transportation (WSDOT) requires the following protocol and standards for fish exclusion, capture, handling, and relocation (hereafter referred to as "fish exclusion protocol (FEP)" or "fish moving") to reduce the risk of potential injury to fish during construction.

This protocol generally meets Endangered Species Act (ESA) Section 7 consultation and Hydraulic Project Approval (HPA) requirements, but specific consultation or permit conditions take precedence over any project-specific components that conflict with these best practices.

When to Use this Guidance

This guidance is applicable for work proposed in fish-bearing waters. Work should be conducted in isolation from flowing water, if practicable. **Work shall be allowed in water if:** (1) this FEP is implemented, (2) placement or removal of material (wood or rock, etc.) is small in quantity, (3) installation of best management practices (BMPs) (turbidity curtain, etc.) is performed under site conditions where the potential to affect fish is minimized,[3] and/or (4) work is conducted under a declared emergency, under emergency conditions, or when flow conditions preclude safe implementation of this FEP.

Directing Biologist

The FEP shall be planned and supervised by a WSDOT biologist or qualified biologist under contract with WSDOT (hereafter referred to as the Directing Biologist). The Directing Biologist must possess the required knowledge, training, and experience for safe and effective implementation of the FEP (**Appendix A**).

The Directing Biologist shall work with maintenance, construction, and/or environmental staff to plan and manage the FEP. This plan should consider the size and channel characteristics of the area to be isolated, dewatering method (diversion with bypass flume or culvert, washed gravel bags, sheet pile, cofferdam, etc.), and most effective manner by which to move fish.

Assisting Staff

All assisting staff shall have the required training, knowledge, skills, and ability to safely and effectively, move fish (**Appendix A**).

Fish Exclusion - Considerations

The Directing Biologist shall implement the FEP in consideration of the following: (1) habitat connectivity and fish habitat requirements, (2) duration and extent of planned in-water work, (3) anticipated flow and temperature conditions during in-water work, and (4) risk of fish exposure to turbidity or other water quality and site conditions

[3] WSDOT shall make this determination after consulting with regulatory agencies with jurisdiction, including the Washington State Department of Fish and Wildlife (WDFW), U.S. Fish and Wildlife Service (USFWS), and/or NOAA-National Marine Fisheries Service (NMFS). In some locations the Tribes will have jurisdiction. This exception is not applicable to in-water excavation or work that may increase turbidity beyond the immediate work area for more than 15 minutes.

during construction.

When the work area to be isolated is small, depth is shallow, and/or conditions are conducive to fish capture, it may be possible to isolate the work area and move fish prior to dewatering or flow diversion.

When the area to be isolated is large, water is deeper, flow volume and/or velocity is higher, and/or conditions are not conducive to fish capture, it may be necessary to commence with dewatering or flow diversion concurrent with fish moving. WSDOT should have oversight and final approval in this situation. The Directing Biologist shall use best professional judgment in implementing the FEP in a manner that minimizes exposure of fish to potential stress or injury.

If the area to be isolated includes only a portion of the wetted channel width (e.g., in large and/or deep rivers), or if a bypass flume or culvert will effectively maintain fish passage during construction, it may be suitable to move fish out of the in-water work area (IWA).

However, if the IWA includes the entire wetted channel width, and it is unlikely that fish passage can be maintained during construction, the Directing Biologist must **decide whether to move fish upstream and/or downstream** of the IWA, depending on available habitat conditions and species captured.

If a large number of fish is to be moved, it may be appropriate to relocate fish both upstream and downstream of the IWA to avoid concentrating fish in areas where their habitat needs may not be met. Where habitat connectivity or quality is poor, the Directing Biologist should determine whether relocated fish will have access to suitable habitat for the duration of planned in-water work. If such habitat is not present in the vicinity, it may be appropriate to relocate fish a greater distance upstream and/or downstream (even thousands of feet or miles). When a distant relocation is deemed necessary, WSDOT shall provide notice in advance to agencies with jurisdiction.

Block Nets

The Directing Biologist shall select block nets that are appropriate for site conditions and fish species present. It may be necessary to contact other WSDOT regions or offices for access to nets, equipment and/or materials. A suitable block net is composed of **3/32-inch knotless stretched nylon**. WDFW may authorize different mesh size depending on site conditions. A vinyl apron or skirt to facilitate securing nests to the channel bottom is recommended.

Block nets must be **secured to both banks and the channel bottom** to prevent failure due to debris accumulation, high flow, and/or flanking. Supplemental block net support may be required (e.g., hardware cloth, affixed metal fence posts, batter T-posts, etc.). Block nets should be **installed at an angle to the direction of flow** (i.e., 45-degree angle if practicable and not directly perpendicular to flow) to reduce the risk of impinging fish. Anchor bags, filled with clean, washed pea gravel, can be used to support nets that may remain in place for more than two weeks or high flow events are expected. Any use or manipulation of native substrates or other materials on site should be incidental and shall not measurably affect the channel bed or bank baseline condition. In most instances, block nets will require pea-gravel bags placed approximately 12-inches downstream to sufficiently reduce velocity and backwater the block net to prevent impingement on the net face.

The Directing Biologist shall **determine appropriate locations for block nets** based on site characteristics and in consideration of the type and extent of planned in-water work. Locations with lower flow volume and/or velocity, uniformity of depth, and good accessibility are preferred. Sites with heavy vegetation, large cobble or boulders, undercut banks, and deep pools should be avoided due to the difficulty of securing and/or maintaining nets. Sites with a narrow channel cross-section (constriction) should be avoided if foreseeable flow conditions might increase likelihood of fish impingement or overwhelm or dislodge the nets.

Except when planning to herd fish upstream, an **upstream block net** (UBN) shall be placed first. With the UBN in

place, a second block net can be used as a seine to herd fish downstream, starting at the UBN. When the IWA includes a culvert, deep pools, undercut banks, or other cover attractive to fish (thick overhanging vegetation, rootwads, logjams, etc.) it may be appropriate to isolate these areas, or several areas, of the IWA rather than attempting to herd fish from the entirety of the IWA in a single downstream pass. Try to avoid herding fish into these areas of the IWA.

Fish capture and removal will be most successful if fish are strategically concentrated in areas where they can more easily be seined and netted. Care shall be taken not to herd fish toward areas where they are exposed to sources of stress. If unavoidable, do not allow fish to be concentrated in such areas for more than 30 minutes.

A **downstream block net** (DBN) is typically required to prevent downstream fish from entering the work area.

When gradual dewatering or flow diversion is staged concurrently with fish moving, it may be appropriate to delay installation of the DBN until fish have first been allowed sufficient time to move downstream by their own choosing (volitional movement). Gradual dewatering can be an effective method to reduce the risk of fish stress or injury. Encouragement of volitional fish movement out of the work area is particularly important where the IWA is large and may hold many fish. However, when the IWA includes a culvert, deep pools, undercut banks, or other cover attractive to fish, fish may not move downstream. In this case, the Directing Biologist should use best professional judgment in determining how to best move fish.

Block nets shall remain in place until work is complete and conditions are suitable for the reintroduction of fish.[4] Block nets require frequent inspection and debris removal. Inspection may be conducted by the WSDOT Environmental Compliance Inspector or contractors that have been provided on-site training. They shall immediately notify the Directing Biologist if any impinged, injured or deceased fish are observed or net repair/adjustment is necessary. An individual trained in fish handling shall be assigned the responsibility of safely relocating any impinged fish and repairing nets.

Net inspection frequency shall be in accordance with Standard Specification 8.31.3(5). They shall, at a minimum, be inspected at least three times daily or as requested by the Directing Biologist. An inspection shall be completed at the start, middle and end of the workday. On non-working days, an inspection shall be performed between 6:00 am and 8:00 am, 11:00 am and 1:00 pm and 4:00 pm and 6:00 pm. Nets may need to be checked more frequently for the first 24 hours after a significant rainfall, change in flow volume or velocity, or significant windstorm that can result in leaf drop. If fish are impinged on the net or weather and/or flow conditions change significantly, the Directing Biologist shall adjust the frequency of net inspections to minimize risk to fish.

Pumps: If dewatering and/or flow diversion requires the use of pumps, this work shall comply with the HPA issued by the Washington Department of Fish and Wildlife (WDFW) as well as any Terms and Conditions issued by the USFWS and/or NMFS in a Biological Opinion. Commitments may also appear in ESA minimization measures or the project description.

[4] If a FEP is implemented for installing a cofferdam BMP, AND construction is isolated from suitable fish habitat by the cofferdam, AND construction is scheduled for a long period of time (weeks, months), it may be appropriate to remove block nets and allow fish to re-enter suitable habitat from which they were moved.

Pump intakes shall be screened to prevent fish from entering the intake. Screens shall comply with Washington State law (RCW 77.57.010 and 77.57.070), guidelines provided by the NMFS,[5] and the HPA. If pumps are to be used for a longer period of time to divert flow around the IWA, the dewatering plan shall address contingencies for extremes in flow and/or weather. The plan shall include ready access to a larger, or additional, backup pump with appropriately-screened intake. Pumps must be monitored outside of active construction hours/days. There must be sufficient fuel safely stored onsite.

Once the Directing Biologist confirms that (1) the work area is isolated and all fish have been excluded, (2) there is no risk of entraining fish, and (3) a contingency plan is in place (including a routine schedule for inspection), then pumps may be operated **without a screened intake**. Note that block nets do not meet screening criteria.

Moving Fish

Methods for the safe relocation of fish are described below. At most locations, a combination of methods may be necessary.

In order to avoid and minimize the risk of injury to fish, **an attempt to seine and/or net fish should always precede the use of an electrofisher**. Via visual observation techniques, including snorkeling, surveying with polarized glasses, or using Plexiglas-bottomed buckets, the effectiveness of seining/netting can be determined.

If fish moving has not been addressed during ESA consultation and fish listed under the ESA may be present, the Directing Biologist must stop work and reinitiate Section 7 consultation with the Services in advance of in-water work. Work conducted under a declared emergency, or emergency conditions, shall follow established ESA notification protocol.

When fish listed under the ESA may be present, the Directing Biologist shall insure thatfish moving adheres, at a minimum, to the following guidelines:

(1) Only dip nets and seines composed of knotless (non-abrasive) material shall be used.

(2) Electrofishing equipment shall be used only after less-injurious methods have removed most, if not all, fish over 300 mm, by completing a minimum of three passes with seins and/or nets.

(3) The success of fish moving shall be confirmed prior to dewatering or other work within the IWA.

(4) Fish listed under the ESA shall not be held in containers for more than 10 minutes unless containers are dark-colored, lidded, and fitted with a portable aerator.

(5) A plan for achieving efficient and rapid return of fish to suitable habitat will be developed before fish moving.

Minnow Traps

Baited Minnow Traps are typically used before seining. They shall be inspected at least four times daily to remove captured fish and thereby minimize predation in the trap. Traps should be checked more frequently if temperatures exceed 15 degrees C (59 F).

Traps may be left in the IWA overnight. However, predation in the trap may present an unacceptable risk because

[5] National Marine Fisheries Service. 2011. Anadromous Salmonid Passage Facility Design. Chapter 11: Fish Screen and Bypass Facilities. NMFS Northwest Region, July 2011, 140 p.

large sculpin and other predators are typically more active at night. The Directing Biologist shall consider the risk of predation when determining whether to utilize traps at night.

Seining

Seining is the preferred method for fish capture. Other methods shall be used when seining is not possible or is proven ineffective. Seines, once pursed, should remain in the water while fish are removed with dip nets. Seines with a bag are advantageous because they minimize handling stress. They are also preferred when obstructions inhibit access to water or when seine deployment/retrieval is difficult.

In general, seining is more effective if fish, especially juvenile fish, are moved away ("flushed") from under cover. Flush efficiency can be increased by conducting seining during dawn or dusk, in conjunction with snorkeling. In flowing waters, especially where flow volume and/or velocity is higher, seines that employ a heavy lead line and variable mesh size are preferred. Small mesh sizes are more effective across the full spectrum of fish sizes (and age classes), but they also increase resistance and can make seine deployment/retrieval more difficult in flowing waters. Seines with a small-diameter mesh size in the bag (or body), and a larger, less resistant, mesh size in the wings, may be more effective and efficient.

Dip Nets

Dip Nets shall be used in conjunction with seining. This method is particularly effective during gradual dewatering or flow diversion. To minimize stress and risk of injury to fish, dewatering or flow diversion should proceed at a measured pace (within constraints), to encourage the volitional downstream movement of fish, and reduce the risk of stranding. Work shall not proceed unless there are sufficient staff and materials on site to properly relocate fish. Generally, this will require a minimum of two staff (three, if electrofishing).

Once netted, fish shall remain in water until transferred to a bucket, cooler, or holding tank. Dip nets which retain a volume of water (sanctuary nets) are preferred. However, sanctuary nets may be ineffective where flow volume or velocity is higher due to increased resistance. Where water depth is shallow and/or fish are concentrated in very small receding pools or coarse substrate, a small aquarium net may be a more effective option.

Connecting Rod Snake

A Connecting Rod Snake (CRS) can be used to flush fish out of culverts. Like other cover attractive to fish, culverts (especially long culverts), can present a challenge in moving fish. A first step in implementing the FEP should be to place block nets immediately upstream and/or downstream of culvert to minimize the number of fish that might seek cover within the culvert. Fish should then be herded into areas where they can be easily seined and netted. Once fish have been relocated, the block net downstream of the culvert should be removed so that fish inside the culvert can volitionally move downstream – or be flushed with the CRS.

Electrofishing

Electrofishing shall be performed only when other methods to move fish have proven impracticable or ineffective at removing all fish. Larger fish (adult and sub-adult fish with longer spine lengths) are more susceptible to electrofishing injury than smaller fish. The Directing Biologist shall confirm that other fish-moving methods have been attempted before using an electrofisher. An electrofisher should not be used in water where visibility less than 0.5 meter.

The following performance measures shall apply to the use of an electrofisher:

(1) Upon request, the WSDOT shall allow the Services, WDFW, and in some cases the Tribes to observe fish capture and removal operations. Work conducted under a declared emergency, or emergency conditions,

shall follow established ESA notification protocols.

(2) **Electrofishing shall only be conducted when a Directing Biologist is present**, possessing the required training and experience (Appendix A).

(3) The Directing Biologist shall ensure that electrofishing is conducted using the **minimum voltage, pulse width, and rate settings necessary** to elicit galvanotaxis. Water conductivity shall be measured prior to work to determine appropriate settings. Electrofishing methods and equipment shall comply with guidelines outlined by the NMFS[6] and USFWS[7] if bull trout may be present.

(4) The **initial and maximum settings** listed in **Table 1** shall serve as guidelines when electrofishing in waters that may support ESA-listed fish. Only DC or pulsed DC current shall be used. Many modern electrofishers are equipped with a setup, or initialization, function. The Directing Biologist shall have the discretion to use this function to identify proper initial settings.

Electrofishing shall begin with initial settings. If fish do not exhibit a response, the settings shall be gradually increased until galvanotaxis is achieved. The lowest effective settings shall be used to minimize risks to both personnel and fish. **The Directing Biologist shall ensure the safety of all staff** and provide necessary safety equipment and materials (insulated waders and gloves, first aid/CPR kit, safety plan with emergency contacts and phone numbers, etc.). Only individuals that are trained and familiar with the use of electrofishing equipment should provide direct assistance during work.

Table 1. Guidelines for initial and maximum settings for backpack electrofishing[8]

	Initial Settings	Conductivity (µS/cm)	Maximum Settings
Voltage	100 V	< 300	800 V
Voltage	100 V	>300	400 V
Pulse Width	500µs	-----	5 ms
Pulse Rate	15 Hz	-----	60 Hz (>40 Hz may injure more fish)

(5) **Electrofishing shall not be conducted** where spawning adults or redds with incubating eggs may be exposed to the electrical current. As a general rule, waters that support anadromous salmon should not be electrofished from **October 15 to May 15**, and non- anadromous waters (resident fish only) from **November 1 to May 15**. If located within waters that may support bull trout, especially waters that support spawning and rearing, seasonal limitations on the use of electrofishing equipment may be more restrictive. If a more restrictive work window is identified during ESA consultation, that window shall apply.

(6) **An individual shall be stationed at the DBN** during electrofishing to recover stunned fish in the event they are flushed downstream and impinged against the net.

(7) The operator of the electrofisher shall use caution to **prevent fish from coming into direct contact with the anode**. Under most conditions, the zone of potential fish injury extends approximately 0.5 meter from

[6] National Marine Fisheries Service. 2000. Guidelines for electrofishing waters containing salmonids listed under the Endangere d Species Act.
[7] U.S Fish and Wildlife Service. 2012 Recommended Fish Exclusion, Capture, Handling, and Electroshocking Protocols and Standards
[8] Adapted from NMFS Backpack Electrofishing Guidelines, June 2000, and WDFW Electrofishing Guidelines for Stream Typing, May 2001.

the anode. Netting shall not be attached to the anode as this practice presents an increased risk of direct contact and injury. Extra care shall be taken near in-water structures or undercut banks, in shallow waters, or where fish densities are high. Under these conditions fish are more likely to come into close or direct contact with the anode and/or voltage gradients may be intensified. When electrofishing areas near cover, fish that avoid capture may be repeatedly exposed to the electrical current. Repeated or prolonged exposure to electrical current presents a higher risk of injury. As such, the electrofisher settings should be adjusted to accommodate changing conditions in the field.

(8) **Once galvanotaxis is observed**, the IWA shall be worked systematically. The number of passes shall be kept to a minimum, but, dependent upon the numbers of fish and site characteristics, shall be at the discretion of the Directing Biologist. Electrofishing shall not be conducted unless there are sufficient staff and materials on site. Fish shall be immediately removed from the electrical field to avoid repeat exposure. **Fish shall not be held in dip nets while electrofishing is in progress** (i.e., while continuing to capture additional fish). When flow velocity or turbulence is higher (e.g., within riffles), it may be difficult to see and net fish. In this scenario, fish may evade capture, resulting in repeated exposure, and/or may become impinged on the DBN. A "frame net," or small portable block net, approximately three feet in width, can be effective under these conditions when immediately downstream of the anode.

(9) **The condition of captured fish shall be carefully observed and documented**. Dark bands on the body and/or extended recovery times are signs of stress or injury. When such signs are noted, settings for the electrofishing unit may require adjustment. The Directing Biologist should also consider modifications to the way electrofishing is conducted. If adjustments do not lessen the frequency (or severity) of observed stress, the Directing Biologist shall have the authority to postpone work. Each captured fish shall be capable of remaining upright and actively swimming prior to release. If necessary the fish should be revived in aerated holding tanks.

(10) **Electrofishing shall not be conducted** when aquatic visibility is less than 0.5 meter, water conductivity exceeds 350 µS/cm, or when water temperature exceeds 18°C (64°F) or is less than 4°C (39°F).

Fish Handling, Holding and Release

(1) Fish moving shall be conducted such that **handling is minimized**.

(2) Fish shall **remain in water** during seining/netting, handling, and transfer for release.

(3) The Directing Biologist shall **document** fish species, number, condition at release, and release location. Fish tissue shall not be sampled, or fish anesthetized, unless allowed under the WSDOT Section 10 scientific collection permit.

(4) Individuals handling fish shall ensure that their **hands are clean** and free of substances potentially harmful to fish, including, but not limited to, sunscreen, lotion, and insect repellent.

(5) Water quality shall be maintained in buckets, coolers, or holding tanks that are used to hold and transfer captured fish. Clean water from the natal stream shall be used. Aerators shall be used, as necessary, to provide well-oxygenated water. Holding containers are to be **monitored frequently**, shaded where possible, and work adjusted appropriately, to minimize fish stress. If fish are held for more than a few minutes prior to release, the Directing Biologist should consider using **dark-colored, lidded containers** only. Fish shall not be held in containers for more than 10 minutes, unless those containers are dark-colored, lidded, and fitted with a portable aerator.

(6) Captured fish shall be held in **low densities** to avoid overcrowding. Large fish shall be separated from

smaller fish to **prevent predation**. Water-to-water fish transfer shall be implemented, whenever possible.

(7) **Release sites** shall be determined by the Directing Biologist in consideration of site characteristics (flow, temperature, available refuge and cover, etc.) as well as the class of fish captured (out-migrating smolt, kelt, pre-spawn migrating adult, etc.). More than one site may be selected to provide for varying needs and to separate prey-sized fish from larger fish.

(8) Any **ESA-listed fish incidentally killed** shall be preserved and delivered to the appropriate authority, upon request. Photos are recommended to facilitate later identification if the specimen is lost or deteriorates.

(9) If the limits on take of ESA-listed species are exceeded, or if **incidental take** is approaching and may exceed specified limits, the Directing Biologist shall postpone work and notify the federal agency (or agencies) with jurisdiction. If dewatering or flow diversion is incomplete and still in- progress, WSDOT shall take remedial actions directed at maintaining sufficient quantity and quality of flow to reduce the potential for fish stress and/or injury. If conditions contributing to fish stress and/or injury may worsen before the federal agency with jurisdiction can be contacted, WSDOT should attempt to safely move fish to a suitable location near the capture site.

Reintroduction of Flow and Fish to the IWA

If fish moving involves placement of block nets, the Directing Biologist shall ensure that the nets remain in place until work is complete and conditions are suitable for the reintroduction of fish.

Flow shall be gradually reintroduced to the IWA to prevent channel bed or bank instability, excessive scour, or elevated turbidity and sedimentation. The Directing Biologist shall ensure that no fish are stranded during reintroduction of flow. If conditions causing, or contributing to, fish stress and/or injury are observed, WSDOT shall take remedial action, including, but not limited to, a more gradual reintroduction of flow.

Temporary structures and materials (block nets, posts and anchors, bypass flume or culvert, gravel bags, sheet pile or similar cofferdam, etc.) shall be removed at the completion of work. Block net removal is to be overseen by the Directing Biologist.

Documentation

(1) Work area isolation and fish moving shall be documented in a logbook with the following information: project location, date, methods, personnel, water temperature, conductivity, visibility, electrofishing equipment settings, and other comments.

(2) All fish handled shall be documented: number of each species, condition at release, and location of release. Photograph individuals that are not confidently identified.

(3) If fish are observed in distress, a fish kill occurs, or water quality problems develop (including equipment leaks or spills), the Directing Biologist shall immediate notify WSDOT management, who in turn, shall notify the WDFW as required by the HPA. Notification shall consist of a phone call or voice mail message directed to the Area Habitat Biologist.

(4) Any **ESA-listed species incidentally killed** shall be documented and the appropriate authority (USFWS and/or NMFS) notified within two working days. If the Directing Biologist is a consultant, he/she shall immediately notify WSDOT, who will, in turn, notify the Services.

Initial notification shall consist of a phone call or voice mail message, directed to the nearest USFWS Law

Enforcement Office, the Washington Fish and Wildlife Office at (360) 753-9440, the NMFS Office of Law Enforcement at (800) 853-1964, and the Washington State Habitat Office at (360) 753-9530.

Any **dead specimens** shall be kept whole and preserved on ice or frozen until WSDOT receives a response and further directions from the appropriate authority. If WSDOT receives no response within five working days, the Directing Biologist shall have the discretion to dispose of specimens. Initial notification shall be followed by a second notification in writing. All notifications shall provide, at a minimum, the following: date, time, WSDOT point of contact (the Directing Biologist and/or supervisor), project name (with USFWS and/or NMFS tracking number, if available), precise location of incidentally killed, injured and/or unrecovered fish, number of specimens and species, cause of death or unrecoverable injury, and measures taken to address the cause of mortality. If the limit of authorized incidental take is exceeded, the written notification shall also include an explanation of the circumstances causing or contributing to take.

(5) The final condition of the IWA, including temporary bypass, shall be documented in qualitative terms, including any obvious signs of channel bed or bank instability resulting from work. WSDOT shall document any remedial actions taken to correct channel instability as well as the final condition of the IWA.

Safety

Implementing the FEP must comply with WSDOT safety requirements. In certain circumstances, it may be appropriate to conduct work without an IWA (not move fish) to ensure safety. In-water work at night is generally not permissible. If the Directing Biologist determines that night work is required, it must be pre-approved by WSDOT management, including the safety officer, as well as regulatory agencies with jurisdiction.

Equipment Sanitation

To minimize the risk of spreading invasive species, aquatic parasites, and/or disease, the Directing Biologist shall ensure that all equipment and materials are cleaned and dried per protocol[9] before using them at another aquatic area. It is recommended having two or more outfits for different locations on consecutive days. Once equipment is fully dried, it should remain dry for at least 48 hours before use. Felt-soled shoes are prohibited.

[9] WDFW Invasive Species Management Protocols, Version 4, September 2022.

APPENDIX A - TRAINING REQUIREMENTS

Directing Biologist

(1) Completion of a two-day electrofishing class.

(2) Training in fish ecology and identification.

(3) 100 hours of electrofishing experience in the Pacific Northwest (PNW), at least 20 hours of which should have been in the last 5 years in the PNW.

(4) Possession of a current CPR certification.

(5) Possession of a current first aid certification.

(6) Demonstrated understanding of aquatic invasive species and the appropriate decontamination methods.

(7) Demonstrated ability to interpret contract plan sheets/specification, contactor schedule and plans prepared by the contractor.

(8) Ability to move fish per the most current version of the "WSDOT Fish Exclusion Protocols and Standards"

(9) Must develop and deliver on site field training that includes the following elements:

   a. Safety plan.

   b. Fish exclusion plan.

   c. Role and responsibility of each participant. Assisting staff may include WSDOT and consulting biologists, and non-biologists (contractors) assigned limited responsibilities. The directing biologist will provide constant supervision when assigning responsibilities to contractors.

   d. Fish identification and species expected.

   e. Fish handling techniques.

   f. Seine, net, and electrofisher techniques (and electrofisher settings).

   g. Basic terminology (galvanotaxis, narcosis, and tetany).

   h. How electrofishing attracts fish.

   i. How to recognize signs of fish stress or injury.

   j. Sorting fish by size.

   k. Proper fish holding in buckets to ensure water quality and address predation

   l. Hand cleanliness and gear sanitation protocol.

   m. Review of common mistakes.

n. Discuss personal floatation devices, if required.

Trained Biologists

People without a class or 100 hours – "trained" is a good classification for people that have worked under a directing bio and could operate an electrofisher under direct supervision (have to have 40 hours in USFWS protocol). In other words, people who have the experience but maybe not the time but will get the experience/time to qualify as a directing bio because they are under the direct supervision of the directing bio.

Assisting Staff

(1) Must possess training, knowledge, skills and ability to ensure proper handling of fish and safety of staff conducting work (see Directing Biologist responsibility #9 above).

(2) Possession of a current first aid certification and current CPR certification (this should be a standard for all assisting staff and is typically included in conjunction with first aid certification).

Appendix D. Reasonably Foreseeable Projects Summary Table

Reasonably Foreseeable Projects Summary Table

This appendix summarizes the past, ongoing, and reasonably foreseeable projects that were considered in the analyses of the effects for the resource topics presented in Chapter 3.

TABLE D-1. LIST OF PREVIOUS, ONGOING, AND FORESEEABLE FUTURE ACTIONS AND LAND USES

Project Name	Description	Status	Resources Affected
Construction of SR 410	Construction of SR 410 in 1931	Previous	Soils and Vegetation Wetlands Floodplains Fish, Wildlife, and Special Status Species Cultural Landscapes Park and Highway Operations Visitor Use Experience
Establishment of Wilderness Area (Wilderness Act of 1964)	Establishment of wilderness area and maintenance boundaries for SR 410 within wilderness area boundaries.	Previous	Fish, Wildlife, and Special Status Species Park and Highway Operations Visitor Use Experience Wilderness
SR 410 Routine Maintenance	Typical maintenance activities that Washington State Department of Transportation conducts as part of the maintenance agreement on SR 410. Includes patching potholes, cleaning ditches, painting stripes on roadway, repairing damage to guardrails, controlling noxious weeds, and plowing snow.	Previous and Ongoing	Soils and Vegetation Wetlands Floodplains Cultural Landscapes Park and Highway Operations Visitor Use Experience Wilderness Fish, Wildlife, and Special Status Species

Project Name	Description	Status	Resources Affected
Park Operations – Natural Resources Management	Natural resource management activities include monitoring wildlife (e.g., elk, northern spotted owls, bull trout, amphibians, and birds), monitoring forest processes and landscape change, rehabilitating wilderness camping areas, removing non-native plant species, and conducting restoration projects, some of which entail helicopter flights.	Ongoing	Soils and Vegetation Wetlands Floodplains Cultural Landscapes Park and Highway Operations Visitor Use Experience Wilderness Fish, Wildlife, and Special Status Species
Park Operations – Hazard Tree Management	Hazard tree activities include monitoring and treating hazard trees within designated areas of the park to protect visitors, staff, and facilities. This management has the potential to remove habitat trees for northern spotted owls, bald eagles, and marbled murrelets, and mitigation measures are used to reduce impacts. Closures around hazard trees and other methods may also be used to protect the public.	Ongoing	Soils and Vegetation Wetlands Floodplains Cultural Landscapes Park and Highway Operations Visitor Use Experience Wilderness Fish, Wildlife, and Special Status Species
Fryingpan Creek Bridge Replacement Project	Bridge replacement and road realignment at the Fryingpan Creek crossing on Sunrise Road. Construction will occur over the course of about three years. Project will include clearing trees, in-water work, and potential blasting.	Future	Soils and Vegetation Historic Structures and Cultural Landscapes Park and Highway Operations Visitor Use Experience Floodplains Fish, Wildlife, and Special Status Species

Project Name	Description	Status	Resources Affected
Dispersed/Primitive Camping	Includes permitted activities for visitors accessing the wilderness area in the project vicinity or from access points along SR 410	Previous, Ongoing, and Future	Soils and Vegetation Wetlands Floodplains Fish, Wildlife, and Special Status Species Cultural Landscapes Park and Highway Operations Visitor Use Experience Wilderness

Appendix E. Tree Count Survey

Tree Count Survey

A tree count was performed within the project area. In total, 873 trees were identified.

TABLE E-1. TREE COUNTS WITHIN THE PROJECT AREA

DBH (inches)	Taxonomy	Status	Count in Study Area	Count in Headcut Fill Structure Footprint[1]	Count in Engineered Log Jam Work Area
2	CONIF	Alive	15	-	-
3	CONIF	Alive	3	-	-
3	DECID	Alive	4	-	-
4	CONIF	Alive	4	-	-
4	DECID	Alive	5	-	-
5	DECID	Alive	13	-	-
6	CONIF	Alive	76	3	37
6	DECID	Alive	19	-	-
6	UNKNOWN	Dead	4	-	4
7	CONIF	Alive	1	-	-
8	CONIF	Alive	59	3	16
8	DECID	Dead	1	-	-
8	DECID	Alive	23	-	6
8	UNKNOWN	Dead	2	-	-
10	CONIF	Alive	81	8	21
10	DECID	Dead	1	-	-
10	DECID	Alive	7	-	1
10	UNKNOWN	Dead	1	-	-
12	CONIF	Alive	149	3	29
12	DECID	Dead	1	1	4
12	DECID	Alive	52	-	8
12	UNKNOWN	Dead	17	-	-
14	DECID	Alive	3	-	2
15	CONIF	Alive	3	-	-
16	CONIF	Alive	1	-	-
18	CONIF	Alive	68	3	21
18	DECID	Alive	10	-	8
18	UNKNOWN	Dead	12	-	4

DBH (inches)	Taxonomy	Status	Count in Study Area	Count in Headcut Fill Structure Footprint[1]	Count in Engineered Log Jam Work Area
24	CONIF	Dead	1	-	-
24	CONIF	Alive	80	1	24
24	DECID	Dead	2	-	-
24	DECID	Alive	3	-	-
24	UNKNOWN	Dead	10	-	1
28	CONIF	Alive	2	-	-
30	CONIF	Alive	25	-	7
30	UNKNOWN	Dead	5	-	1
32	CONIF	Alive	8	-	2
36	CONIF	Alive	44	2	8
36	UNKNOWN	Dead	6	-	1
38	CONIF	Alive	1	-	-
40	CONIF	Alive	4	-	-
42	CONIF	Alive	11	-	4
42	UNKNOWN	Dead	3	-	-
46	CONIF	Alive	2	-	-
48	CONIF	Alive	12	-	-
48	UNKNOWN	Dead	3	-	-
54	CONIF	Alive	3	-	-
60	CONIF	Alive	9	1	2
66	CONIF	Alive	2	1	-
70	CONIF	Alive	1	-	-
84	CONIF	Alive	1	-	-
Total			**873**	**26**	**211**

Source: Hamer 2024

Appendix F. Wetlands, Rivers, Streams, and Buffers Impact Analysis

Wetlands, Rivers, Streams, and Buffers Impact Analysis

This appendix summarizes the impacts the proposed project would have on wetlands, streams, rivers, and their buffers in the project area as presented in the Wetland and Stream Delineation Report.

While the large woody material proposed for placement is not considered fill by USACE, the soil, gravel, and other materials used to anchor it into place will be. Permanent impacts to one wetland, Wetland E, would be necessary to install the headcut fill structure, along with permanent impacts to wetland buffers for Wetlands A through E and the intermittent stream between them. Impacts associated with the installation of the headcut fill structure include 0.002 acre of direct impact on Wetland E, completely filling it. Additionally, temporary impacts to the wetland buffers for Wetlands A through D would occur in the material drop zone. No direct wetland impacts are anticipated in association with the installation of the engineered log jam, but permanent impacts to wetland buffers of Wetlands H through J would occur within the footprint of the log jam (Table 1 and Figure 1). Indirect adverse impacts to wetlands may occur as a result of erosion and sediment built up from construction, and from increased human activity in the area disturbing habitat. These impacts would be limited to Wetland B, located on the northern edge of the headcut fill structure installation area, and would be possible due to activity in that area including within the material drop zone. Construction activities would both permanently and temporarily impact portions of the riparian buffer and associated streams and river (Table 2 and Figure 2).

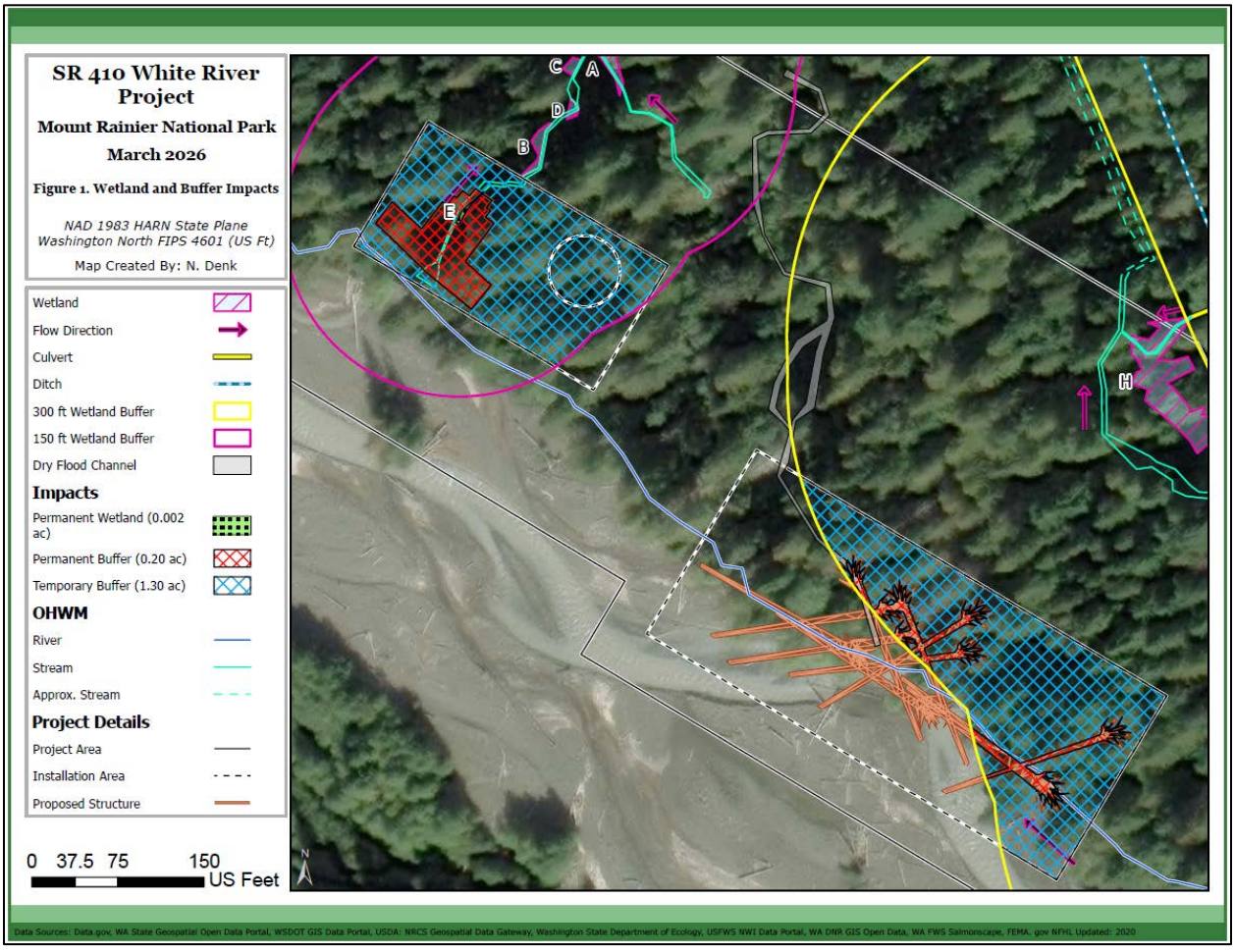

FIGURE 1. SUMMARY OF WETLAND AND WETLAND BUFFER IMPACTS.

TABLE 1. SUMMARY OF WETLAND AND BUFFER IMPACTS.

Wetland	Wetland Impacts (acre) Temporary	Wetland Impacts (acre) Permanent	Wetland Buffer Impacts (acre) Temporary	Wetland Buffer Impacts (acre) Permanent
Wetland A	--	--	0.16	0.001
Wetland B	--	--	0.53	0.12
Wetland C	--	--	0.17	0.01
Wetland D	--	--	0.32	0.05
Wetland E	--	0.002	N/A	N/A
Wetland F	--	--	--	--
Wetland G	--	--	--	--
Wetland H	--	--	0.61	0.05
Wetland I	--	--	0.56	0.04
Wetland J	--	--	0.44	0.03

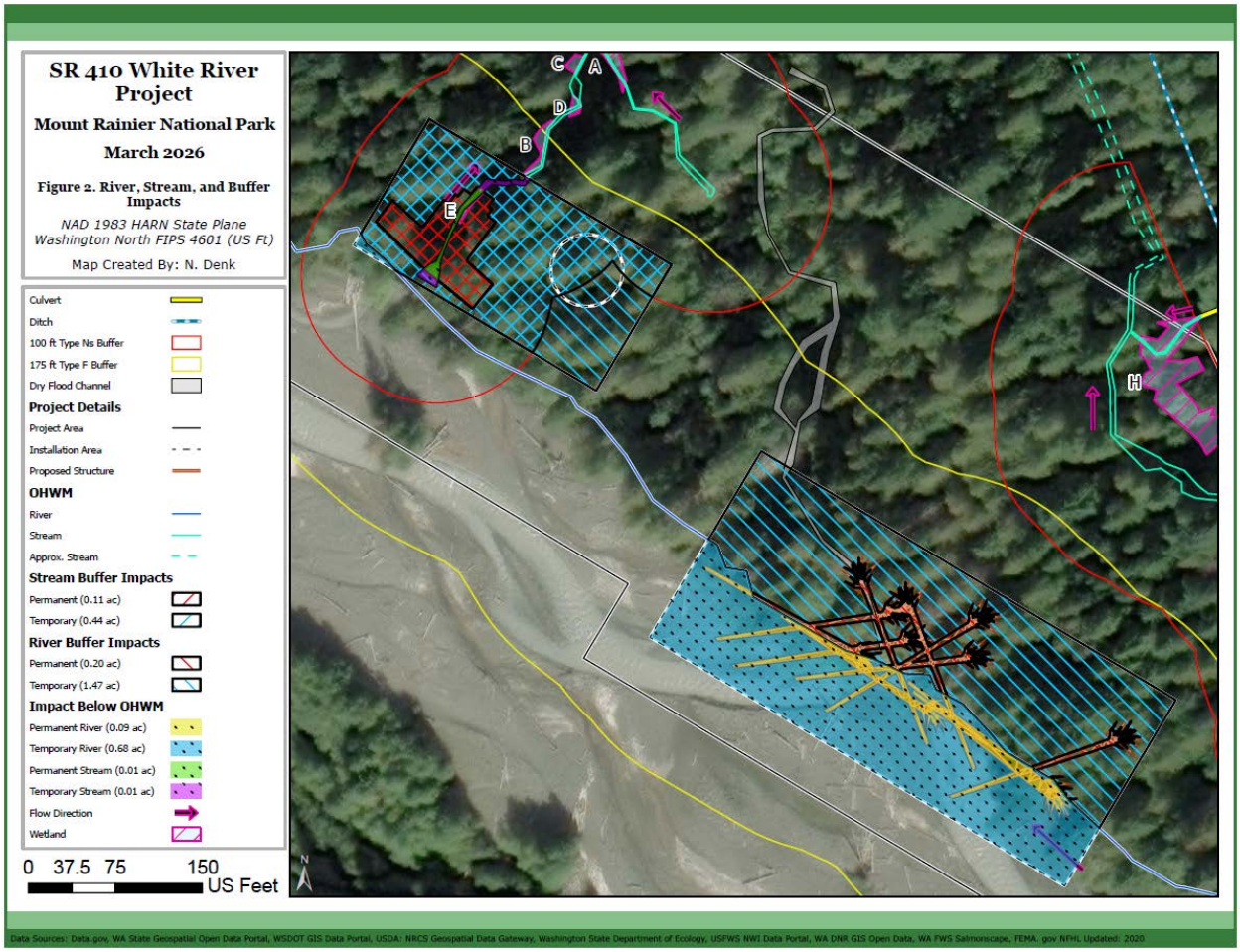

FIGURE 2. SUMMARY OF STREAM, RIVER, AND RIPARIAN BUFFER IMPACTS

TABLE 2. SUMMARY OF STREAM, RIVER, AND RIPARIAN BUFFER IMPACTS.

Waterbody	River/Stream Impacts (acre) Temporary	River/Stream Impacts (acre) Permanent	Riparian Buffer Impacts (acre) Temporary	Riparian Buffer Impacts (acre) Permanent
White River	0.68	0.09	1.47	0.20
Streams	0.01	0.01	0.44	0.11

1.1 Wetlands and Buffers

1.1.1 Wetland A

The proposed project would not directly impact this wetland, which is located at the north end of the onsite portion of the stream with the proposed headcut fill structure. Construction activities within the installation work area would temporarily impact 0.16 acre of the wetland buffer and would permanently impact approximately 0.001 acre of the buffer with the placement of the headcut fill structure. Temporary impacts would occur due to potential soil compaction and vegetation damage within the installation work area. This wetland is rated low for water quality functions, moderate for hydrologic functions, and high for habitat functions. The impacts on the wetland buffer from the Proposed Action are not anticipated to change the functions of this wetland.

1.1.2 Wetland B

The proposed project would not directly impact this wetland, which is located near the center of the onsite portion of the stream with the proposed headcut fill structure. Construction activities within the installation work area would temporarily impact 0.53 acre of the wetland buffer and would permanently impact approximately 0.12 acre of the buffer with the placement of the headcut fill structure. Temporary impacts would occur due to potential soil compaction and vegetation damage within the installation work area. This wetland is rated low for water quality functions, moderate for hydrologic functions, and high for habitat functions. The impacts on the wetland buffer from the Proposed Action are not anticipated to change the functions of this wetland.

1.1.3 Wetland C

The proposed project would not directly impact this wetland, which is located just south of Wetland A along the onsite portion of the stream with the proposed headcut fill structure. Construction activities within the installation work area would temporarily impact 0.17 acre of the wetland buffer and would permanently impact approximately 0.01 acre of the buffer with the placement of the headcut fill structure. Temporary impacts would occur due to potential soil compaction and vegetation damage within the installation work area. This wetland is rated low for water quality functions, moderate for hydrologic functions, and high for habitat functions. The impacts on the wetland buffer from the Proposed Action are not anticipated to change the functions of this wetland.

1.1.4 Wetland D

The proposed project would not directly impact this wetland, which is located between Wetlands B and C along the onsite portion of the stream with the proposed headcut fill structure. Construction activities within the installation work area would temporarily impact 0.32 acre of the wetland buffer and would permanently impact approximately 0.05 acre of the buffer with the placement of the headcut fill structure. Temporary impacts would occur due to potential soil compaction and vegetation damage within the installation work area. This wetland is rated low for water quality functions, moderate for hydrologic functions, and high for habitat functions. The

impacts on the wetland buffer from the Proposed Action are not anticipated to change the functions of this wetland.

1.1.5 Wetland E

The Proposed Action would directly impact this wetland, which is located at the southern end of the onsite portion of the stream with the proposed headcut fill structure. Construction activities—specifically fill placement—would permanently fill the entirety of the 0.002-acre wetland. This wetland is rated low for water quality functions, moderate for hydrologic functions, and high for habitat functions. The impacts on the wetland from the Proposed Action would permanently remove the function of the wetland.

1.1.6 Wetland F

The proposed project would not directly impact this wetland, which is located along the bank of the White River in the southern portion of the primary project area. The existing shoulder pull-out area to be used for vehicle staging overlaps with approximately 0.18 acre of the wetland buffer. The designated foot path to be utilized for foot access to the installations would avoid this wetland; however, it may be located within the wetland buffer resulting in temporary disturbance.

1.1.7 Wetland G

The proposed project would not directly or indirectly impact this wetland, which is located southeast of Wetland J, along the bank of the stream that flows parallel to SR 410. The designated foot path to be utilized for foot access to the installations would avoid this wetland; however, it may be located within the wetland buffer resulting in temporary disturbance.

1.1.8 Wetland H

The proposed project would not directly impact this wetland, which is located near the northeast corner of the primary project area, between SR 410 and the stream that flows parallel to SR 410. The engineered log jam footprint would permanently impact 0.05 acre of the wetland buffer. Potential soil compaction and vegetation damage within the installation work area would temporarily impact 0.61 acre of the wetland buffer. The designated foot path to be utilized for foot access to the installations would avoid this wetland; however, it may be located within the wetland buffer resulting in temporary disturbance.

1.1.9 Wetland I

The proposed project would not directly impact this wetland, which is located southeast of Wetland H, along the bank of the stream that flows parallel to SR 410. The engineered log jam footprint would permanently impact 0.04 acre of the wetland buffer. Potential soil compaction and vegetation damage within the installation work area would temporarily impact 0.56 acre of the wetland buffer. The designated foot path to be utilized for foot access to the installations would avoid this wetland; however, it may be located within the wetland buffer, resulting in temporary disturbance.

1.1.10 Wetland J

The proposed project would not directly impact this wetland, which is located south of Wetland I, along the bank of the stream that flows parallel to SR 410. The engineered log jam footprint would permanently impact 0.03 acre of the wetland buffer. Potential soil compaction and vegetation damage within the installation work area would temporarily impact 0.44 acre of the wetland buffer. The designated foot path to be utilized for foot access to the installations would avoid this wetland; however, it may be located within the wetland buffer, resulting in temporary disturbance.

1.2 Rivers, Streams, and Riparian Buffers

1.2.1 White River

The proposed project would directly impact the river and its riparian buffer, which is located along the southern edge of the primary project area. Construction activities associated with the headcut fill structure and engineered log jam—specifically vegetation removal and log placement—would impact the riparian buffer, which is comprised of mature coniferous forest with a sparse understory. Construction activities to install the headcut fill structure and engineered log jam would permanently impact 0.09 acre and temporarily impact 0.68 acre of the river channel below the OHWM. Riparian buffer impacts would include 0.20 acre of permanent impact and 1.47 acre of temporary impact.

1.2.2 Stream at Headcut

The proposed project would directly impact the stream in the channel where the headcut fill structure is proposed. Construction activities associated with the headcut fill structure—specifically log placement and removal of one ten-inch diameter at breast height and two twelve-inch snags—would impact the riparian buffer, which is comprised of mature coniferous forest with a sparse understory. Construction activities would permanently impact 0.11 acre of the buffer and temporarily impact 0.44 acre of the buffer. 0.01 acre of the stream below the Ordinary High Water Mark would be permanently impacted and 0.01 acre of the stream below the Ordinary High Water Mark would be temporarily impacted by the placement of the headcut fill structure. The stream may be impacted by a loss or reduction of hydrology as a result of filling the headwater of the stream and further separating the stream channel from the channel of the White River.

Appendix G. Draft Minimum Requirements Analysis Framework Workbook

MINIMUM REQUIREMENTS ANALYSIS FRAMEWORK WORKBOOK

"…except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act…"

— Section 4(c), Wilderness Act of 1964

Introduction

The Minimum Requirements Analysis (MRA) is designed to examine whether a project truly needs to occur in wilderness, and if so, how to accomplish it with the least impact to the wilderness resource. The framework below is intended to help managers: 1) evaluate actions proposed in wilderness involving a use otherwise prohibited by the Wilderness Act; and 2) consider appropriate choices about administrative actions they might take. Like the previous version of this document (the Minimum Requirements Decision Guide (MRDG)), the MRA Framework (MRAF) is based on the Wilderness Act and is consistent with agency policy. The MRAF incorporates lessons learned by agency employees as they used the MRDG over the years. The goal of the MRAF is to help provide consistency in the way wilderness-managing agencies consider actions to address threats to wilderness, and to ensure that agencies strive to preserve wilderness character through their on-the-ground decisions.

This document is intended for uses prohibited by Section 4(c) of the Wilderness Act in designated wilderness, but it can be used to analyze all projects in wilderness. Check agency policy to determine if this workbook may be appropriate for other proposals in wilderness.

If applicable, per agency policies, collaborate and coordinate with associated Tribe(s) and/or Tribe(s) with historical, treaty, or related ties to the area.

Note: For each fillable field, click or tap on the arrow that will appear to the left of the Word "HELP" for more instructions. Please read the full instructions before proceeding. Delete this note before finalizing the document.

Title

White River State Route 410 Flood and Erosion Risk Reduction in the Mount Rainier Wilderness

Step 1: Determine If Administrative Action May Be Necessary

Issue Statement

The White River is a major glacier river originating in the Mount Rainier Wilderness. The bed of the river has aggraded over the last century and will continue to aggrade. As it does so, the main channel of the river migrates across the flood plain, which spans the entire valley floor.

State Route 410 was built in the flood plain against the east valley wall. The road is a transportation corridor between west and eastern Washington, and is also a primary access route to Mount Rainier National Park.

During recent flood events, the river has spilled into side channels that run through the forested area between the river and the road. The side channels are actively head-cutting toward the river and will eventually connect to the main river channel. Because the side channels and road prism are lower in elevation than the main channel currently occupied by the river, there is a risk that the river will jump into, and remain in, these channels in the near term. This would greatly increase the frequency of inundation and road bank erosion, leading to long closures and costly repairs.

River avulsion is currently inhibited by the old growth forest that exists between the active river channel and the highway, but because of floodplain topography, once the river occupies the existing side channel, there would be no place to divert the water away from the road corridor without excavating a man-made channel through old-growth forest.

Inundation and erosion of the road prism have occurred in the recent past, and risks of more damaging events have been extensively documented. The flood risk to public safety is currently low because the road is typically closed to the public during the time of year when floods occur; however, if the river were to shift channels, even summer flows could threaten the road.

WSDOT has proposed targeted short-term stabilization actions to prevent or delay the main-stem river from avulsing into the road corridor. The location of these actions would be in designated wilderness. The project area includes old growth forest suitable as habitat for Northern Spotted Owl and Marbled Murrelet, and contains side channel spawning habitat utilized by ESA-listed fish species.

This MRA was prepared in tandem with the drafting of an Environmental Assessment for the project. Alternatives considered in the MRA were also considered during the development of the proposed action in the EA. Effects on the natural quality of wilderness character were informed by the analysis of effects in the EA and the Biological Assessment. More detail on the Issue Statement is available in the Purpose and Need section of the EA.

Options Outside of Wilderness

Is this issue wilderness dependent, or can an action occur outside of wilderness to properly resolve the issue now or over time?

Can the issue be resolved or addressed outside of wilderness?

☒ YES **STOP – EXPLAIN BELOW AND DO NOT TAKE ACTION**

☒ NO **EXPLAIN BELOW AND PROCEED TO THE NEXT SECTION**

The feasibility of options outside of designating wilderness has been the primary consideration during the Environmental Assessment process. During project scoping, WSDOT and the NPS discussed a suite of possible actions outside of wilderness to address the issue. These options are informed by multiple studies, reach assessments, and professional recommendations solicited over the past 20 years. Additionally, a four-day Value Engineering workshop conducted early in 2026 provided a structured approach to developing, evaluating, and documenting long-term, near-term, and emergency actions, many of which were proposed to avoid conflict with wilderness protections.

Several of the identified non-wilderness alternatives would have significant environmental impacts, including adverse effects on threatened and endangered species, adverse impacts on the Mount Rainier National Historic Landmark District, long term maintenance complications, and/or would not adequately address the primary risk, which is a full channel avulsion.

Complicating this analysis, those impacts occurring outside of designated wilderness do not directly affect wilderness character, but would likely be significantly greater in scale. In addition, because the non-wilderness alternatives do not reduce the risk of channel avulsion and the White River flows out of and back into the designated wilderness, it is reasonably foreseeable that the effects of erosion and repair would extend into wilderness, even with non-wilderness actions.

There is agreement between previous assessments and the current project team that the preferred long-term solution would be to elevate the highway on piers within the current alignment to effectively remove it from the floodplain. However, this alternative

would require extensive planning and engineering, take years to implement, and exceed available funds by two orders of magnitude. Because major highway re-construction is not feasible in the near term or with available resources, this alternative was determined to not meet the project purpose and need – which is for a cost effective, feasible action to reduce near-term flood risk while longer term solutions are pursued.

The following analysis compares the potential wilderness impacts of the proposed action identified in the EA with the reasonably foreseeable impacts of the no-action, with the assumption of eventual avulsion of the main stem White River into the road prism.

Criteria for Determining Necessity

Do any of the criteria below apply?

A. Wilderness Character

Based on the Issue Statement, are any of the qualities of wilderness character degraded, impaired, or threatened to a degree that it is necessary to analyze potential action otherwise prohibited by Section 4(c) to address the issue?

UNTRAMMELED

Select your answer.

☒ YES ☐ NO

Within wilderness, the river currently behaves as a natural, unconstrained glacial river system. Outside of wilderness, the river is somewhat constrained by the existing road corridor, where the road and bank armoring prevent expansion or movement of the river to the east. If the river were to avulse into the roadside corridor, emergency action to restore the road could include proposals to block the new channel to redirect the river away from the road, which would require intervention in wilderness.

UNDEVELOPED

Select your answer.

☒ YES ☐ NO

Similarly, an emergency action to stabilize a river channel avulsion after it occurs could include proposals to construct engineered log structures, dikes, or levees, requiring the use of heavy equipment such as excavators, cranes, and helicopters, including temporary roads.

NATURAL

Select your answer.

☒ YES ☐ NO

The project area includes shallow side channel habitat used by ESA-listed fish species for spawning every year. These redds can often be found just a few feet from the road shoulder. A large washout of the road could transport asphalt, road base and fill downstream into spawning habitat both outside of wilderness and within designated wilderness.

OUTSTANDING OPPORTUNITIES FOR SOLITUDE or PRIMITIVE and UNCONFINED RECREATION

Select your answer.

☐ YES ☒ NO

This quality is enhanced when visitors experience remoteness from the sights and sounds of modern human activity and occupation. Generally, higher levels of visitation result in reduced opportunities for solitude, and lower levels of visitation improve this quality. The primitive and unconfined element of this quality is enhanced when visitors are free to experience wilderness directly, without managerial constraints.

State Route 410 is a primary access route to the eastern half of the Mount Rainier Wilderness. Loss of road access would make wilderness trailheads more remote but would not eliminate access. During and after wash-outs, a majority of visitors traveling to the East side of the park from the Seattle-Tacoma region would require a detour that adds roughly three to four hours of round-trip driving time. When combined with the heavy traffic congestion and multi-hour gate delays common at the alternative entrance (Nisqually) during the peak summer season, this disruption would effectively curtail recreational opportunities in the Sunrise, Ohanapecosh, and White River areas, including trips into the wilderness.
While action is not necessary to preserve this quality, action is necessary to preserve access to recreational opportunities, as addressed below.

OTHER FEATURES OF VALUE

Select your answer.

☐ YES ☒ NO

No specific features of value have been identified in this area of the wilderness.

B. Valid Existing Rights

Select your answer.

Is action necessary to satisfy a valid existing right? If so, cite the specific right, terms and conditions, and source.

☐ YES ☒ NO

11 miles of State Route 410 was incorporated into the national park when the boundary was modified in the 1930s. The highway was built and is still maintained by Washington State. While the section of the highway within the park is owned by and under the exclusive jurisdiction of the United States, the State is responsible for some maintenance on the road as a component of the state highway system through a maintenance agreement with the park. There are no specific rights established through this arrangement.

C. Special Provisions of Wilderness Legislation

Is action necessary to satisfy a special provision in wilderness legislation (i.e., Section 4(d) of the Wilderness Act of 1964 or subsequent wilderness-enabling laws) that requires action? Cite law and section.

☒ YES ☐ NO

The park's Wilderness Recommendation specifically identified the SR410 road corridor to be maintained as a non-wilderness access route to the park. The Wilderness Recommendation proposed a wilderness boundary drawn along the west bank of the White River, which would have excluded the area between the river and SR410 (the project area) from wilderness.

The 1988 Washington Park Wilderness act differed from this recommendation by establishing the boundary at 200' from the centerline of the road, while allowing for a greater setback if necessary for "areas needed to maintain and repair existing roads." No special setback was identified in the wilderness map or legal description at the time of establishment.

Uniquely, title IV of the establishing legislation also directed the park to manage the undeveloped non-wilderness areas adjacent to roads as wilderness to the extent practicable. These provisions do not allow the NPS to administratively adjust the 200 foot wilderness boundary, but they make clear the intent to preserve road access and provide for road maintenance, while ensuring that the non-wilderness roadside areas remain generally undeveloped.

The Wilderness Act itself contains a special provision for National Park Wilderness. Section 4(a)(3) states: "the designation of any area of any park, monument, or other unit of the national park system as a wilderness area pursuant to this Act shall in no manner lower the standards evolved for the use and preservation of such park, monument, or other unit of the national park system," including the NPS Organic act, which requires the Service to "conserve the scenery and the natural and history objects" and to provide for public enjoyment of the same.

Furthermore, Section 4(b) of the Wilderness Act provides that wilderness areas shall be devoted to the public purposes of recreation, scenic, scientific, educational, conservation, and historical use.

D. Requirements of Other Federal Laws

*Not including special provisions found in wilderness-enabling laws, does another Federal law, by itself or as implemented or interpreted through EO, court order, etc., **require** action? Cite law and section.*

☐ YES ☒ NO

Click or tap here to explain your "Requirements of Other Federal Laws" response.

Step 1: Determination – Is Administrative Action Necessary in Wilderness?

Based on the responses and detailed explanations in A through D above, is there a need to proceed to Step 2? If at least one criterion in B through D in Step 1 has been met, or at least one quality of wilderness character is threatened, check the "Yes" box and provide a thorough explanation of the rationale described in A through D. It may also be helpful to describe in this determination how action would be consistent with the public purposes of wilderness or satisfy a specific agency obligation. If none of the criteria have been met, action is NOT necessary. Check the "No" box, explain why the proposed project does not meet the criteria, and stop your analysis.

☒ YES **EXPLAIN BELOW AND COMPLETE STEP 2 OF THE MRAF**

☐ NO **STOP – EXPLAIN BELOW AND DO NOT TAKE ACTION**

Action is necessary to proactively preserve the road corridor. If no action is taken, the NPS and WSDOT would continue to clear and repair the roadway after flood events, but if the river were to shift channels to the road corridor, road materials could be washed downstream into wilderness, and emergency interventions would need to be heavy handed and environmentally destructive. In the longer term, there is concern that agency capacity to maintain the road would be exceeded, resulting in interruption, reduction, or loss of public access to recreational opportunities in a primary visitor use area of the National Park.

Step 2: Determine the Minimum Activity

Other Direction

Is there "special provisions" language in legislation or other congressional direction that explicitly allows consideration of (but does not require) a prohibited use? (Step 1 has a similar question in Section C, but that question is specific to other legislation requiring action in wilderness; this question is specific to other legislation addressing ***consideration of prohibited uses)****.*

AND/OR

Has the issue been addressed or prescribed in agency policy, management plans, or legal directive (e.g., treaty, EO, court order, or other binding agreement with federal, state, or local agencies or authorities)?

☒ YES **DESCRIBE OTHER DIRECTION**

☐ NO **SKIP TO "UNCONTROLLABLE TIMING REQUIREMENTS" BELOW**

Executive Order 11988 of May 24, 1977 (Floodplain Management) Section 2(a)(2), as amended by the Executive Order of Jan 30, 2015, directs agencies to, "Where possible, ... use natural systems, ecosystem processes, and nature-based approaches when developing alternatives for consideration."

Uncontrollable Timing Requirements

What, if any, are the considerations that would dictate timing of the action?

Work must be conducted during periods of minimal flows, to reduce the need for dewatering and potential to affect aquatic species.

Workflow Components

What are the distinct components or phases of the action?

Example	*Transportation of personnel to the project site*
Component 1	Erosion Control Structures
Component 2	Source for Materials
Component 3	Transport of Materials
Component 4	Tools/Equipment for installation and construction
Component 5	

Feasibility of Alternatives

Only include feasible alternatives in this section. Some alternatives that are not feasible may warrant documentation in the "Alternatives Considered but Dismissed" section to provide a brief description and explanation of why it was dismissed and not considered in detail.

Possible reasons for dismissal include alternatives that are impossible, have unacceptable impacts, are unsafe, are proven ineffective, have excessive costs, or whose timing would cause degradation to wilderness character.

The alternatives should also be reasonable. For example, there is no need to include helicopters in an alternative for equipment transport when that equipment can be easily carried by people or pack stock along a maintained trail.

Refer to the MRAF instructions regarding alternatives and the effects to each of the comparison criteria.

Step 2: Alternatives

Alternative 1

Install two engineered log structures.

Component Methods

How will each of the components of the action be performed under this alternative?

Component	Workflow Components	Component Methods for this Alternative
	Example: Transportation of personnel to the project site.	*Example: Workers walk to work site.*
1	Erosion Control Structures	Log crib channel-fill structure; Bank armoring with logs
2	Source for Materials	Salvaged from Fryingpan Creek bridge project
3	Transport of Materials	Heavy lift aircraft
4	Tools/Equipment for installation and construction	Motorized winches, power tools
5		

Description of the Alternative

What are the details of this alternative? When, where, and how will the action occur? What mitigation measures will be taken? Provide a complete narrative description of the Component Methods identified above.

Two erosion control structures would be constructed from natural materials at the origin of the side channels to prevent or delay movement of the main stem White River into the channels. (The term structure is used generically, and is not to be confused with "structure" as defined in NPS Reference Manual 41). This would maintain the current function of the side channels as overflow during flood events but slow the rate of channel development that could lead to capture of the mainstem of the river. The highway corridor would continue to be managed in its current approach, with periodic repair and improvements after flood events, and it would retain the current scenic character and alignment. A more detailed description of this alternative can be found in the Environmental Assessment.

Wilderness Character

Component Number	For each component number, indicate the impact the **method for this alternative** will have on each of the five qualities of Wilderness: Positive = P, Negative = N, No Effect = 0 *Describe in detail the impacts to each of the five qualities in the narrative section below*	Untrammeled	Undeveloped	Natural	Solitude or Primitive and Unconfined	Other Features of Value
	Example: Workers walk to work site.	0	0	0	0	0
1	Log crib channel-fill structure; Bank armoring with logs	N	N	P	0	0
2	Salvaged from Fryingpan Creek bridge project	0	0	0	0	0
3	Heavy lift aircraft	0	N	0	N	0
4	Motorized winches, power tools	0	N	0	0	0
5		0	0	0	0	0

What is the effect of each Component Method on the qualities of wilderness character? What mitigation measures will be taken? Include cumulative impacts in the explanation.

UNTRAMMELED: Explain the intensity of the action that would intentionally control, manipulate, or hinder the conditions or processes of ecological systems:

Negative and small scale. Unlike a dike or levy, the river would still behave naturally during floods by flowing into side channels and spreading flood water into adjacent forested areas, but head cut development would be arrested, providing more time to pursue a long term, non-wilderness solution. The erosion control structure would protect the natural levee of earth and tree roots that currently prevents channel avulsion during flood events.

UNDEVELOPED: Explain the effects to this quality in terms of how “the imprint of man’s work [would] remain substantially unnoticeable,” and how wilderness will continue to be in contrast with other areas of “growing mechanization”:

The installation of the head cut fill log crib would have a small scale but long term effect on this quality. The bank armoring, consisting of natural materials strategically placed, would be almost indistinguishable from ordinary drift logs in the flood plain, and would not be considered installations. The reliance on aircraft to deliver and place materials would have a notable impact on this quality. The use of motorized saws, drills and winches, while lessening the duration of the construction, would also degrade this quality.

Examples include describing: 1. Type and degree of structures and installations: number, duration, and how advanced are materials and technology. 2. Motorized tools or mechanical transport: number, duration, and the power of the tool to modify the landscape.

NATURAL: Explain the effects to this quality in terms of protection, degradation, or restoration of natural conditions:

Short-term disturbances would occur during construction from work in the floodplain and use of motorized equipment, including aviation support. Impacts are mitigated by scheduling work around sensitive time periods for birds and fish. Natural function of the river is maintained by allowing floods to intermittently occupy side channels, maintaining fish habitat and wetlands. Installations are naturalistic, in that they are constructed of natural materials sourced from higher in the same watershed and designed to mimic natural floodplain processes. Effects are positive in the long term, in contrast to the no-action alternative, through the preservation of habitat, ecosystem function, and by reducing the likelihood that eroded road materials will be washed into the wilderness.

OUTSTANDING OPPORTUNITIES FOR SOLITUDE OR PRIMITIVE and UNCONFINED RECREATION: Explain how opportunities for visitors to experience solitude or a primitive and unconfined type of recreation will be protected or degraded. As appropriate, describe solitude, primitive recreation, and unconfined recreation separately**:**

The most notable impact to solitude would be from the sound of helicopter flights during the construction period, audible over a wide area. Similar to vehicle noise from the highway corridor, these flights are a prominent form of modern human activity. In the long term, visitors travelling off trail in the project area may encounter the man-made structures.

OTHER FEATURES OF VALUE: Explain any effects to features of scientific, educational, scenic, or historical value that are not accounted for in the above qualities, including cultural and paleontological resources that are integral to wilderness character:

No tangible features of value have been identified within the wilderness in project area.

Alternative 2:

No Action would be taken in wilderness.

Component Methods

How will each of the components of the action be performed under this alternative?

Component	Workflow Components	Component Methods for this Alternative
	Example: Transportation of personnel to the project site.	*Example: Workers walk to work site.*
1	Erosion Control Structures	Small scale interventions outside of wilderness. If the river were to avulse into the road corridor, emergency excavation and barriers could be necessary within wilderness.
2	Source for Materials	N/A
3	Transport of Materials	Could require the use of heavy equipment or aircraft in wilderness.
4	Tools/Equipment for installation and construction	Moving the river out of the new channel, either permanently or for dewatering during repairs, would require heavy equipment, likely in wilderness.
5		

Description of the Alternative

What are the details of this alternative? When, where, and how will the action occur? What mitigation measures will be taken? Provide a complete narrative description of the Component Methods identified above.

No action would be taken to preemptively confine, restrict, or constrain the free play of the White River within designated wilderness. Interventions could occur within the existing 400’ non-wilderness corridor of the highway. The highway would continue to be maintained and repaired after flood events. Small scale improvements such as walls or rip rap might be employed. The risk of the roadside channel capturing the main stem White River would not be addressed. If the river were to shift channels in the future, the road would suffer significantly more erosion and could be closed for long periods of time. During the WSDOT value engineering workshop, potential emergency repair actions were considered. The analysis below considers the effects of a response to a major road washout resulting from a river channel avulsion.

Wilderness Character

Component Number	For each component number, indicate the impact the **method for this alternative** will have on each of the five qualities of Wilderness: Positive = P, Negative = N, No Effect = 0 *Describe in detail the impacts to each of the five qualities in the narrative section below*	Untrammeled	Undeveloped	Natural	Solitude or Primitive and Unconfined	Other Features of Value
	Example: Workers walk to work site.	0	0	0	0	0
1	Small scale interventions outside of wilderness. If the river were to avulse into the road corridor, emergency excavation and barriers could be necessary within wilderness.	N	N	N	N	0
2	N/A	0	0	0	0	0
3	Could require the use of heavy equipment or aircraft in wilderness.	0	N	0	0	0
4	Moving the river out of the new channel, either permanently or for dewatering during repairs, would require heavy equipment, likely in wilderness.	0	N	0	N	0
5		0	0	0	0	0

What is the effect of each Component Method on the qualities of wilderness character? What mitigation measures will be taken? Include cumulative impacts in the explanation.

UNTRAMMELED: Explain the intensity of the action that would intentionally control, manipulate, or hinder the conditions or processes of ecological systems:

Initially, taking no action would demonstrate restraint. Actions could be taken outside of the wilderness boundary including walls, dikes, ditches, rip rap, or elevating the road. In the event of a channel avulsion, state and federal decision makers would have another opportunity to exercise restraint by choosing not to divert the river within wilderness, and to build up or armor the road outside of wilderness. However, political and economic realities could generate strong pressure to construct a levee and/or ELJ in wilderness to confine the river to its previous (existing) channel as the most timely and economical way to repair and reopen the highway, which would be a more heavy-handed manipulation of river processes.

UNDEVELOPED: Explain the effects to this quality in terms of how “the imprint of man’s work [would] remain substantially unnoticeable,” and how wilderness will continue to be in contrast with other areas of “growing mechanization”:

The scenario described under the untrammeled quality would have a greater negative effect than Alternative 1, because the natural levee currently preventing channel avulsion would need to be rebuilt. The opportunity to use small-scale, naturalistic features that mimic flood plain processes would be lost. Intervention would likely require the use of heavy equipment, including excavators and cranes, for construction.

NATURAL: Explain the effects to this quality in terms of protection, degradation, or restoration of natural conditions:

Potentially negative, with short- and long-term impacts to terrestrial and aquatic habitat from impacts of road washout, emergency repairs, and long-term changes to re-align or maintain the channel to restore vehicle access. More significant environmental impacts would be likely outside of wilderness.

OUTSTANDING OPPORTUNITIES FOR SOLITUDE OR PRIMITIVE and UNCONFINED RECREATION: Explain how opportunities for visitors to experience solitude or a primitive and unconfined type of recreation will be protected or degraded. As appropriate, describe solitude, primitive recreation, and unconfined recreation separately**:**

Under this scenario, road closures could be more frequent and of longer duration, limiting access to wilderness trailheads from the North side. This would effectively make areas of the wilderness more remote, which could benefit this quality for visitors to the wilderness. However, for many, longer travel times to wilderness access points may negatively affect some access and experiences, especially day-use. Actions to confine the river after a flood event, such as man-made installations, would degrade this quality where constructed.

OTHER FEATURES OF VALUE: Explain any effects to features of scientific, educational, scenic, or historical value that are not accounted for in the above qualities, including cultural and paleontological resources that are integral to wilderness character:

Click or tap here to enter “Other Features of Value” explanation.

Step 2: Alternatives Considered but Dismissed

What alternatives were considered but dismissed? Why were they dismissed?

Explain:

During project scoping, WSDOT and the NPS discussed a number of ideas for actions outside of wilderness to address the issue. While developing alternatives, a four-day Value Engineering Workshop was conducted to consider a range of long term, near-term, and emergency actions. Potential actions were rated according to cost, feasibility, benefits, and detrimental effects. A comprehensive report is in preparation. Suggestions included:

Flood control/Diversion structures between the wilderness boundary and the road. Surveys of the forested area between the river and the road, through which the side channels flow, show that if the river were to avulse into the side channels, there is no place to redirect the water out of the channel other than the natural gradient which follows the road for some distance before rejoining the current river channel outside of the National Park Wilderness. Thus, crib structures and log installations such as the ones proposed would have no utility in locations other than those proposed.

Elevating the road on piers for the affected section. There is agreement among the planning agencies and subject matter experts that a causeway elevated on piers would be an environmentally preferred, sustainable solution to the issue, even if wilderness constraints were not a consideration. According to current rough estimates, this would cost between 80-250 million dollars. Implementation of such a project is beyond the range of options available to the agencies at this time.

Artificial channel, armored with engineered log structures, rip rap, sheet pile walls, and/or dikes. This option is of unknown feasibility, and would involve removal of a significant amount of old growth forest, with impacts to endangered species habitat, including Northern Spotted Owl and active salmon spawning beds. Both NPS and WSDOT geomorphologists do not consider this option to be feasible or practical.

Relocate the roadway out of the White River floodplain. This would require a modification to the wilderness boundary to allow for new road construction in what is currently designated wilderness. An extensive amount of old-growth forest in current wilderness would be destroyed, but the White River would be allowed to migrate within the flood plain unimpeded. This project would also cost hundreds of millions of dollars and require an act of Congress.

Elevating the highway on fill. Elevating the road above the base flood elevation would require a wider road prism and the removal of many trees and the obliteration of spawning beds for listed species. In this alternative, the eventual movement of the main stem white River into the lateral channel would be anticipated by armoring the road bank with rip rap. Periodic repairs would be required, similar to other locations in the park where rivers run adjacent to roads. There would be a continued potential for large washouts resulting in road materials washing into wilderness and long-term closures. The Carbon River Road and Westside Road provide analogues for this type of intervention. This approach was not considered because of the scale of tree removal involved and the potential impacts to endangered species habitat.

In addition to these conceptual alternatives, alternatives for the implementation of the proposed action in wilderness were considered and dismissed. One such alternative would be to construct the engineered log structures without the use of aircraft. In this case, materials would be moved to the project location by heavy equipment. This would require the establishment of a temporary road either through the forest, through the river, or some combination. Because a temporary road and mechanical transport are also prohibited by the Wilderness Act, and have more visible, harmful, and long-lasting effects, only the aircraft dependent alternative was considered.

Step 2: Determination – What is the Minimum Activity?

Refer to the MRAF instructions before identifying the selected alternative and explaining the rationale for its selection.

Selected Alternative

Alternative 1: Install two engineered log structures.

Explain rationale for selection, including a comparison of the selected alternative with other alternatives:

Alternative 1 is selected as the preferred alternative. The primary consideration in this determination is weighing the known, tangible impacts on wilderness character with the potentially greater effects of no action. This approach to road corridor maintenance is also consistent with the standards evolved for the administration of the National Park, the Executive Order on floodplain management, and the language of the wilderness designation, which affirms proactive maintenance of SR 410 with the smallest practicable development footprint.

The alternative protects the natural quality by reducing the potential for road material to be washed into wilderness, preserving habitat for sensitive fish species, and using natural materials that function similarly to naturally occurring large woody debris. Impacts to wilderness character from construction are expected, but they will be short in duration and, other than the head cut fill structure, will not leave lasting impacts.

The Mount Rainier Wilderness was established within the context of a National Park, which has its own statutory purpose to both conserve natural and cultural resources and provide for enjoyment of those resources by providing access. The proposed action is consistent with the standards evolved for the management of the National Park by preserving the historic character of the road corridor and protecting a major access route to popular visitor use areas, including both wilderness non-wilderness areas.

Furthermore, maintaining existing access routes identified in the Park's Wilderness Study and Recommendation would fulfill the Wilderness Act provision that Wilderness shall be devoted to recreational use and other public purposes. This recreation is facilitated by SR410 and would be maintained at current levels.

The proposed action is cost effective, and funding and project support resources are available now. Funding and support for more involved long-
term solutions are not anticipated to become available in the immediate future. This action is intended to reduce the need for heavy-handed emergency road repairs in the near term, while the agencies work toward a more sustainable solution.

Approved?	Prohibited Use	Quantity, Timing, Frequency, or Duration
☒	Mechanical Transport:	Transport of logs by helicopter, with approximately 300 cumulative minutes of hovering over the course of 1 week.
☒	Motorized Equipment:	Use of cable winches and chainsaws intermittently during the construction period
☐	Motor Vehicles:	
☐	Motorboats:	
☒	Landing of Aircraft:	Delivery of approximately 100 logs of varying size delivered by long line over the course of 1 week.
☐	Temporary Roads:	
☐	Structures:	
☒	Installations:	Log crib head cut fill structure

Describe mitigation measures as well as monitoring and reporting requirements, if appropriate:

Mitigation measures are described in the EA.

HELP - “Explain Rationale for Selection”

Which of the prohibited uses found in Section 4(c) of the Wilderness Act are approved in the selected alternative? Describe limits on quantity, timing, frequency, or duration.

Approvals

Project Title (from page 2)**:**

SR410 White River Flood Risk Reduction.

Refer to agency policies for the following signature authorities:

Prepared by:

Name: Daniel van der Elst Position: Wilderness Coordinator

Signature _____ Date _____

Reviewed by:

Name: Julie Hover Position: Natural Resources Specialist

Click or tap here to enter reviewer comments.

Signature _____ Date _____

Reviewed by:

Name Position

Signature _____ Date _____

Click or tap here to enter reviewer comments.

Approved by:

Name: Greg Dudgeon Position: Superintendent

Signature _____ Date _____