STATE OF WASHINGTON

DEPARTMENT OF ARCHAEOLOGY & HISTORIC PRESERVATION

1063 S. Capitol Way, Suite 106 • Olympia, Washington 98501
Mailing address: PO Box 48343 • Olympia, Washington 98504-8343
(360) 586-3065 • Fax Number (360) 586-3067 • Website: www.dahp.wa.gov

June 15, 2009

Received

JUN 16 2009

Environmental Services Office
Mottman

Ms. Pam Trautman
Cultural Resources Specialist
Washington State Department of Transportation
P.O. Box 47332
Olympia, WA 98504-7332

In future correspondence please refer to:
Log: 061509-13-FHWA
Property: Kelso to Martin's Bluff-New Siding Railroad Project
Re: Archaeology - No Historic Properties

Dear Ms. Trautman:

Thank you for contacting our office and providing a project description and history. Based on the previous reviews of the project and the information contained in your report, we concur with your professional recommendations and your finding of No Historic Properties Affected.

We would appreciate receiving any correspondence or comments from concerned tribes or other parties that you receive as you consult under the requirements of 36CFR800.4(a)(4).

These comments are based on the information available at the time of this review and on the behalf of the State Historic Preservation Officer in conformance with Section 106 of the National Historic Preservation Act and its implementing regulations 36CFR800.

Should additional information become available, our assessment may be revised. In the event that archaeological or historic materials are discovered during project activities, work in the immediate vicinity must stop, the area secured, and this office and the concerned tribes notified.

Sincerely,

Matthew Sterner, M.A., RPA
Transportation Archaeologist
(360) 586-3082
matthew.sterner@dahp.wa.gov

DEPARTMENT OF ARCHAEOLOGY & HISTORIC PRESERVATION
Protect the Past, Shape the Future

DEPARTMENT OF
ARCHAEOLOGY &
HISTORIC PRESERVATION
Protect the Past, Shape the Future

Allyson Brooks Ph.D., Director
State Historic Preservation Officer

August 20, 2013

Mr. Scott Williams
Cultural Resources Program Manager
Washington State Department of Transportation
P. O. Box 47332
Olympia, WA 98504

In future correspondence please refer to:
Log: 050813-05-FRA
Property: Kelso Martin's Bluff-Kelso to Longview Junction, Task 6 Improvements
Re: Eligibility Determinations, No Adverse Effect

Dear Mr. Williams:

Thank you for contacting the Washington State Department of Archaeology and Historic Preservation (DAHP). The Kelso Martin's Bluff-Kelso to Longview Junction, Task 6 Improvements project has been reviewed on behalf of the State Historic Preservation Officer under provisions of Section 106 of the National Historic Preservation Act of 1966 (as amended) and 36 CFR Part 800. My review is based upon documentation contained in your communication.

First, DAHP concurs with your determination that the Coweeman River Bridge is eligible for listing in the National Register of Historic Places (NRHP). Furthermore, we concur with your determination that the Everett Stout Gas Station and Auto Repair is not eligible for listing in the NRHP. Based on these concurrences and the description of the proposed construction work associated with this project, I concur with your determination of no adverse effect for the undertaking.

If additional information on the project becomes available, or if any archaeological resources are uncovered during construction, please halt work in the area of discovery and contact the appropriate Native American Tribes and DAHP for further consultation.

Thank you for the opportunity to review and comment. If you have any questions, please contact me.

Sincerely,

Matthew Sterner, M.A.
Transportation Archaeologist
(360) 586-3082
matthew.sterner@dahp.wa.gov

State of Washington • **Department of Archaeology & Historic Preservation**
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DEPARTMENT OF
ARCHAEOLOGY &
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Allyson Brooks Ph.D., Director
State Historic Preservation Officer

April 17, 2014

Mr. Michael Johnsen
Environmental Team Lead
Federal Railroad Administration
1200 New Jersey Avenue, SE
Washington DC 20590

In future correspondence please refer to:
Log: 050813-05-FRA
Property: Kelso Martin's Bluff-Kelso to Longview Junction, Task 6 Improvements: Coweeman River Bridge Pedestrian Walkways, Handrails, and Lighting Installation
Re: No Adverse Effect

Dear Mr. Johnsen:

Thank you for contacting the Washington State Department of Archaeology and Historic Preservation (DAHP). The proposed modifications to the Coweeman River Bridge have been reviewed on behalf of the State Historic Preservation Officer under provisions of Section 106 of the National Historic Preservation Act of 1966 (as amended) and 36 CFR Part 800. My review is based upon documentation contained in your communication.

Based on the information provided to our office concerning modifications to be made to the Coweeman River Bridge, a property considered eligible for listing in the National Register of Historic Places, we concur with your determination that the proposed changes will not constitute an adverse effect to the property. Please make every effort to introduce 'context sensitive' design elements whenever possible, making every attempt to blend new elements with the historic character of the bridge.

If additional information on the project becomes available, or if any archaeological resources are uncovered during construction, please halt work in the area of discovery and contact the appropriate Native American Tribes and DAHP for further consultation.

Thank you for the opportunity to review and comment. If you have any questions, please contact me.

Sincerely,

Matthew Sterner, M.A.
Transportation Archaeologist
(360) 586-3082
matthew.sterner@dahp.wa.gov

State of Washington • **Department of Archaeology & Historic Preservation**
P.O. Box 48343 • Olympia, Washington 98504-8343 • (360) 586-3065
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DEPARTMENT OF
ARCHAEOLOGY &
HISTORIC PRESERVATION
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Allyson Brooks Ph.D., Director
State Historic Preservation Officer

August 11, 2014

Mr. David Valenstein
Chief, Environment and Systems Planning
U.S. Department of Transportation
1200 New Jersey Ave, SE
Washington, DC 20590

In future correspondence please refer to:
Log: 061509-13-FHWA
Property: Kelso to Martin's Bluff-New Siding Railroad Project
Re: APE Concur, More Information Required

Dear Mr. Valenstein:

I have reviewed the materials forwarded to our office for the Kelso to Martin's Bluff-New Siding Railroad project. Thank you for your description of the modification to the area of potential effect (APE) associated with the culvert replacement. I have no concerns with the definition of the APE modification. However, due to the highly sensitive nature of the area under consideration, I will require a more detailed plan concerning archaeological testing of the area associated with the culvert installation.

These comments are based on the information available at the time of this review and on behalf of the State Historic Preservation Officer in conformance with Section 106 of the National Historic Preservation Act and its implementing regulations 36CFR800. Should additional information become available, our assessment may be revised. We would appreciate receiving any correspondence or comments from concerned tribes or other parties that you receive as you consult under the requirements of 36CFR800.4(a)(4).

Thank you for the opportunity to review and comment. If you have any questions, please feel free to contact me.

Sincerely,

Matthew Sterner, M.A.
Transportation Archaeologist
(360) 586-3082
matthew.sterner@dahp.wa.gov

Cc: Jennifer Papazian, FRA
Erin Littauer, WSDOT

January 27, 2015

Mr. David Valenstein
Chief, Environment and Systems Planning
U.S. Dept. of Transportation
1200 New Jersey Ave, SE
Washington, DC 20590

In future correspondence please refer to:
Log: 061509-13-FHWA
Property: Kelso to Martin's Bluff-New Siding Railroad Project
Re: Archaeology - No Historic Properties

Dear Mr. Valenstein:

Thank you for contacting our office and providing your determination of effect for tthis culvert replacement project that is part of the Kelso to Martin's Bluff-New Siding Railroad project. I concur with the professional recommendations as stated in the previously reviewed geoarchaeological report and your finding of no historic properties affected for this portion of the project. As I stated in my previous letter reviewing the geoarchaeological report, I agree with the consultant's recommendation that an archaeological monitor be present during ground-disturbing construction as per the parameters stipulated in the report.

We would appreciate receiving any correspondence or comments from concerned tribes or other parties that you receive as you consult under the requirements of 36CFR800.4(a)(4).

These comments are based on the information available at the time of this review and on the behalf of the State Historic Preservation Officer in conformance with Section 106 of the National Historic Preservation Act and its implementing regulations 36CFR800.

Should additional information become available, our assessment may be revised. In the event that archaeological or historic materials are discovered during project activities, work in the immediate vicinity must stop, the area secured, and this office and the concerned tribes notified.

Thank you for the opportunity to review and comment. If you have any questions, please contact me.

Sincerely,

Matthew Sterner, M.A.
Transportation Archaeologist
(360) 586-3082
matthew.sterner@dahp.wa.gov

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
7600 Sand Point Way N.E., Bldg. 1
Seattle, Washington 98115

Refer to
NMFS Tracking Number:
NWR-2013-10618

December 18, 2014

David Valenstein
Chief, Environment and Systems Planning Division
Federal Rail Administration
1200 New Jersey Avenue SE
Washington, D.C. 20590

Re: Endangered Species Act Section 7 formal consultation, conference opinion, and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for the Kelso to Martins Bluff Task 5: New Siding, Cowlitz County, Washington. (Sixth Field Hydrologic Unit Code: (HUC) 170800030100 Kalama River)

Dear Mr. Valenstein:

The enclosed document contains a biological and conference opinion prepared by the National Marine Fisheries Service pursuant to section 7(a)(2) of the Endangered Species Act on the effects of the Federal Rail Administration proposal to add a third mainline track to the existing 2 lines for a distance of approximately 4 miles. In this biological opinion, the National Marine Fisheries Service (NMFS) concludes that the action, as proposed, is not likely to jeopardize the continued existence of Endangered Species Act (ESA) listed Lower Columbia River (LCR) coho salmon (*Oncorhynchus kisutch*), LCR steelhead *(O. mykiss)*, or result in the destruction or adverse modification of their designated and proposed critical habitat.

As required by section 7 of the ESA, NMFS provided an incidental take statement with the biological opinion. The incidental take statement describes reasonable and prudent measures that NMFS considers necessary or appropriate to minimize incidental take associated with this action. The take statement sets forth nondiscretionary terms and conditions, including reporting requirements, that the Federal agency and any person who performs the action must comply with to carry out the reasonable and prudent measures. Incidental take from actions that meet these terms and conditions will be exempt from the ESA take prohibition.

This document also includes the results of our analysis of the action's likely effects on essential fish habitat (EFH) pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA), and includes three conservation recommendations to avoid, minimize, or otherwise offset potential adverse effects on EFH. One of these conservation recommendations is a a subset of the ESA terms and conditions.

Section 305(b) (4) (B) of the MSA requires Federal agencies to provide a detailed written response to NMFS within 30 days after receiving these recommendations. If the response is inconsistent with the EFH conservation recommendations, the FRA must explain why the recommendations will not be followed, including the scientific justification for any disagreements over the effects of the action and the recommendations. In response to increased oversight of overall EFH program effectiveness by the Office of Management and Budget, NMFS established a quarterly reporting requirement to determine how many conservation recommendations are provided as part of each EFH consultation and how many are adopted by the action agency. Therefore, we request that in your statutory reply to the EFH portion of this consultation, you clearly identify the number of conservation recommendations accepted.

If you have any questions, please contact Scott E. Anderson of the Washington State Habitat Office at (360) 753-5828 or electronic mail at scott.anderson@noaa.gov.

Sincerely,

for William W. Stelle, Jr.
Regional Administrator

cc: Colleen Vaughn, Federal Rail Administration
Cheryl McNamara, WSDOT State Rail and Marine Office
Chris Regan, WSDOT, Environmental Services
Cameron Kukes, WSDOT Environmental Services

Endangered Species Act (ESA) Section 7(a)(2) Biological and Conference Opinion Consultation Report, Section 7(a)(2) "Likely to Adversely Affect" Determination
And
Magnuson-Stevens Fishery Conservation and Management Act (MSA) and Essential Fish Habitat Consultation (EFH)

Kelso to Martins Bluff Task 5, New Siding, Hydraulic Unit Code (HUC) 170800030106
Kalama River-Frontal Columbia River, Cowlitz County, Washington

NMFS Consultation Number: NWR-2013-10618

Lead Action Agency: Federal Railroad Administration

Affected Species and Determinations:

ESA-Listed Species	Status	Is Action Likely to Adversely Affect Species or Critical Habitat?	Is Action Likely To Jeopardize the Species?	Is Action Likely To Destroy or Adversely Modify Critical Habitat?
Lower Columbia River Steelhead DPS (*Oncorhynchus mykiss*)	Threatened	Yes	No	No
Lower Columbia River coho salmon *(O. kisutch)*	Threatened	Yes	No	No*

*Critical habitat is proposed for LCR coho salmon

Fishery Management Plan That Describes EFH in the Project Area	Does Action Have an Adverse Effect on EFH?	Are EFH Conservation Recommendations Provided?
Pacific Coast Salmon	Yes	No

Consultation Conducted By: National Marine Fisheries Service, Northwest Region

Issued by:

for William W. Stelle, Jr.
Regional Administrator

Date: December 18, 2014

TABLE OF CONTENTS

LIST OF ABBREVIATIONS AND ACRONYMS

BA – Biological Assessment
BMP – Best Management Practice
BNSF- Burlington Northern Santa Fe
CESCL – Certified Erosion and Sediment Control Lead
CFS – Cubic Feet per Second
DPS – Distinct Population Segment
ESA – Endangered Species Act
ESU – Evolutionarily Significant Unit
FRA – Federal Highway Administration
HPA – Hydraulic Permit Approval
HUC – Hydrologic Unit Code
LCR – Lower Columbia River
NMFS – National Marine Fisheries Service
NTU – Nephelometric Turbidity Units
OHW – Ordinary High Water
PCE – Primary Constituent Element
PHS – Priority Habitats and Species
RM – River Mile
SPCC – Spill Prevention Control and Countermeasures
TESC – Temporary Erosion and Sediment Control
USFS – United States Forest Service
USFWS – United States Fish and Wildlife Service
USGS – United States Geological Survey
WDFW – Washington Department of Fish and Wildlife
WDNR – Washington Department of Natural Resources
WRIA – Water Resources Inventory Area
WSDOT – Washington Department of Transportation

1. INTRODUCTION

This Introduction section provides information relevant to the other sections of this document and is incorporated by reference into Sections 2 and 3 below.

This document contains a biological opinion (Opinion) that was prepared by National Marine Fisheries Service (NMFS) in accordance with section 7(b) of the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531, et seq.), and implementing regulations at 50 CFR 402.[1] It also contains essential fish habitat (EFH) conservation recommendations prepared by NMFS in accordance with section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. 1801, et seq.) and implementing regulations at 50 CFR 600. The administrative record for this consultation is on file at the Lacey, Washington office.

1.1 Background and Consultation History

On October 5, 2013, NMFS received a letter and biological assessment (BA) from the Federal Railroad Administration (FRA) requesting formal consultation pursuant to section 7(a)(2) of the ESA, and EFH consultation pursuant to section 305(b)(2) of the MSA for the Kelso to Martins Bluff (KMB) Task 5 New Siding, in Cowlitz County, Washington. The Project lies within the range and habitats of several species listed as threatened or endangered under the Federal Endangered Species Act of 1973 (ESA) and because the Project will receive funding from the FRA, a federal nexus is formed under Section 7 of the ESA. The FRA is funding the project with an American Recovery and Reinvestment Act (ARRA) grant in cooperation with the Washington State Department of Transportation (WSDOT), who is, in turn, coordinating with the owner of the railway, Burlington Northern Santa Fe Railway (BNSF), on the implementation of the project. This consultation is for one segment (task 5) of a multi-year, phased project. Previous consultations were conducted by NMFS to address other segments of the project (NMFS # 2009-03885, 2013-10101). The project work for this consultation will not be contiguous but will be located within five segment areas along the railroad right-of-way as follows: Area 1 – North End (MP 105.65 to 105.92), Area 2 – Oak Street (MP 107.16 to 107.56), Area 3 – Kalama Yard (MP 107.16 to 107.56), Area 4 – Double Crossovers (MP 108.51 to 108.87), and Area 5 – South End (MP 109.40 to 100.00). We are considering the effects of these individual actions on listed species and critical habitat in an additive manner as we complete each consultation.

During consultation, NMFS inquired as to indirect or interrelated effects from increased rail traffic and possible ancillary automobile traffic and other potential indirect effects related to the addition of 1.7 miles of bypass track. The project will reduce automobile traffic by adding two high-speed passenger trains per day. Further, the project will not add any additional access to ports, passenger stations, parking areas, or other termini. Therefore, NMFS concurred that no indirect or interrelated effects will result from the 1.7 miles of bypass track constructed for this project, and there are no indirect effects from this proposed action.

In the BA, the FRA determined the proposed action was likely to adversely affect Lower Columbia River (LCR) steelhead (*O. mykiss*), and LCR coho salmon (*O. kisutch*). The FRA also

[1] With respect to designated critical habitat, the following analysis relied only on the statutory provisions of the ESA, and not on the regulatory definition of "destruction or adverse modification" at 50 CFR 402.02.

determined the proposed action was likely to adversely affect designated critical habitat of LCR steelhead, and was not likely to destroy or aversely modify proposed critical habitat for LCR coho salmon, but would have an adverse effect on Essential Fish Habitat (EFH) for LCR coho salmon. The NMFS requested further information on October 10, 2013. Sufficient information was supplied and NMFS initiated formal consultation on October 25, 2013. New questions regarding indirect or interrelated effects were raised by NMFS. A field visit to the construction site occurred on January 23, 2014. Further information was received on April 20, 2014. On May 2, 2014, the WSDOT contacted NMFS with a significant design change and requested that the project be put on hold. On June 11, 2014, an addendum to the BA detailing design changes was received by NMFS. Formal consultation began on June 11, 2014.

The biological and conference opinion (opinion) and incidental take statement portions of this document were prepared by the National Marine Fisheries Service (NMFS) in accordance with section 7(b) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531, et seq.), and implementing regulations at 50 CFR 402. This biological opinion is based on information provided in the BA, information obtained from the WDFW, field investigations, and other sources of information. The consultation also included telephone conversations and electronic mail between NMFS and Washington Department of Transportation (WSDOT). A complete record of this consultation is on file at the Lacey, Washington office.

The NMFS also completed an Essential Fish Habitat (EFH) consultation in accordance with section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. 1801, et seq.) and implementing regulations at 50 CFR 600. The opinion and EFH conservation recommendations are both in compliance with section 515 of the Treasury and General Government Appropriations Act of 2001 (Public Law 106-5444) ("Data Quality Act") and underwent pre-dissemination review.

1.2 Proposed Action

"Action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration. As explained above, we did not identify any interrelated or interdependent actions.

The FRA proposes to fund the construction of approximately 4.3 miles of a third mainline track to the east of the existing BNSF double-track mainline in the Port of Kalama from BNSF milepost (MP) 110.00 near Toteff Road north to MP 105.7 south of the Kalama River (Figure 1). Grading, excavation, retaining walls, and rail embankment construction will support the new track and associated infrastructure improvements. This project's only location for potential impacts to ESA-listed aquatic species are in tributary (T3) and a few adjacent wetland channels between Interstate 5 and the railroad. These channels combine with T3 and flow under the BNSF tracks via the existing 36-inch diameter culvert. The stream discharges to the Columbia River, approximately 270 feet downstream from the upper end of the culvert. In this general location, along the east slope of the existing railroad grade, a 1,500 foot retaining wall will be constructed to add 8 feet of width to facilitate rail improvements. The construction of the retaining wall will require approximately 0.08 acres of fill in the adjacent, fish-accessible wetland channels. The 270-foot long, 36-inch culvert is proposed to be removed. A pair of new, 90-foot long, side-by-side, 60-inch wide culverts will be installed, and will transition into a 5-foot high, 15-foot wide, 110-foot long box culvert. From the end of the box culvert, T-3 will flow daylighted approximately 70-feet across the beach, where a new stream channel will be constructed.

The new box culvert would extend approximately 200 feet west of BNSF right-of-way (ROW) to the Columbia River (Figure 1). The limits of construction for this culvert include pit excavation for a jack and bore machine west of the railroad structure on BNSF ROW and in Hendrickson Drive. The 20-by 40-foot bore pit would be excavated to a depth of 20 to 25 feet below the surface. Pumps would be used to dewater during construction and use of the bore pit. Two new 60-inch diameter, 90-foot long culverts would be installed under the railroad structure by the jack and bore method to limit disruption of rail traffic. West of the bore pit, an approximately 5-foot-high by 15-foot-wide three-sided (bottomless) box culvert would be installed via an open cut across Hendrickson Drive and the Port of Kalama's parking lot (Figure 1). It would convey water to an open stream channel that would flow across the beach use area of the Port of Kalama's Louis Rasmussen Day Use Park. The open cut would be approximately 10 to 20 feet deep and 30-feet wide. In addition, the culvert outfall would include a gate (i.e. traditional culvert gate, angled culvert gate, or equivalent) to prevent pedestrian access for safety reasons. The gate will be designed to not inhibit fish passage. After installation, the open cut would be closed and the stream channel would be enhanced with appropriate sized boulders, and riparian plantings. Construction is anticipated to take up to two months.

Work is expected to include stream isolation and fish handling, and will take place in three phases over an estimated 45-day work period between July 15 to August 31, 2015. Permanent impacts to fish-accessible off-channel wetlands associated with the T3 drainage will be limited to approximately 3,485 square feet (sf), or approximately 0.08 acre. Tributary 3 and adjacent accessible habitat is designated critical habitat for LCR steelhead, and proposed critical habitat for LCR coho salmon.

As currently proposed, the stream would be an approximately 70-foot-long, open, enhanced stream channel to the Columbia River. The stream channel is expected to be roughly 20 feet at bank full width, with gradual embankments and a rock and gravel stream bottom. Water levels in the stream would range from 3 to 4 inches at low tide and 14 to 18 inches at high tide. Winter river flows may reach as high as 3 to 4 feet. The outfall of the existing culvert will be removed once construction of the new culvert is completed.

The existing retaining wall on the east side of the tracks in the BNSF right of way (ROW) will be extended no more than 8 feet to the east of the proposed walls, in the vicinity of the off-channel wetland. Besides this fill, this area may have vegetation trimmed back for safe and efficient construction access, but the existing soil and vegetation will not be graded or grubbed. The culverts are proposed to be "jacked" under the railroad, but the length of the culverts will be limited to the railroad property.

The edges of linear wetland features temporarily affected during the Project, such as along the toe of fill or outside the limits of a retaining wall, will be restored to pre-work conditions. These activities will occur within the BNSF ROW and will include, but not be limited to, removal of invasive species and restoration and re-vegetation with native plant species along the edges of the proposed retaining walls when adjacent to wetland areas. This restoration and enhancement is expected to benefit listed ESA species within T3 by improving cover and shade and by stabilizing the riparian edge areas to avoid long-term erosion and sedimentation.

Figure 1 Site plan view rendering of the T-3 outfall and natural stream engineering design

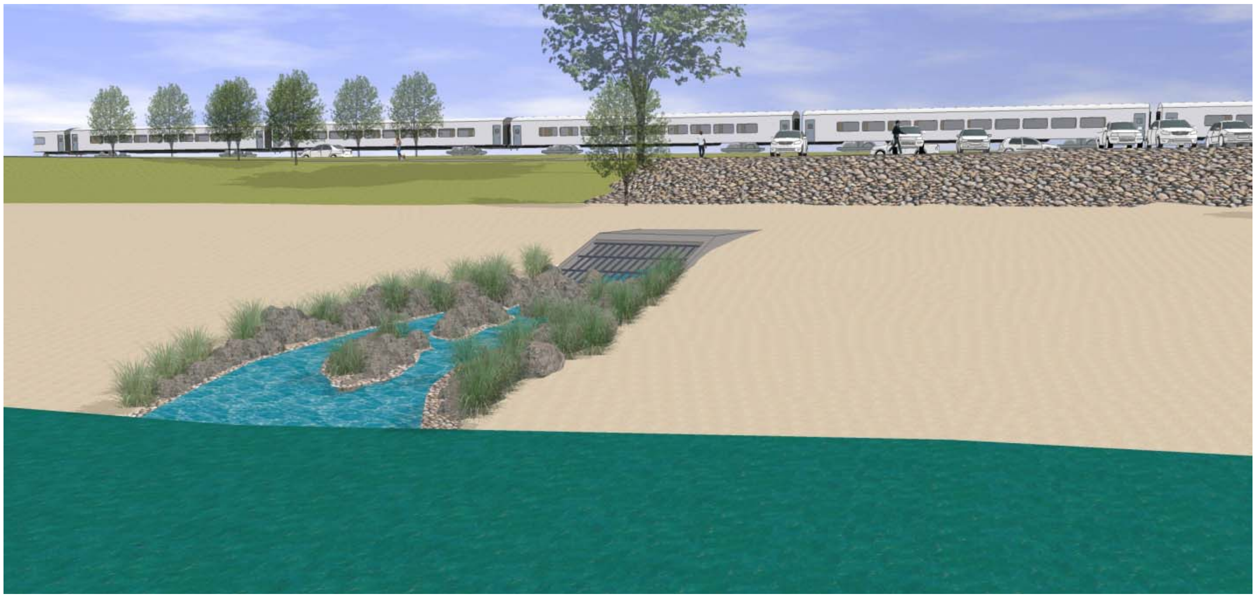

Figure 2. Ground plan view rendering of the T-3 outfall and natural stream

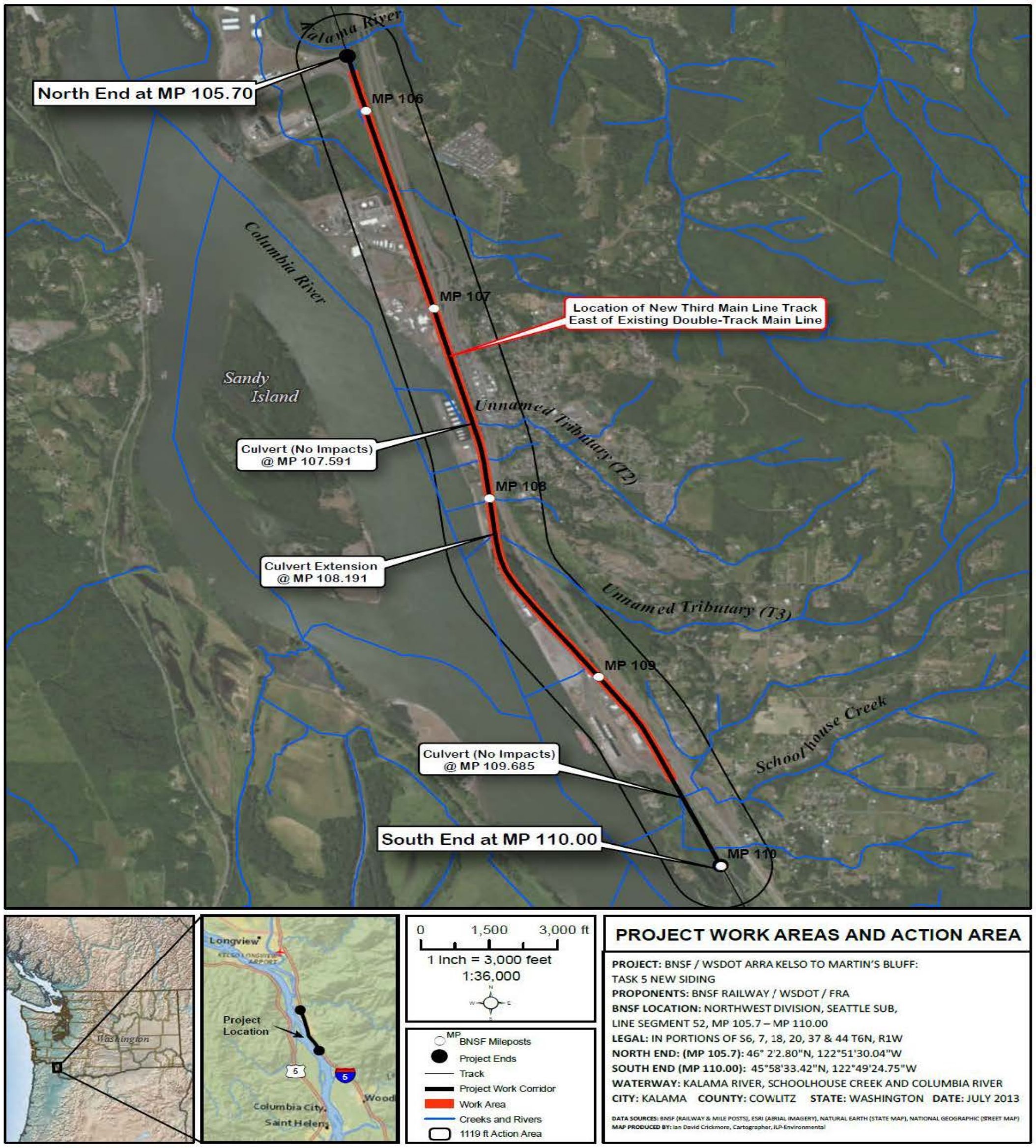

Figure 3. Vicinity map of Project and action area (BA, 2013)

1.3.1 Measures to Avoid and Minimize Effects of the Action

General minimization and conservation measures for avoiding and minimizing Project impacts to ESA-listed species and critical habitats are:

- An approved Spill Prevention, Control, and Countermeasures Plan (SPCC) will be implemented prior to and during construction. Implementation of the SPCC is intended to minimize potentially adverse effects from construction activities that are primarily related to equipment fueling and maintenance. It includes protocols for equipment operation in or near jurisdictional areas, types of hydraulic fluids used, emergency spill containment procedures, and the spill containment materials to have on hand in the event of a spill.

- Prior to the start of construction, work staging and construction material stockpile areas will be identified and developed in either existing BNSF yard or maintenance areas or in upland locations within the BNSF ROW. These areas will be located a minimum of 150 feet away from aquatic habitat areas containing potential ESA-listed species.

- Prior to earth disturbing activities, clearing/grading limits will be marked with stakes/flagging or high visibility sediment fencing to avoid impacts to jurisdictional areas that are not part of the Project work.

- Permanent removal of existing, established native vegetation will be restricted to what is required for direct construction impacts, such as retaining wall construction, new rail grade establishment, new track, and safe signal and crossing sight distances for the completion of the Project.

- Existing established vegetation areas that will only be temporarily impacted may be trimmed back for work access and safety, but will not be grubbed.

- During construction, disturbed soil areas will not remain open to become a possible source of offsite sediment pollution (i.e., storm water runoff or construction dust) for more than seven (7) days. Such areas will be stabilized with rock cover, mulch, or plastic cover.

- All disturbed areas associated with the new third mainline track or roads for maintenance access, will be stabilized and restored with native grass in accordance with the Project-specific SWPPP.

- Final slopes within the Project corridor (i.e., track embankment or rail grade) will be stabilized to avoid sedimentation to wetlands and surface waters.

- Construction related waste or debris will be contained in appropriate receptacles and regularly managed by the BNSF general contractor throughout the construction Project.

- Portable toilet facilities will be available as needed throughout the Project work area and regularly maintained.

- Culvert extensions will be the minimum required and are designed to not adversely affect fish passage or water flow in the existing culvert structures.

- Retaining wall construction and permanent maintenance access road development will be the minimum required for appropriate safe management of rail operations.

- All in-water work will be conducted during windows recommended by the Washington Department of Fish and Wildlife (WDFW) and approved by NMFS.

- If needed, fish relocation and handling activities will follow the most current WSDOT protocols which can be found in Appendix 1.

1.3 Action Area

"Action area" means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). The Project corridor occurs in portions of Sections 6, 7, 18, 20, 37, and 44 in Township 6 North, Range 1 West, Willamette Meridian, Cowlitz County, Washington. Latitude/Longitude points for either end of the Project are: North End (MP 105.7) = 46º2'2.80" N; 122º51'30.04"W and South End (MP 110.0) = 45º58'33.42" N; 122º49'24.75"W (Figure 1).

The Project is within the unincorporated City limits of Kalama, Washington and Watershed Resource Inventory Area (WRIA) 27 – Lewis, Hydrologic Unit Code (HUC) – Lower Cowlitz. 170800030106, Kalama River-Frontal Columbia River.

The action area for the project is centered where adverse effects on ESA-listed species and habitats are expected to occur. Impacts to roughly 270 feet of stream habitat and the 0.08 acre of fill into the adjacent wetland for retaining wall construction are not expected to have any upstream impacts or to extend more than 270-feet downstream from the point of construction.

2. ENDANGERED SPECIES ACT: BIOLOGICAL AND CONFERENCE OPINION AND INCIDENTAL TAKE STATEMENT

The ESA establishes a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat on which they depend. Section 7(a)(2) of the ESA requires Federal agencies to consult with the United States Fish and Wildlife Service, NMFS, or both, to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or adversely modify or destroy their designated critical habitat. Section 7(b)(3) requires that at the conclusion of consultation, the Service provide an opinion stating how the agencies' actions will affect listed species or their critical habitat. If incidental take is expected, Section 7(b)(4) requires the provision of an incidental take statement (ITS) specifying the impact of any incidental taking, and including reasonable and prudent measures to minimize such impacts.

2.1 Approach to the Analysis

Section 7(a)(2) of the ESA requires Federal agencies, in consultation with NMFS, to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species, or adversely modify or destroy their designated or proposed critical habitat. The jeopardy analysis considers both survival and recovery of the species. The adverse modification analysis considers the impacts to the conservation value of the designated critical habitat.

"To jeopardize the continued existence of a listed species" means to engage in an action that would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR 402.02).

This biological opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR 402.02. Instead, we have relied upon the statutory provisions of the ESA to complete the following analysis with respect to critical habitat.[2]

We will use the following approach to determine whether the proposed action is likely to jeopardize listed species or destroy or adversely modify critical habitat (and proposed critical habitat for our conference opinion):

- Identify the rangewide status of the species and critical habitat likely to be adversely affected by the proposed action.
- Describe the environmental baseline for the proposed action.
- Analyze the effects of the proposed actions.
- Describe any cumulative effects.
- Integrate and synthesize the above factors to assess the risk that the proposed action poses to species and critical habitat.
- Reach jeopardy and adverse modification conclusions.
- If necessary, define a reasonable and prudent alternative to the proposed action.

2.2 Rangewide Status of the Species and Critical Habitat

This opinion examines the status of each species that would be affected by the proposed action. The status is the level of risk that the listed species face, based on parameters considered in documents such as recovery plans, status reviews, and listing decisions. The species status section helps to inform the description of the species' current "reproduction, numbers, or distribution" as described in 50 CFR 402.02. The opinion also examines the condition of critical habitat throughout the designated area, evaluates the conservation value of the various watersheds and coastal and marine environments that make up the designated area, and discusses the current function of the essential physical and biological features that help to form that conservation value.

One factor affecting the status of ESA-listed species and aquatic habitat at large is climate change as explained further, below.

2.2.1 Status of Listed Species

For LCR coho and steelhead, NMFS commonly uses four parameters to assess the viability of the populations that, together, constitute the species: spatial structure, diversity, abundance, and productivity (McElhany *et al.* 2000). These viable salmonid population criteria therefore encompass the species' "reproduction, numbers, or distribution" as described in 50 CFR 402.02. When these parameters are collectively at appropriate levels, they maintain a population's capacity to adapt to various environmental conditions and allow it to sustain itself in the natural environment. These attributes are influenced by survival, behavior, and experiences throughout a

[2] Memorandum from William T. Hogarth to Regional Administrators, Office of Protected Resources, NMFS (Application of the "Destruction or Adverse Modification" Standard Under Section 7(a)(2) of the Endangered Species Act) (November 7, 2005).

species' entire life cycle, and these characteristics, in turn, are influenced by habitat and other environmental conditions.

"Spatial structure" refers both to the spatial distributions of individuals in the population and the processes that generate that distribution. A population's spatial structure depends fundamentally on habitat quality and spatial configuration and the dynamics and dispersal characteristics of individuals in the population.

"Diversity" refers to the distribution of traits within and among populations. These range in scale from DNA sequence variation at single genes to complex life history traits (McElhany *et al*. 2000).

"Abundance" generally refers to the number of naturally-produced adults (*i.e.*, the progeny of naturally-spawning parents) in the natural environment (*e.g*., on spawning grounds).

"Productivity," as applied to viability factors, refers to the entire life cycle; *i.e.*, the number of naturally-spawning adults produced per parent. When progeny replace or exceed the number of parents, a population is stable or increasing. When progeny fail to replace the number of parents, the population is declining. McElhany *et al*. (2000) use the terms "population growth rate" and "productivity" interchangeably when referring to production over the entire life cycle. They also refer to "trend in abundance," which is the manifestation of long-term population growth rate.

For species with multiple populations, once the biological status of a species' populations has been determined, NMFS assesses the status of the entire species using criteria for groups of populations, as described in recovery plans and guidance documents from technical recovery teams. Considerations for species viability include having multiple populations that are viable, ensuring that populations with unique life histories and phenotypes are viable, and that some viable populations are both widespread to avoid concurrent extinctions from mass catastrophes and spatially close to allow functioning as metapopulations (McElhany *et al*. 2000).

Climate change is likely to play an increasingly important role in determining the abundance of ESA-listed species, and the conservation value of designated critical habitats, in the Pacific Northwest. These changes will not be spatially homogeneous across the Pacific Northwest. Areas with elevations high enough to maintain temperatures well below freezing for most of the winter and early-spring will be less affected. Low-elevation areas are likely to be more affected.

During the last century, average regional air temperatures increased by 1.5°F, and increased up to 4°F in some areas. Warming is likely to continue during the next century as average temperatures increase another 3°F to 10°F. Overall, about one-third of the current cold-water fish habitat in the Pacific Northwest is likely to exceed key water temperature thresholds by the end of this century (USGCRP 2009).

Precipitation trends during the next century are less certain than for temperature but more precipitation is likely to occur during October through March and less during summer months, and more of the winter precipitation is likely to fall as rain rather than snow (ISAB 2007; USGCRP 2009). Where snow occurs, a warmer climate will cause earlier runoff so stream flows in late spring, summer, and fall will be lower and water temperatures will be warmer (ISAB 2007; USGCRP 2009).

Higher winter stream flows increase the risk that winter floods in sensitive watersheds will damage spawning redds and wash away incubating eggs. Earlier peak stream flows will also flush some young salmon and steelhead from rivers to estuaries before they are physically mature, increasing stress and the risk of predation. Lower stream flows and warmer water temperatures during summer will degrade summer rearing conditions, in part by increasing the prevalence and virulence of fish diseases and parasites (USGCRP 2009). Other adverse effects are likely to include altered migration patterns, accelerated embryo development, premature emergence of fry, variation in quality and quantity of tributary rearing habitat, and increased competition and predation risk from warm-water, non-native species (ISAB 2007).

The earth's oceans are also warming, with considerable interannual and inter-decadal variability superimposed on the longer-term trend (Bindoff *et al.* 2007). Historically, warm periods in the coastal Pacific Ocean have coincided with relatively low abundances of salmon and steelhead, while cooler ocean periods have coincided with relatively high abundances (Scheuerell and Williams 2005; Zabel *et al.* 2006 USGCRP 2009;). Ocean conditions adverse to salmon and steelhead may be more likely under a warming climate (Zabel *et al.* 2006).

Lower Columbia River Coho Salmon

Originally part of a larger lower Columbia River/southwest Washington ESU, Lower Columbia coho were identified as a separate ESU and listed as threatened on June 28, 2005. Three status evaluations of LCR coho salmon status, all based on WLCTRT criteria, have been conducted since the last NMFS status review in 2005 (McElhany et al. 2007, Beamesderfer et al. 2010, LCFRB 2010). Of the 27 historical populations in the ESU, 24 are at "very high" risk. The remaining three populations (Sandy, Clackamas and Scappoose) are at "moderate" or "high" risk (Ford et al. 2011). NOAA Fisheries issued results of a five-year review on August 15, 2011 and concluded that this species should remain listed as threatened because, overall, the new information considered does not indicate a change in the biological risk category since the last status review (Ford 2011).

Spatial Structure and Diversity. This species includes all naturally-spawned populations of coho salmon in the Columbia River and its tributaries in Washington and Oregon, from the mouth of the Columbia up to and including the Big White Salmon and Hood rivers; in the Willamette River to Willamette Falls, Oregon; and progeny of 25 artificial propagation programs. The WLCTRT identified 24 historical populations of LCR coho salmon and divided these into two strata based on major run timing: early and late (Myers et al. 2006). Three strata and nine historical populations of LCR coho salmon occur within the action area. Of these nine populations, Clackamas River is the only population characterized as "viable" (McElhany et al. 2007). Spatial diversity is rated "moderate" or "low" risk for all the populations, except the North Fork Lewis River, which has a "high" risk rating for spatial structure. All LCR coho salmon populations, except the Clackamas and Sandy river populations (low risk), are at "moderate" or "high" risk for diversity.

Abundance and Productivity. In Oregon, the Scappoose Creek and Clackamas River populations have “moderate” risk ratings for abundance and productivity, while the rest are rated “high” or “very high” risk. Of the Clackamas and Sandy populations, the geometric mean abundance is substantially below the long-term Minimum Abundance Threshold of 3,000 spawners, and neither population shows a clear long term trend in log natural origin abundance. All of the Washington populations have “extirpated or nearly so” ratings for abundance and productivity. The results from Oregon and Washington are largely driven by the very low abundance and productivity of naturally produced LCR coho. As was noted in the 2005 status review, smolt traps indicate some natural production in Washington populations, though given the high fraction of hatchery origin spawners suspected to occur in these populations it is not clear that any are self-sustaining (Ford, 2011).

Limiting factors identified for the ESU in LCFRB 2010 and NMFS 2011) include:

- Degraded estuarine and near-shore marine habitat resulting from cumulative impacts of land use and flow management by the Columbia River hydropower system
- Fish passage barriers that limit access to spawning and rearing habitats
- Degraded freshwater habitat: Floodplain connectivity and function, channel structure and complexity, riparian areas and large wood supply, stream substrate, stream flow, and water quality have been degraded as a result of cumulative impacts of agriculture, forestry, and development
- Hatchery-related effects
- Harvest-related effects
- An altered flow regime and Columbia River plume has altered the temperature regime and estuarine food web, and has reduced ocean productivity
- Reduced access to off-channel rearing habitat in the lower Columbia River
- Reduced productivity resulting from sediment and nutrient-related changes in the estuary
- Juvenile fish stranding that result from ship wakes
- Contaminants affecting fish health and reproduction

Estimates of returning Kalama River adult LCR coho salmon spawners show considerable variability in the annual abundance from year to year. Adult LCR coho salmon return to the Kalama River in the fall/winter, migration upstream to spawn, with a peak in November to December. Out-migration of juveniles to the ocean occurs from February through June, with a peak from April to mid-May. Coho juveniles may seek forage and refuge during higher flows of the Columbia River but they are less likely to be present during summer low flow conditions. No spawning habitat exists in the project action area.

Lower Columbia River Steelhead

This DPS was listed as threatened on March 19, 1998; in 2005 the BRT found moderate risks in all the VSP categories its threatened status was reaffirmed on January 5, 2006. The 2010 ODFW recovery plan and the 2010 LCRFB recovery plan indicate that only 2 of the 26 historical LCR steelhead populations are considered viable, while 17 populations are considered at high or very high risk. NOAA Fisheries issued results of a five-year review on August 15, 2011 and the current review retains the status as threatened (Ford 2011).

Spatial Structure and Diversity. This species includes all naturally-spawned steelhead populations below natural and manmade impassable barriers in streams and tributaries to the Columbia River between and including the Cowlitz and Wind rivers, Washington; in the Willamette and Hood rivers, Oregon; and progeny of ten artificial propagation programs; but excluding all steelhead from the upper Willamette River basin above Willamette Falls, Oregon, and from the Little and Big White Salmon rivers, Washington.

Summer steelhead return to freshwater long before spawning. Summer steelhead spawning areas in the Lower Columbia River are found above waterfalls and other features that create seasonal barriers to migration. Winter steelhead, in contrast, return from the ocean much closer to maturity and spawn within a few weeks. Where no temporal barriers exist, the winter-run life history dominates. There are six strata and 26 historical populations of LCR steelhead hatchery contribution to natural spawning remains high in many populations. At least four historical populations are extirpated (Myers et al 2002).

Abundance and Productivity. All of the populations increased in abundance during the early 2000s, generally peaking in 2004. Most populations have since declined back to levels within one standard deviation of the long term mean. Exceptions are the Washougal summer run and North Fork Toutle winter run, which are still higher than the long term average, and the Sandy, which is lower. In general, the populations do not show any sustained dramatic changes in abundance or fraction of hatchery origin spawners since the 2005status review (Ford . 2011).

Limiting factors for the DPS identified in LCFRB 2010 and NMFS 2011) include:

- Degraded estuarine and nearshore marine habitat resulting from cumulative impacts of land use and flow management by the Columbia River hydropower system
- Degraded freshwater habitat: Floodplain connectivity and function, channel structure and complexity, riparian areas and recruitment of large wood, stream substrate, stream flow, and water quality have been degraded as a result of cumulative impacts of agriculture, forestry, and development
- Reduced access to spawning and rearing habitat mainly as a result of tributary hydropower projects and lowland development
- Avian and marine mammal predation in the lower mainstem Columbia River and estuary.
- Hatchery-related effects
- An altered flow regime and Columbia River plume has altered the temperature regime and estuarine food web, and has reduced ocean productivity
- Reduced access to off-channel rearing habitat in the lower Columbia River
- Reduced productivity resulting from sediment and nutrient-related changes in the estuary
- Juvenile fish strandings that result from ship wakes
- Contaminants affecting fish health and reproduction

Estimates of returning Kalama River adult LCR steelhead spawners show some variability in the annual abundance from year to year, but summer steelhead have generally stayed below 500 fish, and winter steelhead have generally stayed below 1000 fish. In 2009, WDFW counted 269 adult summer steelhead spawners in the Kalama, and an additional 940 winter steelhead spawners.

Myers et al (2003) identified two historical demographically independent populations of LCR steelhead within the subbasin: Kalama River summer- and winter-run steelhead. The Kalama River summer-run population has been classified by the TRT as a "core" population i.e. historically abundant and "may offer the most likely path to recovery" (WLC-TRT 2003). Both summer-and –winter-run steelhead juveniles from the Kalama population may be present in T3 where suitable habitat exists.

Use of T3 by LCR coho salmon and steelhead juveniles is limited to migration and rearing, where they may forage of seek refuge during higher flows of the Columbia River. Both coho salmon and steelhead juveniles could be present year round in T3 but are less likely during warm summer months when water temperatures are elevated.

2.2.2 Status of Critical Habitat

The following includes consideration of the status of critical habitat that will be designated for LC coho salmon for our conference opinion. NMFS reviews the status of designated critical habitat affected by the proposed action by examining the condition and trends of the PCEs throughout the designated area. The PCEs are physical features essential to the conservation of the ESU or DPS(for example, spawning gravels, good water quality and appropriate water quantity, accessible side channels, sufficient forage species), because these features enable spawning, rearing, migration, and foraging behaviors essential for survival and recovery. Specific types of sites, and the features associated with the PCEs for salmonids, include:

1. Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation, and larval development

2. Freshwater rearing sites with: (i) water quantity and floodplain connectivity to form and maintain physical habitat conditions and support parr growth and mobility; (ii) water quality and forage supporting parr development; and (iii) natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels and undercut banks.

3. Freshwater migration corridors free of obstruction and excessive predation with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting parr and adult mobility and survival.

4. Estuarine areas free of obstruction and excessive predation with: (i) water quality, water quantity and salinity conditions supporting parr and adult physiological transitions between fresh and saltwater; (ii) natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels; and (iii) parr and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation.

5. Near shore marine areas free of obstruction and excessive predation with: (i) water quality and quantity conditions and forage, including aquatic invertebrates and fishes,

supporting growth and maturation; and (ii) natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels.

6. Offshore marine areas with water quality conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation.

In designating critical habitat in freshwater spawning, rearing, and migration corridors, NMFS determined that critical habitat includes the stream channels in each designated reach with a lateral extent as defined by the ordinary high water line. While critical habitat must contain one or more PCEs, this does not mean that all PCEs are present or that the PCEs present are functioning optimally. The NMFS designated critical habitat for LCR steelhead and LCR Chinook salmon in Pacific, Wahkiakum, Cowlitz, Lewis, Clark, Skamania, and Klickitat counties.

Salmonids require properly functioning habitat components and many of these have been negatively affected by natural and man-made influences. Throughout southwest Washington, the loss of riparian habitat, elevated water temperatures, elevated levels of nutrients, increased nitrogen and phosphorus loading, and higher levels of turbidity, presumably from urban and highway runoff, wastewater treatment, failing septic systems, and agriculture or livestock impacts, have degraded critical habitat.

On the mainstem of the Columbia River, hydropower projects, including the Federal Columbia River Hydropower System (FCRPS), have significantly degraded and adversely affected salmonids and their habitats (Bottom et al. 2005, Fresh et al. 2005, NMFS 2005, 2006). The series of dams and reservoirs that make up the FCRPS block an estimated 12 million cubic yards of debris and sediment that would otherwise naturally flow down the Columbia and replenish shorelines along the Washington and Oregon coasts.

In addition to the hydropower development in the Columbia River, complex freshwater and estuarine habitats needed to maintain diverse wild populations and life histories have been lost and fragmented, increasing the risk of extinction for salmon stocks in the Columbia River basin. Freshwater rearing sites and migration corridors for juvenile salmonids are PCEs of critical habitat. Not only have rearing habitats been removed or altered within the Lower Columbia River, but the connections among habitats needed to support tidal and seasonal movements of juvenile salmon have been severed.

The Columbia River estuary has lost a significant amount of tidal marsh and tidal swamp habitat that are critical to juvenile salmon and steelhead, particularly small or ocean-type species (Johnson et al. 2003, Thomas 1983, COE 2001). Edges of marsh areas provide sheltered habitats for juvenile salmon and steelhead where food, in the form of amphipods or other small invertebrates which feed on marsh detritus, is plentiful, and larger predatory fish can be avoided (Seaman 1977). Habitat and food-web changes within the estuary, and other factors affecting salmon population structure and life histories, have altered the estuary's capacity to support juvenile salmon (Bottom et al. 2005, Fresh et al. 2005, NMFS, 2006). Diking and filling activities that decrease the tidal prism and eliminate emergent and forested wetlands and floodplain habitats have likely reduced the estuary's salmon-rearing capacity. Moreover, water and sediment in the lower Columbia River and its tributaries have levels of toxic contaminants that are harmful to fish and wildlife (LCREP 2007). Contaminants of concern include dioxins and furans, heavy metals, polychlorinated biphenyls (PCBs) and organochlorine pesticides such as dichloro-diphenyl-trichloroethane (DDT).

Historically, floodwaters of the Columbia River inundated the margins and floodplains along the estuary, allowing juvenile salmon and steelhead access to a wide expanse of low-velocity marshland and tidal channel habitats. In general, the riverbanks were gently sloping, with riparian and wetland vegetation at the higher elevations of the river floodplain becoming habitat for salmon and steelhead during flooding river discharges or flood tides. Sherwood et al. (1990) estimated that the Columbia River estuary lost 20,000 acres of tidal swamps, 10,000 acres of tidal marshes, and 3,000 acres of tidal flats between 1870 and 1970. This study further estimated an 80 percent reduction in emergent vegetation production and a 15 percent decline in benthic algal production. Restoration of estuarine habitats, particularly diked emergent and forested wetlands, reduction of avian predation by terns, and flow manipulations to restore historical flow patterns might significantly enhance the estuary's productive capacity for salmon, although historical changes in population structure and salmon life histories may prevent salmon from making full use of the productive capacity of estuarine habitats, even in their presently altered state.

The most extensive urban development in the lower Columbia River subbasin occurs in the Portland/Vancouver area where industrial harbor and port development have been, and continue to be, significant influences (Bottom et al. 2005, Fresh et al. 2005, NMFS 2005, 2006). The lower Columbia River supports three deep water port districts on the Washington side: Kalama, Longview, and Vancouver. These ports primarily focus on the transport of timber and agricultural commodities. Since 1878, 100 miles of river channel within the mainstem Columbia River, the estuary, and Willamette River have been dredged to create a shipping and navigation channel to support these ports. Originally dredged to a 20-foot minimum depth, the Federal navigation channel of the lower Columbia River is now maintained at a depth of 43 feet and a width of 600 feet. In addition to the disruption of benthic habitat due to dredging along with the loss of riparian habitat, high levels of several chemicals, such as arsenic and polycyclic aromatic hydrocarbons (PAH), have been identified in sediments within lower Columbia River watersheds in the vicinity of these ports.

Altered channel morphology and stability, lost/degraded floodplain connectivity are significant limiting factors in the Willamette and lower Columbia Rivers and their tributaries. Other major factors affecting critical habitat PCEs are loss of habitat diversity, excessive sediment, degraded water quality, increased stream temperatures, reduced stream flows, and blocked fish passage.

The range of critical habitat designated for LCR steelhead includes 46 watersheds in Washington and Oregon. In CHART Team conservation value ratings, 29 of those watersheds received a high rating, eleven watersheds received a medium rating, and two received a low rating. The Lower Columbia/Clatskanie subbasin, of which the Kalama River watershed is a portion, contains PCEs sufficient to deem it of moderately high conservation value. The Kalama River watershed supports summer-and- winter-run populations and the summer-run Kalama River fish are a Technical Recovery Team (TRT) core population (McElhany et al. 2006).

2.3 Environmental Baseline

The "environmental baseline" includes the past and present impacts of all Federal, state, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process (50 CFR 402.02).

The action area for this project incorporates T3, which supports rearing and refuge for LCR coho and steelhead, and confluence habitat of this unnamed tributary in the mainstem Columbia River where rearing, refuge and migratory habitat functions are provided. The action area is not recognized in the LCR recovery plan as uniquely important or fundamental for LCR listed salmonids survival or recovery, but losses or gains in the functions of the habitat in the action area could have incremental effects on the viability of individuals of listed stocks using the action area. Tributary 3 flows from hillside drainage east of the Project through a culvert under Interstate 5 to various seasonal channels that merge and flow under the BNSF tracks through a 36-inch diameter culvert at BNSF MP 108.19. This culvert conveys T3 into the Columbia River approximately 270 feet from the culvert inlet in the wetland (Figure 4). The portion of the drainage in the project area has limited riparian vegetation and is dominated by reed canarygrass. The main drainage channel is approximately three feet wide, one foot deep where it enters the BNSF culvert at MP 108.19. Tributary 3 is identified by WDFW and NMFS as providing degraded habitat for LCR coho salmon and steelhead. The WDFW assumes this culvert is impassable at low tide, and partially passable during higher tides.

Figure 4. Current conditions of Culvert Outlet (left) and culvert inlet (right) with trash rack on Tributary 3.

Water quality data for small drainages in the project vicinity, including T3, is unavailable. Water quality is presumed to have elevated summer water temperatures due to the small drainage areas and adjacent land uses (i.e. interstate highway, interstate rail corridor, urban/industrial development). Salmonid habitat in these drainages also appears to be limited by fish barriers and compromised floodplain connectivity from development.

Tributary 3 is designated critical habitat for LCR steelhead and proposed critical habitat for LCR coho salmon. The stream in the project area is characteristic of a depositional reach, where fine sediment has accumulated as a result of low-velocity hydrologic conditions created by constrictions from an undersized culvert upstream under the freeway, and another under the railroad, which this consultation addresses. Further, elevated levels of suspended sediment are common within the creek during most flows, diminishing the function as rearing habitat. Elevated fine sediments have filled interstitial spaces used by aquatic invertebrates, displacing a source of forage for juvenile salmon in the reach; resulting in extremely limited gravels and associated benthic invertebrates. Further, vegetation around T3 in the action area is dominated by reed canarygrass (Figure 5), and overhanging native vegetation, large wood, and other complex habitat features are largely absent. As a result of these degraded conditions, PCEs for critical habitat are minimally functioning in the action area. Shallow pools that may provide some rearing habitat are located within the immediate vicinity of the proposed culvert extension and upstream, although summer low flow and high temperatures will limit the presence of juvenile steelhead and coho salmon in the vicinity. No suitable spawning habitat is present within the project limits of T3.

Land management and development activities (road and railroad building, timber harvest, industrial development) in the action area have reduced connectivity (i.e., the flow of energy, organisms, and materials) between streams, riparian areas, floodplains, and uplands. Decreasing these structural components of salmon and steelhead habitat features (e.g. natural substrate and links to allochthonous material sources) impairs the processes that maintain channel complexity, reducing the extent of available rearing habitat (Spence et al. 1996). Evidence of past land management actions affecting action area function are reflected in the habitat of tributary T3 pictured in Figure 2. As notable in this photograph, the channel of the small creek appears to have been straightened such that it currently has low sinuosity, which in turn, prevents the creek from accumulating large wood that would otherwise improve rearing conditions, and allow for sediment sorting—a process needed for the accrual of spawning gravels. Development actions likely associated with the development of I-5, or perhaps even pre-dating that, have also created conditions wherein invasive reed canary grass has become the dominant vegetation along the riparian corridor of the creek, and within the creek channel. This invasive species slows water flow, degrading water quality, and prevents a robust tree layer from becoming established that would otherwise recruit wood to the stream to provide enhanced functions for rearing.

Figure 5. Looking east and upstream of the culvert inlet on unnamed tributary T3, Interstate 5 in the background.

2.4 Effects of the Action on the Species and Critical Habitat

"Effects of the action" means the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline (50 CFR 402.02). Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur.

2.4.1 Effects on Listed Species

The Project will require fish relocation activities for the extension of the culvert at T3. Listed fish species present (LCR coho salmon and steelhead) may experience trauma as a result of the electrofishing and netting and seining removal process necessary to remove individuals from the isolated in-water work area. Juvenile fish rearing in the area may be present during the identified in-water work window (July 15 through October 31), although warmer water temperatures and low water levels typical during this period will reduce that potential. The BNSF's contractor will use the most recent WSDOT Fish Removal Protocols when completing the fish removal/creek channel isolation activities to minimize adverse effects to individuals present.

Effects of Worksite Isolation and Fish Exclusion Operations on ESA-Listed Fish

Contractors will isolate the work areas to avoid or reduce exposure of listed fish to certain in-water work during construction. All fish exclusion and handling will comply with the WSDOT's Fish Exclusion Protocol and Standards (WSDOT 2009). Work area isolation and the attendant removal of juvenile fish within the project action area is designed to reduce the number of fish that would be injured or killed during project construction; however, isolation and removal techniques themselves can injure or kill fish. Additionally, juvenile fish can be stranded in the dewatered sections of the stream and if not detected, can die there.

Isolating the worksites is intended to reduce the number of individual fish exposed to the effects of in-water work including equipment operating in the channel. Installing cofferdams and removing fish from the isolated worksites are designed to reduce stranding, capture, and handling. While these activities minimize the number of fish exposed to in-water work, the activities themselves can adversely affect fish. All capture methods are stressful to some degree (Wydoski 1980 in Synder 2003). Therefore, the effects of capture and relocation are discussed below.

Construction will require work below the Ordinary High Water Line (OHWL), including fish exclusion, electroshocking, and potential handling of juvenile LCR steelhead and LCR coho salmon. Typically, fish recover fairly rapidly from the stress and fatigue of capture and relocation, unless injured. Stress and fatigue are physiological responses that disrupt physicochemical balance, osmoregulatory functions, and normal behavior, but usually require only a short time for recovery (Snyder 2003). To minimize stress, injury and death an experienced fishery biologist will directly supervise all fish capture and handling operations, and all staff working with the seining, netting, and trapping operations will have the necessary knowledge, skills, and abilities to ensure the safe capture and relocation of salmonids. Fish remaining within the isolated areas when construction commences will likely die or be injured as a result of direct contact from heavy equipment or from the extremely high turbidity expected within the isolated areas.

Even though the goal of the fish exclusion is to reduce overall stress and mortality, capturing and handling fish can cause short-term stress, disrupt normal behavior, and may result in injury or mortality (Frisch and Anderson 2000). Fish handling may also cause reduced predator avoidance (Olla et al. 1995). Injury and handling stress from nets and seines are expected to be lower than the stress from electroshocking but may still result in adverse effects. Worksite isolation, capture, handling, transport and release of at-risk fish species will strand some juvenile fish, disrupt normal behavior, and cause short-term stress, fatigue, and some injury and mortality. Capturing and handling fish causes them short-term stress, including increased plasma levels of cortisol and glucose (Frisch and Anderson 2000; Hemre and Krogdahl 1996). Even short-term, low intensity handling may cause reduced predatory avoidance for up to 24 hours (Olla et al. 1995). Regardless of best practices used, salvage and relocation efforts could harm listed juvenile steelhead and coho salmon that may be rearing in the vicinity of the project. In summary, the capture, transport, and release of ESA-listed fish, if needed, would cause short-term stress and possibly kill juveniles from netting and electrofishing injury, as well as from an increased chance of predation. Effects of stocking captured fish into a new upstream habitat may lead to competitive interactions with fish residing at the site and in some cases can lead to predation on the disoriented fish being released.

The dewatered areas would temporarily reduce the amount of habitat available to fish. However, as discussed above, the number of fish affected by this is expected to be very low since the stream temperatures are expected to be above optimal for rearing, and flow in the tributary is expected to be very low at the time of project implementation.

Work area isolation activities for the project are expected to take place in phases between July 15 and August 31, and are expected to temporarily affect 270 feet of stream habitat. Seasonal low water levels and high temperatures in the action area waters are likely to preclude or reduce the presence of juvenile fish in the construction zone prior to dewatering. However, NMFS conservatively assumes that some juvenile LCR coho salmon and steelhead will be present in the pool above the culvert where project construction will occur. Assuming some level of presence, the number of fish affected by worksite isolation can be crudely estimated. Suring and Constable Jr. (2009) estimated distribution and density of summer juvenile coho and steelhead within non-tidal rearing habitat in tributaries along the Oregon Coast and Lower Columbia River from snorkel surveys conducted in 2008. Average pool density of juvenile coho in Fourth- to Sixth-order (mainstem) streams was 0.006 coho per square meter and 0.010 steelhead per square meter. Assuming that juvenile coho and steelhead densities within the dewatered work area above the existing culvert are similar to those reported for rearing pool habitats surveyed in the 2008 study, NFMS' estimates fewer than 5 coho salmon and 5 steelhead may be present and affected by fish handling.

Effects of Construction-Related Suspended Sediments and Turbidity on ESA-Listed Fish

Prolonged elevations of suspended sediment can stress fish by impairing their ability to locate predators, find prey, and defend territory, and/or by interfering with gill and related osmoregulatory function. Increased stress can alter blood physiology and compromise the effectiveness of the immune system, growth, and reproduction, and thereby affect mortality rates (USFWS, 1998). Effects realized in individual fish are dependent on the exposure concentration of total suspended solids (TSS) and the exposure duration, and manifest as often harmless behavioral avoidance at low concentrations and/or low exposure time, to sublethal physiological responses or death at extremely high concentrations over long exposure periods (Newcomb and Jensen 1996).

For the current action, a temporary increase in suspended sediments (solids) and associated turbidity is reasonably certain to occur during the placement of the culvert extension, due to the disturbance of existing channel substrates. Increased turbidity within the aquatic portion of the action area is anticipated to be limited to the 3-foot wide channel of T3 for a total distance of about 270 feet from areas of disturbance to where it discharges into the Columbia River.

Several measures inherent to the action description will minimize the likelihood of exposure of fish to the effects of elevated suspended sediment in the action area, but will not eliminate the likelihood of exposure entirely. First, all work in fish-bearing waters below the OHWL will be conducted over a seven-day period during the July 15 through August 31 in-water work window, when juvenile and adult salmon and steelhead are least likely to be present. Further, sediment recruitment into action area waters from upland erosion will be minimized by applying appropriate sediment and erosion control BMPs before construction begins and maintaining these measures in working order throughout the construction period. Most juvenile salmonids remaining in the action area affected by elevated suspended sediments and turbidity are reasonably certain to avoid the degraded water quality by moving into other areas for foraging and refuge while the source of disturbance continues. However, not all juvenile salmonids would be able to avoid elevated turbidity. Any juvenile salmonids that cannot avoid the turbidity would be subject to those effects discussed above, and subject to take in the form of harm

Effects on Fish from Permanent and Temporary Habitat Loss

Permanent and temporary habitat effects will result from in-stream work on T3 and fill from the new retaining wall. As discussed above, temporary impacts to water quality components of habitat with potential effects to individual fish are expected from construction-related turbidity and suspended sediment. Further, approximately 270 feet of stream habitat will be affected from placement of new culverts and habitat features. While the existing habitat to be impacted is severely degraded (Figure 2), algae and macroinvertebrates in the culvert and adjacent drainage channel will be temporarily affected by the proposed work. As such, forage opportunities are reasonably likely to be diminished for up to about 6 months following construction (Fowler 2004, Korsu 2004).

Fish-accessible wetlands will also be impacted. Permanent impacts to fish habitat from the new 1500-foot retaining wall adjacent to T3 are estimated to be 0.08 acres. Spawning areas are not currently present in T3 in the action area or in upstream locations. Installation of the new fish-passable culverts will create improved access to habitat in and associated with T3, and will also create an additional 3,240 square feet of new stream channel. Approximately 200 feet of this stream channel will remain within culverts, blocking the stream from sunlight and allochthonous inputs, precluding primary producers such as algae and diatoms, which require sunlight to fuel the photosynthetic process. However, many aquatic invertebrates drift, migrate, and otherwise move within stream channels, and will occupy streambeds within culverts (at least temporarily) as long as passage and appropriate substrate is available (Vaughan, 2002). Further, studies have shown that several aquatic invertebrates will move upstream in their nymph or larval stage, as long as the culvert is passable (Vaughan, 2002).

While culverts are not optimal for invertebrate colonization, the increased culvert size and passage conditions within the streambed area of the culvert will greatly improve conditions for fish and other organisms within T3. Given the short term nature of the construction disturbances to habitat associated with the project, the project timing which largely avoids direct fish exposure to the temporal effects of these habitat changes, and the recovery of the benthic forage that is reasonably certain to occur before the seasonal fish use of the area is presumed to typically occur, the effects on fish from this element of the action are unlikely to rise to the level of take. While not a factor in our evaluation of the acute effects of this component of the action on individual fish, the improved passage conditions and channel habitat enhancements will ultimately increase the functional value of this small action area for rearing and refuge over the long term within the recovery domains for LCR coho salmon and steelhead.

Relevance of Effects on Individual Fish to Salmonid Population Viability. The NMFS evaluates project effects at the population scale by determining if effects to individual fish will negatively influence VSP characteristics of specific populations. The death or injury of five LCR coho and five LCR steelhead juvenile from the effects of the action will be indiscernible against present abundance and therefore unlikely to influence the rate of juvenile to adult survival for returning adults. Therefore, abundance within the populations in the DPS is not negatively affected by this proposed action. Because the number of juveniles lost from each ESU and DPS is indiscernible, the proposed action will not influence population viability for any of the affected populations.

2.4.2 Effects of the Action on Designated and Proposed Critical Habitat

As discussed above, the FRA determined the proposed action was not likely to adversely affect designated critical habitat of LCR steelhead and will not destroy or adversely modify proposed critical habitat for LCR coho salmon. NMFS agrees with the determination for proposed critical habitat and concludes the conference accordingly as described below in the conclusion section of this opinion. But NMFS disagrees with the effect determination for designated critical habitat for LCR steelhead. Therefore, NMFS assesses the effects of water quality and other habitat changes on designated critical habitat during construction, shortly after construction, and long term, below.

The Primary Constituent Elements (PCEs) for critical habitat in the action area are 1) freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development; 2) freshwater rearing sites with water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; water quality and forage supporting juvenile development; and natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks; and 3) Freshwater migration corridors free of obstruction and excessive predation with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival. The majority of these PCEs at T3 are not currently functioning.

Approximately 270 feet of stream habitat will be directly impacted by the new culverts and habitat features at T3. Permanent impacts from fill in the adjacent wetland, associated with T3, are estimated to be 0.08 acres. Algae and macroinvertebrates in the adjacent wetland drainage channels will be temporarily affected by the proposed work. Invasive species removal and native plantings will, over time, help replace some lost or absent functions such as shade, stream complexity, and forage opportunities. Existing designated critical habitat for steelhead and proposed critical habitat for coho salmon will be enhanced with the addition of the fully passable culvert, daylighted stream channel, and other enhancements. Further, although use by steelhead and coho salmon is limited, significant improvements to the existing migration or feeding habitat functions in the action area are expected because of passage and habitat improvements relative to the conditions under the environmental baseline. As such, we expect critical habitat PCEs for forage and cover for to improve in the long term. Spawning areas are not currently present in T3 in the Project action area or in upstream locations and this condition is not expected to change from the proposed action.

Water quality is an essential element of each of the three freshwater PCEs in the action area. Water quality must be sufficient to support each of the life histories or behaviors associated with those PCEs. As described above for project effects of fish, temporary changes in water quality will briefly lower the function of the three freshwater PCEs present in the action. However, water quality will return to pre-project conditions within hours of completion.

2.5 Cumulative Effects

"Cumulative effects" are those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

The population of the Cowlitz County grew from 68,600 in 2000 to 75,621 in 2012, an approximately 10 percent increase. Thus, NMFS assumes that the population will continue to rise and future private and state actions will continue within the action area, increasing as population density rises. As the human population in the action area continues to grow, demand for agricultural, commercial, or residential development is also likely to grow. The NMFS believes the majority of environmental effects related to future growth will be linked to land clearing, associated land-use changes (i.e., from forest to lawn or pasture) and increased impervious surface and related subbasin changes. The effects of these activities have been cumulatively adverse to ESA-listed fish. These effects include contaminant loading into receiving waters which compromises individuals' fitness, simplification of fish habitat through the alteration of sediment supply and wood loading, and by altering hydrological regimes such that extreme flows occur more rapidly and with greater frequency to the detriment of the habitat components upon which fish depend. While these effects are inherent to the environmental baseline of this proposed project, we expect that land use changes and development of the built environment are reasonably certain to continue under existing zoning into the future. Future actions within the action area specifically for this project are likely to involve a federal nexus, given the location along the Columbia River, and within the jurisdiction of the FRA. As such, these actions would involve Section 7 consultation where such effects could be considered and minimized. However, NMFS believes that many of the existing local and state regulatory mechanisms intended to minimize and avoid effects on subbasin function and listed species from future commercial, industrial, and residential development are generally not adequate, or not implemented sufficiently. Though these existing regulations could decrease adverse effects on subbasin function, as currently constructed and implemented, they still allow incremental degradation to occur and these effects are reasonably certain to be conveyed into the action area. Over time, the incremental degradation, when added to the already degraded environmental baseline, can result in reduced habitat quality for at-risk salmon and steelhead.

In 2006, NMFS approved an interim recovery plan developed by the LCFRB in collaboration with local citizens, tribes, technical experts and policy makers to protect and restore steelhead and salmon runs within the lower Columbia River. In partnership with the LCRFB, many on-going habitat restoration projects in the Lower Columbia basin that include, but are not limited to, riparian plantings, removal of fish passage barriers, culvert replacements, and placement of in-stream habitat structures.

When considered together, these cumulative effects are likely to have a small, negative effect on salmon and steelhead population abundance and productivity. To the extent that recovery actions are implemented and on-going actions continued, adverse cumulative effects may be minimized, but will probably not be completely avoided.

2.6 Integration and Synthesis

The Integration and Synthesis section is the final step of NMFS' assessment of the risk posed to species and critical habitat as a result of implementing the proposed action. In this section, NMFS adds the effects of the action to the environmental baseline together with the cumulative effects to formulate the agency's biological opinion as to whether the proposed action is likely to: (1) Result in appreciable reductions in the likelihood of both survival and recovery of the species in the wild by reducing its numbers, reproduction, or distribution; or (2) reduce the value of designated or proposed critical habitat for the conservation of the species. These assessments are made in full consideration of the status of the species and critical habitat. Critical habitat for LCR coho salmon has not been designated but is proposed.

Although the vast majority of the LCR populations of coho salmon and steelhead considered in this opinion spawn primarily in the Kalama River watershed and other tributaries along the lower mainstem Columbia River, low numbers of coho salmon and steelhead may migrate into and rear and forage in the action area. Of these populations, Kalama River coho salmon is classified as a "contributing" population, and Kalama River winter and summer steelhead as "primary" populations (LCFRB, 2010). A primary population is biologically significant, highly viable, and as such, primary populations are considered to have an important role in the recovery of the DPS. Historically, primary populations were a large segment of the population structure. A contributing population is recognized as viable but in lower abundance than a primary population. However, a contributing population is recognized as an important source of diversity and contributes to the health of the overall ESU or DPS.

As discussed above, the area of direct habitat effects are limited to a discrete area. Further, the area is currently only partially accessible by LCR steelhead and LCR coho salmon and is presumed to be used for juvenile rearing only by a limited number of fish. Because the project will not affect adults, and particularly spawning adults, project effects will have little if any influence on VSP parameters for LCR steelhead and LCR coho salmon. Since the proposed action is unlikely to bear on any of the viability characteristics, the effects of the action are unlikely to bear on long term survival or recovery of the species considered in this consultation. However, the effects of the project together with the baseline existence of commercial and residential development, water withdrawal, and a host of other activities bear on all four of the VSP parameters. Even though an individual project may not impose significant impacts on salmon ESU, DPS, or population, the baseline and cumulative effects of watershed modifications has contributed to, and is likely to perpetuate, the decline of several salmon species.

Any land or water management action that changes habitat conditions beyond the tolerance of the species results in lower life-stage survival and abundance of the species. In some cases, the range of tolerance for some species is quite narrow and relatively small changes in habitat can have large effects on species survival (Upper Columbia Salmon Recovery Board (UCSRB) 2007). Thus, continued development in the spawning, rearing and migration corridor of already high-risk species will further increase the level of risk of both listed salmonids. However, the proposed action’s negative effects are short-term and not additive to risk, and the action will provide improved habitat conditions after project completion. Additionally, LCR coho salmon and LCR steelhead, although currently well below historic levels, are distributed widely enough and are presently at high enough abundance levels that any short-term adverse effects resulting from project activities will not have an observable effect on the spatial structure, productivity, abundance and diversity of these species. Therefore, when considered in light of existing risk, baseline effects, and cumulative effects, the project itself does not increase risk to either of the affected populations to a level that would reduce appreciably the likelihood for survival and recovery of the subject ESU or DPS.

The quality of proposed and designated critical habitat for LCR steelhead and coho salmon varies at the designation scale. There are a few select areas where high quality is high, but most habitat has been degraded to some degree by human development. In the action area, habitat is currently degraded but still provides some function to a small number of LCR steelhead and coho salmon. Cumulative effects from ongoing and future development are likely to have some negative impact on critical habitat at the designation-scale and in the action area,

At the watershed scale, the project will not increase the extent of degraded habitat within tributary T3, add to the degradation of water quality, further decrease limited rearing areas, or limit access to rearing habitat Proposed and designated critical habitat for coho salmon and LCR steelhead will remain functional, or retain the current ability for the PCEs to become functionally established, to serve the intended conservation role for the species. These same considerations support the action agency’s effects determination for proposed critical habitat as well.

Although the project will have temporary adverse effects on critical habitat related to elevated turbidity and suspended sediment from the construction elements of the action, critical habitat PCEs in the action area will slightly improve as a result of native vegetation plantings, stabilization and restoration of the affected stream reach, and improved passage conditions in T3. These project components are reasonably certain to provide improved cover, shade, forage and migration conditions in the long term. Therefore, PCEs of critical habitat will not be impaired in a way that would undermine the conservation value within the action area or the HUC 5 wherein the project is located.

2.7 Conclusion

After reviewing the current status of the listed species, the environmental baseline within the action area, the effects of the proposed action, and cumulative effects, it is NMFS’ biological opinion that the proposed action is not likely to jeopardize the continued existence of LCR coho salmon, or LCR steelhead. Additionally, the action will not destroy or adversely modify designated critical habitat for LCR steelhead or proposed critical habitat for LCR coho salmon.

You may ask NMFS to adopt the conference opinion as a biological opinion when critical habitat for LCR coho salmon is designated. The request must be in writing. If we review the proposed action and find there have been no significant changes to the action that would alter the contents of the opinion and no significant new information has been developed, including during the rulemaking process, we may adopt the conference opinion as the biological opinion on the proposed action and no further consultation will be necessary.

2.8. Incidental Take Statement

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by regulation to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. For purposes of this consultation, we interpret "harass" to mean an intentional or negligent action that has the potential to injure an animal or disrupt its normal behaviors to a point where such behaviors are abandoned or significantly altered.[3] Section 7(b)(4) and Section 7(o)(2) provide that taking that is incidental to an otherwise lawful agency action is not considered to be prohibited taking under the ESA, if that action is performed in compliance with the terms and conditions of this incidental take statement.

2.8.1 Amount or Extent of Take

As described in the effects analysis above, we assume a few individual fish from the identified populations are reasonably certain to be present in the action area and exposed to the effects of the action. Some exposed fish will respond to exposure with impaired behavior in ways that results in their injury. Therefore, incidental take of individual fish is reasonably certain to occur. In this case, take is expected from work site isolation and fish handling, and from the elevated suspended sediments resultant from construction.

Take from Work Site Isolation and Fish Handling

Assuming that juvenile coho and steelhead densities within the dewatered work area above the existing culvert are similar to those reported for rearing pool habitats surveyed in the 2008 study, as discussed in Section 2.4, we estimate that no more than 5 juvenile coho salmon and 5 juvenile steelhead may be present and affected by work site isolation and the associated fish handling that is presumed to require electrofishing.

[3] NMFS has not adopted a regulatory definition of harassment under the ESA. The World English Dictionary defines harass as "to trouble, torment, or confuse by continual persistent attacks, questions, etc." The U.S. Fish and Wildlife Service defines "harass" in its regulations as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering (50 CFR 17.3). The interpretation we adopt in this consultation is consistent with our understanding of the dictionary definition of harass and is consistent with the U.S. Fish and Wildlife interpretation of the term.

Take from Suspended Sediment

Some ESA-listed LCR coho salmon and steelhead are presumed to be exposed to elevated suspended sediment concentrations from construction actions. We expect juvenile coho salmon and steelhead will be harmed by short-term exposures to sublethal concentrations of suspended sediments. Exposure to sediment inputs will be sporadic, with the largest pulses occurring during excavation and construction events. Take caused by the effects of this action cannot be accurately quantified as a number of fish. This is because the precise distribution and abundance of fish within the action area at the time the action is proposed is not a simple function of the quantity, quality, or availability of predictable habitat resources within that area. Rather, the distribution and abundance of fish within this action area shows wide, random variations due to biological and environmental processes operating at much larger demographic and regional scales. Furthermore, the number of fish injured or killed by elevated turbidity can almost never be accurately detected as not all affected fish are captured or seen.

In such circumstances, NMFS quantifies the extent of take based on the extent of habitat modified by the project. Here, the extent of take is that aquatic habitat influenced by elevated turbidity. As such, NMFS expects direct injury or death and behavioral effects to occur within the 270-foot stream channel and associated 0.08 acres of off-channel wetlands to be affected at T3. The NMFS expects this extent of take, measured as turbidity no longer measurable above background near the confluence of T3 and the Columbia River, to persist only during periods of in-water work in this location. This exemption for take applies during the July 15 to August 31 work window. Exceeding these limits will trigger the reinitiation provisions of this Opinion.

Take is exempted for:

1. Lower Columbia River coho salmon and steelhead that are harmed by the temporary degradation of T3 from pulses of elevated suspended below the OHWL from the construction site to T3’s outlet at the Columbia River to occur between July 15 and August 30.

The pulses of elevated suspended sediment will harm fish by impairing the feeding and sheltering success of LCR steelhead and LCR coho through displacement from their preferred habitat, and through increased physiological stress. The estimated extent of habitat affected by elevated sediment levels represents the extent of take from the temporary water quality degradation of the T3, to the point where turbidity falls to background levels. This extent is readily observable and therefore suffices to trigger reinitiation of consultation, if exceeded and necessary (see H.R. Rep. No 97-567, 97th Cong., 2d Sess. 27 (1982).

2.8.2 Effect of the Take

In the biological opinion, NMFS determined that the amount or extent of anticipated take, coupled with other effects of the proposed action, is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

2.8.3 Reasonable and Prudent Measures and Terms and Conditions

"Reasonable and prudent measures" are nondiscretionary measures to minimize the amount or extent of incidental take (50 CFR 402.02). "Terms and conditions" implement the reasonable and prudent measures (50 CFR 402.14). These must be carried out for the exemption in section 7(o)(2) to apply. The following reasonable and prudent measures are necessary and appropriate to minimize the take of listed species.

The FRA shall:

1. Minimize take of LCR coho salmon and LCR steelhead from elevated turbidity.

2. Minimize incidental take from fish capture and removal operations

To be exempt from the prohibitions of section 9 of the ESA, the FRA and its cooperators must comply with the following terms and conditions that implement the reasonable and prudent measures described above.

1. To implement Reasonable and Prudent Measure #1, the FRA shall:

   a. Conduct all in-water work for a brief a period as practicable between July 15 and October 31;
   b. When operating machinery below the OHWL, use extreme care to avoid mistakes to minimize the amount of time spent working below OHWL.
   c. Monitor erosion control activities, including minimization measures and BMPs, and take corrective action if necessary to ensure protection of riparian areas and waterways. The FRA shall submit reports on the contractor's compliance with and the effectiveness of the erosion control BMPs, minimization measures, to NMFS within 60 days of project completion.
   d. Monitor turbidity levels in T3 near the confluence but prior to reaching the Columbia River, where turbidity levels are expected to fall to background levels or below. The FRA shall report the results of the turbidity monitoring to NMFS within 60 days of project completion.

2. To implement Reasonable and Prudent Measure #2, The FRA shall:

   a. Conduct fish exclusion, electrofishing, and relocation actions in accordance with applicable guidelines outlined in Appendix I.
   b. Document all LCR steelhead and LCR coho salmon encountered during work area isolation by submitting an In-water Construction Monitoring Report (Appendix I) or equivalent to NMFS within 30 days of work area isolation.
   c. All reports shall be sent to National Marine Fisheries Service, Oregon Washington Coastal Area Office, Attention: Scott E. Anderson, 510 Desmond Drive SE, Suite 103, Lacey, Washington 98503.

d. NOTICE: To follow inactive projects and, if necessary, withdraw the opinion for an incomplete project, the FRA shall provide an annual report even if no actual work was completed in a particular year.

2.9. Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Specifically, conservation recommendations are suggestions regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information (50 CFR 402.02).

The following recommendation is a discretionary measure that NMFS believes is consistent with this obligation and therefore should be carried out by the FRA:

> Monitor the stream culvert inlet and outlet monthly and after heavy storms for debris to ensure fish passage.

To be kept informed of actions minimizing or avoiding adverse effects, or those that benefit listed salmon and their habitats, NMFS requests notification of any actions leading to the achievement of the conservation recommendation.

2.10 Reinitiation of Consultation

As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) The amount or extent of incidental take is exceeded, (2) new information reveals effects of the agency action on listed species or designated critical habitat in a manner or to an extent not considered in this opinion, (3) the agency action is subsequently modified in a manner that causes an effect on the listed species or critical habitat not considered in this opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action.

To reinitiate consultation, contact the Oregon Washington Coastal Area Office of NMFS, and refer to the NMFS Tracking Number assigned to this consultation (NWR-2013-10618).

Please notify NMFS if the FRA carries out any of these recommendations so that we will be kept informed of actions that are intended to improve the conservation of listed species or their designated critical habitats.

3. MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT ESSENTIAL FISH HABITAT CONSULTATION

The consultation requirement of section 305(b) of the MSA directs Federal agencies to consult with NMFS on all actions or proposed actions that may adversely affect EFH. The MSA (section 3) defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." Adverse effects include the direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects on EFH may result from actions occurring within EFH or outside EFH, and may include site-specific or EFH-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810). Section 305(b) also requires NMFS to recommend measures that can be taken by the action agency to conserve EFH.

This analysis is based, in part, on the EFH assessment provided by the FRA and descriptions of EFH for Pacific coast salmon (PFMC 1999) contained in the fishery management plans developed by the Pacific Fishery Management Council (PFMC) and approved by the Secretary of Commerce.

3.1 Essential Fish Habitat Affected by the Project

The proposed action and action area for this consultation are described in the Introduction to this document. The action area includes areas designated as EFH for of coho salmon (*O. kisutch*) and Chinook salmon, but does not occur within a Habitat Area of Particular Concern.

3.2 Adverse Effects on Essential Fish Habitat

The NMFS determined that the proposed action will have adverse effects on EFH designated for coho and Chinook salmon, based on information provided in the BA and the analysis of effects presented in the ESA portion of this document. . During project construction, salmon could be in the action area. Therefore, NFMS believes that during project construction in-water work will damage water quality over a short timeframe.

The NMFS determined that the proposed action will adversely affect EFH as follows:

1. A short-term, temporary reduction in water quality (turbidity) will result from in-stream work associated with the culvert replacement.

2. A short-term reduction in benthic forage production in the affected stream channel and culvert placement areas.

3.3 Essential Fish Habitat Conservation Recommendations

The NMFS believes that the ESA terms and conditions are necessary and sufficient to avoid, mitigate, and offset the impact of the proposed action on EFH. Therefore, NMFS recommends that the FRA adopt the following measures as EFH conservation recommendations:

1. Minimize all in-water work to as brief a period as practicable between July 15 and October 31, and use extreme care when conducting in-water work to minimize disturbance and turbidity to the extent possible.

2. Minimize damage and vegetation removal to the extent possible while creating and using access points for construction near and below the OHWL.

3. Monitor the benthic recolonization rate below, within and above the culvert placement area, where in-water work was performed.

3.4 Statutory Response Requirement

Federal agencies are required to provide a detailed written response to NMFS' EFH conservation recommendations within 30 days of receipt of these recommendations (50 CFR 600.920(k)(1)). The response must include a description of measures proposed to avoid, mitigate, or offset the adverse effects of the activity on EFH. If the response is inconsistent with the EFH conservation recommendations, the response must explain the reasons for not following the recommendations. The reasons must include the scientific justification for any disagreements over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate, or offset such effects.

3.5 Supplemental Consultation

The FRA must reinitiate EFH consultation with NMFS if the proposed action is substantially revised in a way that may adversely affect EFH, or if new information becomes available that affects the basis for NMFS' EFH conservation recommendations [50 CFR 600.920(l)].

4. DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

Section 515 of the Treasury and General Government Appropriations Act of 2001 (Public Law 106-554) (Data Quality Act) specifies three components contributing to the quality of a document. They are utility, integrity, and objectivity. This section addresses these Data Quality Act (DQA) components, documents compliance with the DQA, and certifies that this opinion has undergone pre-dissemination review.

4.1 Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended users of the information in these two consultations are the COE and their contractors, and NMFS. The information is also useful and of interest to the general public as it describes the manner in which public trust resources are being managed and conserved. The information is beneficial to citizens of Cowlitz County in Washington State because the underlying project affects natural resources at a site within that county.

An individual copy was provided to the COE. The format and naming adheres to conventional standards for style.

4.2 Integrity

This consultation was completed on a computer system managed by NMFS in accordance with relevant information technology security policies and standards set out in Appendix III, 'Security of Automated Information Resources,' Office of Management and Budget Circular A-130; the Computer Security Act; and the Government Information Security Reform Act.

4.3 Objectivity

Information Product Category: Natural Resource Plan.

Standards: This consultation and supporting documents are clear, concise, complete, and unbiased; and were developed using commonly accepted scientific research methods. They adhere to published standards including the NMFS ESA Consultation Handbook, ESA regulations, 50 CFR 402.01, et seq., and the MSA implementing regulations regarding EFH, 50 CFR 600.920(j).

Best Available Information: This consultation and supporting documents use the best available information, as referenced in the Literature Cited section. The analyses in this Opinion/EFH consultation contain more background on information sources and quality.

Referencing: All supporting materials, information, data and analyses are properly referenced, consistent with standard scientific referencing style.

Review Process: This consultation was drafted by NMFS staff with training in ESA and MSA implementation, and reviewed in accordance with Northwest Region ESA quality control and assurance processes.

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Appendix I. Worksite Isolation and Fish Capture and Handling Protocol

This Appendix provides additional clarifying detail for the non-discretionary terms and conditions that must be undertaken by COE to ensure the reasonable and prudent measures identified in the Section on "Reasonable and Prudent Measures and Terms and Conditions" in the opinion, are implemented, and specifically, Reasonable and Prudent Measure Number 2.

1. Personnel conducting fish capture and handling have the necessary training, knowledge, skills, and abilities to ensure the safe handling of all ESA-listed fish:
    a. Fish capture operations will only be conducted by or under the direct supervision of a fishery biologist trained and experienced in such efforts;
    b. All personnel operating electrofishing equipment will have appropriate training and experience with electrofishing techniques (NMFS 2000), and specifically:
        i. The supervising biologist will:
            1. Have a minimum of 100 hours electrofishing experience in the field using similar equipment;
            2. Be familiar with the principles of electrofishing, including the effects of voltage, pulse width and pulse rate on fish, and associated risk of injury or mortality; and
            3. Have knowledge regarding galvanotaxis, narcosis and tetany, their relationships to injury/mortality rates, and has the ability to recognize these responses when exhibited by fish.
        ii. All other individuals operating electrofishing equipment will have a minimum of 40 hours electrofishing experience under direct supervision.
    c. Adequate numbers of trained and experienced personnel to conduct fish capture and removal will be available at all times during these operations.

2. Steps will be taken to encourage the volitional excavation of juvenile salmon and steelhead from areas where equipment will be used prior to construction as described in this opinion, and to ensure the safe removal of those salmonids trapped or stranded by work site isolation operations, including:
    a. Conducting work site isolation and fish capture and handling as described in this opinion.
    b. Use of the following mandatory fish capture methods and equipment, unless otherwise stated:
        i. Dip nets, seines, and block nets composed of soft (non-abrasive) nylon material.
        ii. Sanctuary dip nets that are used in conjunction with other methods as the area is dewatered – use of sanctuary dip nets is mandatory.
        iii. Optional use of aquarium nets if water depths in remaining pools are very shallow and/or fish are concentrated in very small receding pools or coarse substrate; however, once netted, fish must remain in water until transferred to a holding container with dissolved oxygen concentrations at saturation—either through supplemental aeration provided, or flow-

through conditions consistent with a netted 'live box' holding apparatus secured in the stream flow.

iv. Seines with mesh of a size to ensure entrapment of the residing ESA-listed fish and age classes, and with a bag to minimize handling stress.

v. Electrofishing only after all other means of fish capture have been exhausted (e.g., a minimum of three complete passes of the seine without fish capture); and provided electrofishing methods and equipment comply with NMFS' Backpack Electrofishing Guidelines (NMFS 2000) (attached to this opinion) that include, but are not limited to:

1. Use of the minimum voltage, pulse width, and rate settings necessary to achieve the desired response.
2. Measurement of water conductivity in the field prior to each electrofishing attempt to determine the appropriate settings.
3. Use of the initial and maximum settings as specified in the NMFS guidelines.
4. Use of only direct current (DC) or pulsed DC current.
5. Preventing fish from coming into direct contact with the netted anode while an electrical current is discharged.
6. Careful observation and documentation of the condition of captured fish; adjustment of electrofishing unit settings and manner in which used as necessary; and termination of electrofishing operations if the adjustments do not lessen the frequency of observed stress.

NOTE: Additional information for fish capture and handling that may be of assistance to avoid and minimize the number of fish captured and handled and to ensure their safe release can be found in The Fish Exclusion Protocols and Standards in the Washington State Department of Transportation Biological Assessment Preparation for Transportation Projects – Advanced Training Manual – Version 02-2011/02/2012, Part 2, Chapter 14, Inwater Work (available at: http://www.wsdot.wa.gov/Environment/Biology/BA/BAguidance.htm)

7. A last check for remaining fish is conducted once the area is dry.

vi. Completing the cofferdam at the downstream end of the dewatered reach.

vii. Pulling the surrogate block net taut against the outside of the installed barrier/cofferdam, securing it to the bankline, and leaving it in place until all work, including cofferdam removal is complete.

c. Handling ESA-listed fish with extreme care by:

i. Keeping them in water at all times during transfer procedures.

ii. Transferring fish with a sanctuary net that holds water during transfer, whenever necessary to prevent the added stress of an out-of-water transfer.

iii. Providing a healthy environment for captured fish by:

1. Ensuring water quality conditions in the buckets used to transport fish are adequate by providing circulation of clean, cold water, using aerators to provide dissolved oxygen, and minimizing hold times;

2. Use of large, dark colored, lidded buckets (5 gallon minimum to prevent overcrowding) and minimal handling of fish;
3. Keeping densities of fish within buckets low (no more than 10 fish per 5 gallon bucket) and larger fish separated from smaller fish;
4. Not allowing the water temperature in the transfer buckets to exceed above that of the ambient stream water temperature in the action area during fish transfer activities associated with the action;
5. Suspending electrofishing when turbidity reduces visibility to less than 0.5 meter (1.6 feet), when water conductivity exceeds 350 picosiemens per centimeter (pS/cm), or when water temperature is above 18 degrees Celsius (64.4 degrees Fahrenheit), unless no other method of capture is available;
6. Retaining fish the minimum time possible (less than 10 minutes) to ensure that stress is minimized, temperatures do not rise, and dissolved oxygen remains suitable;
7. Releasing fish as near as possible to the isolated reach in a pool or area that provides cover and flow refuge, and as quickly as possible; and
8. Frequently monitoring of captured fish to minimize fish stress.
9. Ensuring that the hands of individuals handling are free of harmful and/or deleterious products, including but not limited to sunscreen, lotion, and insect repellent.
10. Minimizing handling of fish by visually counting, determining approximate age (age-0 plus or age-1 plus) and whether the fish is marked or not; assessing species and releasing the fish without further handling if species is not immediately determinable (note as such).
11. Not measuring fish, using anesthesia, or conducting other sampling activities, except visual assessments as noted above.

d. Rewatering of the coffered area at a slow, measured pace to minimize bed disturbance and the downstream release of suspended sediments, and in essentially the reverse order of the dewatering procedure by:
   i. Removing the downstream barrier.
   ii. Removing the top layer to the upstream barrier to slowly release one-quarter to one-third of the streamflow
   iii. Inspecting the block net for impinged or dead fish, carefully removing impinged or dead fish,
   iv. Removing the next layer to the upstream barrier to slowly release one-half to two-thirds of the streamflow such that the release of suspended sediments does not exceed limits described in Term and Condition Number 2 described in the Section on “Reasonable and Prudent Measures and Terms and Conditions” in the opinion.
   v. Continuing block net inspections and slow removal of the upstream barrier.

vi. Removing the block net once the dewatered area is completely rewatered and the entire barrier is removed. Removal proceeds from the downstream end, upstream.

e. Describing the capture and release effort in a post-project report (see Term and Condition Number 2 described in the Section on “Reasonable and Prudent Measures and Terms and Conditions” in the opinion).

Appendix I - In-water Construction Monitoring Report

Start Date: ________________
End Date: ________________

Waterway: _______________________ in _______________ County

Construction Activities:

____
____
____
____
____

Number of fish observed: ____________
Number of salmonid juveniles observed (what kind?):
____

Number of salmonid adults observed (what kind?):
____

What were fish observed doing prior to construction?____
____
____

What did the fish do during and after construction?
____
____
____

Number of fish stranded as a result of this activity: ___________

How long were the fish stranded before they were captured and released to flowing water?
____
____
____

Number of fish that were killed during this activity: ___________

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
7600 Sand Point Way N.E., Bldg. 1
Seattle, Washington 98115

Refer to NMFS No.:
WCR-2014-813

February 04, 2015

David Valenstein
Chief, Environmental & Systems Planning Division
Office of Railroad Policy and Development
Federal Rail Administration
U.S. Department of Transportation
1200 New Jersey Avenue, SE
Washington, DC 20590

Re: Endangered Species Act Section 7(a)(2) Biological and Conference Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Kelso to Martin's Bluff Rail Improvements—Task 6

Dear Mr. Valenstein:

Thank you for your letter of May 2, 2014 requesting initiation of consultation with NOAA's National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act of 1973 (ESA) (16 U.S.C. 1531 et seq.) for the Kelso to Martin's Bluff Rail Improvements—Task 6. We prepared the enclosed biological opinion (opinion) pursuant to section 7(a)(2) of the ESA on the effects of the project. In this Opinion, we conclude that the proposed action is not likely to jeopardize the continued existence of the ESA-listed salmon and steelhead of the Columbia River and is not likely to destroy or adversely modify their critical habitat.

The document also contains the results of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) Essential Fish Habitat (EFH) consultation. The Federal Rail Administration (FRA) determined that the project will adversely affect EFH. We concur with this determination and is therefore providing conservation recommendations pursuant to the MSA (section 305(b)(4)(A)). The FRA must respond to these recommendations within 30 days (MSA section 305(b)(4)(B)).

If the response is inconsistent with the EFH conservation recommendations, the Federal action agency must explain why the recommendations will not be followed, including the scientific justification for any disagreements over the effects of the action and the recommendations.

In response to increased oversight of overall EFH program effectiveness by the Office of Management and Budget, NMFS established a quarterly reporting requirement to determine how many conservation recommendations are provided as part of each EFH consultation and how many are adopted by the action agency. Therefore, we request that in your statutory reply to the EFH portion of this consultation, you clearly identify the number of conservation recommendations accepted.

Please contact Michael Grady of the Oregon Washington Coastal Area Office at (206) 526-4645, or by email at Michael.Grady@noaa.gov if you have any questions concerning this section 7 consultation.

Sincerely,

for William W. Stelle, Jr.
Regional Administrator

Endangered Species Act (ESA) Section 7(a)(2) Biological and Conference Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation

Kelso to Martin's Bluff Rail Improvements—Task 6

NMFS Consultation Number: WCR-2014-813

Action Agency: Federal Rail Authority

Affected Species and NMFS' Determinations:

ESA-Listed Species	Status	Is Action Likely to Adversely Affect Species or Critical Habitat?	Is Action Likely To Jeopardize the Species?	Is Action Likely To Destroy or Adversely Modify Critical Habitat?
Lower Columbia River Chinook Salmon (*O. tshawytscha*)	Threatened	Yes	No	No
Upper Columbia River spring-run Chinook Salmon (*O. tshawytscha*)	Endangered	Yes	No	No
Snake River fall-run Chinook Salmon (*O. tshawytscha*)	Threatened	Yes	No	No
Snake River spring/summer-run Chinook Salmon (*O. tshawytscha*)	Threatened	Yes	No	No
Upper Willamette River Chinook Salmon (*O. tshawytscha*)	Threatened	Yes	No	No
Columbia River Chum Salmon (*O. keta*)	Threatened	Yes	No	No
Lower Columbia River Coho Salmon (*O. kisutch*)	Threatened	Yes	No	No (proposed)
Snake River Sockeye Salmon (*O. nerka*)	Endangered	Yes	No	No
Snake River basin Steelhead (*O. mykiss*)	Threatened	Yes	No	No
Upper Columba River Steelhead	Threatened	Yes	No	No
Middle Columba River Steelhead	Threatened	Yes	No	No
Lower Columba River Steelhead	Threatened	Yes	No	No
Upper Willamette River Steelhead	Threatened	Yes	No	No
Southern Pacific Eulachon (*Thaleichthys pacificus*)	Threatened	No	No	No

Fishery Management Plan That Describes EFH in the Project Area	Does Action Have an Adverse Effect on EFH?	Are EFH Conservation Recommendations Provided?
Pacific Coast Salmon	Yes	Yes

Consultation Conducted By: National Marine Fisheries Service, West Coast Region

Issued By:

William W. Stelle, Jr.
Regional Administrator

Date: February 04, 2015

TABLE OF CONTENTS

1. INTRODUCTION

This Introduction section provides information relevant to the other sections of this document and is incorporated by reference into Sections 2 and 3 below.

1.1 Background

The National Marine Fisheries Service (NMFS) prepared the biological and conference opinion (opinion) and incidental take statement in accordance with section 7(b) of the Endangered Species Act (ESA) of 1973 (16 USC 1531 et seq.) and implementing regulations at 50 CFR 402. We also completed an essential fish habitat (EFH) consultation on the proposed action, in accordance with section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. 1801 et seq.) and implementing regulations at 50 CFR 600.

We completed pre-dissemination review of this document using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). A complete record of this consultation is on file at the Oregon-Washington Coastal Area Office.

1.2 Consultation History

September 9, 2013: We and the project proponents began pre-consultation coordination on the project scope and potential effects to listed species and their habitats..

January 31, 2014: The Federal Railroad Administration (FRA) designated the Washington State Department of Transportation (WSDOT) as its non-Federal representative for ESA and MSA.

September 9, 2013 to May 6, 2014: We worked with the project proponents, via meetings, email, and site visits, to reduce the impacts of the proposed action on listed species.

May 7, 2014: We received the biological assessment (BA) and request for formal consultation from FRA.

May 7, 2014 to September 22, 2012: We continued to work with the project proponents to further reduce the adverse effects by requesting additional information and clarification of the project description and the effects of the proposed action via meetings and email.

September 22, 2014: We received all of the requested information. Formal consultation on the proposed action was initiated.

Table 1. FRA ESA Determinations[1]

Species	Federal Status	Species Determination	Critical Habitat Determination	Listing/ Designation Date
Lower Columbia River Chinook Salmon (*O. tshawytscha*)	Threatened	LAA	LAA	6/28/05 (70 FR 37160)/ 9/2/05 (70 FR 52630)
Upper Columbia River spring-run Chinook Salmon (*O. tshawytscha*)	Endangered	LAA	n/a	6/28/05 (70 FR 37160)/ 9/2/05 (70 FR 52630)
Snake River fall-run Chinook Salmon (*O. tshawytscha*)	Threatened	LAA	n/a	6/28/05 (70 FR 37160)/ 12/28/93 (50 FR 68534)
Snake River spring/summer-run Chinook Salmon (*O. tshawytscha*)	Threatened	LAA	n/a	6/28/05 (70 FR 37160)/ 10/25/99 (50 FR 57399)
Upper Willamette River Chinook Salmon (*O. tshawytscha*)	Threatened	LAA	n/a	6/28/05 (70 FR 37160)/ 9/2/05 (70 FR 52630)
Columbia River Chum Salmon (*O. keta*)	Threatened	LAA	LAA	6/28/05 (70 FR 37160)/ 9/2/05 (70 FR 52630)
Lower Columbia River Coho Salmon (*O. kisutch*)	Threatened	LAA	LAA (proposed)	6/28/05 (70 FR 37160)
Snake River Sockeye Salmon (*O. nerka*)	Endangered	LAA	n/a	6/28/05 (70 FR 37160)/ 12/28/93 (50 FR 68534)
Snake River basin Steelhead (*O. mykiss*)	Threatened	LAA	n/a	1/5/06 (71 FR 834)/ 9/2/05 (70 FR 52630)
Upper Columba River Steelhead	Threatened	LAA	n/a	1/5/06 (71 FR 834)/ 9/2/05 (70 FR 52630)
Middle Columba River Steelhead	Threatened	LAA	n/a	1/5/06 (71 FR 834)/ 9/2/05 (70 FR 52630)
Lower Columba River Steelhead	Threatened	LAA	LAA	1/5/06 (71 FR 834)/ 9/2/05 (70 FR 52630)
Upper Willamette River Steelhead	Threatened	LAA	n/a	1/5/06 (71 FR 834)/ 9/2/05 (70 FR 52630)
Southern Pacific Eulachon (*Thaleichthys pacificus*)	Threatened	NLAA	NLAA	3/18/10 (75 FR 13012)/ 10/20/11 (50 FR 65324)

[1] NMFS agreed with these determinations and initiated consultation accordingly.
[2] LAA = likely to adversely affect
[3] NLAA = not likely to adversely affect

1.3 Proposed Action

"Action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies (50 CFR 402.02). WSDOT is improving intercity passenger rail service by constructing projects along the Pacific Northwest Rail Corridor (PNWRC). The FRA is funding the program under the American Recovery and Reinvestment Act of 2009. The PNWRC Improvement Program will add two additional Amtrak round- trips – per- day (from four to six) between Seattle, Washington, and Portland, Oregon. The PNWRC Improvement Program includes 17 individual tasks between Vancouver, Washington, and the Washington State – Canadian border. The Kelso Martin's Bluff Improvement Projects will improve passenger rail operations near the ports of Kalama (Tasks 4 and 5) and Longview (Task 6). This opinion is for Task 6. We are considering the effects of these individual actions on listed species and critical habitat in an additive manner as we complete each consultation.

Currently, freight trains from the Port of Longview frequently block one of two main- line tracks, which in turn leads to congestion on the rail system. Task 6 will build an additional main-line track through this area which will allow passenger trains to bypass the congestion. The Kelso Martin's Bluff Improvement Projects – Kelso to Longview Junction (Task 6) Project occurs entirely within the Burlington Northern Santa Fe Railway Company (BNSF) right-of-way (ROW).

Task 6 extends from the Kelso Amtrak Station in Township 8 North, Range 2 West, Section 27, Willamette Meridian (W.M.) to approximately 2,000 feet south of the BNSF bridge over Owl Creek in Township 7 North, Range 2 West, Section 24, W.M.. The project is within the Lower Columbia Watershed (6 Field Hydrologic Unit Code [HUC] 170800), Lower Cowlitz Watershed (8 Field HUC 17080005), and Water Resource Index Area (WRIA) 26 – Cowlitz River. The project extends north to south along the eastern bank of the Cowlitz and Columbia Rivers and crosses Owl Creek at River Mile (RM) 0.6 and the Coweeman River at RM 0.03. All in-water work will take place during the following windows:

1. Coweeman River, July 1 to October 31.
2. Off-channel habitat tributary to the Coweeman River, July 1 to November 30.
3. Owl Creek and its off-channel habitat, July 16 to October 14.

WSDOT will conduct the following activities:

1. upgrade the existing railroad bridge over the Coweeman River;
2. construct a new single-track bridge over the Coweeman River;
3. fill approximately 5.7 acres of off-channel habitat within the Coweeman River and Owl Creek watersheds;
4. replace the existing culverts under a BNSF access road;
5. replace a culvert under the Owl Creek Sand and Gravel Company access road;
6. remove a berm separating the Coweeman River and Owl Creek off-channel habitats and create a minimum of 1.5 acres of new off-channel habitat; and
7. acquire and permanently preserve no less than 50 acres of wetlands in the lower Columbia River watershed.

1.3.1 New Coweeman River Bridge

WSDOT will construct a new bridge over the Coweeman River to accommodate the new main-line track adjacent to the existing BNSF Coweeman River bridge. The new Coweeman River Bridge will be approximately 29 feet wide and 246 feet long. WSDOT will construct two new in-water concrete piers on the banks of the Coweeman River. The northern pier will be located entirely below the ordinary high water mark (OHWM) while the southern pier will be partially below the OHWM. A 164-foot-long steel span will extend between the new in-water piers across the Coweeman River.

The in-water work will take at least 114 work days to complete, between July 1 and October 31, 2015. On July 1, 2015, the WSDOT will begin constructing temporary coffer dams along both banks of the Coweeman River. Once the coffer dams are in place, they will remove any stranded fish, per NMFS-approved WSDOT Fish Exclusion Protocols and Standards (WSDOT 2013), and dewater the areas. Sumps and pumps will maintain the dewatered work areas. Within the coffer dams, WSDOT will install sheet piles around the perimeter of the new pier footings to provide shoring. They will then construct four, 54-inch drilled shafts to support each pier foundation using a crane to oscillate hollow, steel casings through the soil and excavating the soil out of the casings. It may be necessary to fill the casings with a bentonite (clay) slurry to support the walls of the boring hole. After excavating the shaft, they will lower a reinforcing steel shaft cage and pump concrete into the casing, displacing the water or slurry. WSDOT will contain, collect, and treat the water or slurry prior to reuse or disposal.

WSDOT will use cranes to construct the bridge and lower the spans into place. WSDOT will temporarily fill 0.25 acre of the off-channel habitat of the Coweeman River in order to build a crane pad. They will shore the fill with sheet piles and isolate the in-water work area with a coffer dam. WSDOT will restore the off-channel habitat after construction (see Section 1.3.5). WSDOT will also place 400 cubic yards of rip rap to the in-water piers to protect against scour. The rip rap will cover approximately 460 square feet of habitat below th ordinary high water mark (OHWM) for a total of 920 square feet (0.02 acre).

1.3.2 Culvert Replacements

A wetlands tributary to the Coweeman River, which runs parallel to the BNSF tracks, provides off-channel habitat for listed fish species. The BNSF access road from Talley Way to the Longview Junction Yard crosses this habitat. The water is conveyed by a submerged 24-inch culvert and a perched 66-inch culvert at this crossing. These two culverts provide some degree of fish passage but do not meet NMFS fish passage standards (NMFS 2011). WSDOT will replace these culverts with a single, larger crossing to meet the fish passage standards.

Owl Creek flows through the BNSF right-of way and connects, via a 36-inch concrete culvert below an access road, to off-channel habitat which runs parallel to the existing tracks. This culvert provides some degree of fish passage but does not meet NMFS fish passage standards. WSDOT will replace this culvert with a larger crossing to improve fish passage and tidal exchange.

WSDOT will isolate the in-water work areas for the culvert replacements with coffer dams, and will remove any stranded fish from the work areas following NMFS-approved WSDOT Fish Exclusion Protocols and Standards (WSDOT 2013) and complete all in-water work between July 16 to October 14.

1.3.3 Widened Track

WSDOT will dump up to 236,000 cubic yards of fill into the off-channel aquatic habitat in order to construct the new track. This off-channel habitat runs parallel to the tracks from Owl Creek to the Coweeman River. The fill will consist of washed quarry spalls, soil, gravel, small rock, and crushed stones. Prior to dumping the fill, WSDOT will isolate the in-water work areas using temporary coffer dams, dams, and culvert blockages and will remove any stranded fish from the work areas following NMFS-approved WSDOT Fish Exclusion Protocols and Standards (WSDOT 2013). An excavator and other equipment, operating from adjacent uplands or isolated in-water work areas, will shape the fill.

1.3.4 Coweeman Off-channel Habitat Restoration

Currently, the off-channel habitat tributary to the Coweeman River becomes disconnected from the river during low flow conditions. This habitat is a shallow and unvegetated tidal channel. WSDOT will restore the channel after project construction is complete, to provide more frequent connectivity to the Coweeman River and greater habitat diversity for juvenile forage and rearing salmonids. To accomplish this, WSDOT will lower the tidal channel elevation and excavate wetland fingers off of the enhanced tidal channel between the Coweeman River and the BNSF driveway. The fingers will support a variety of vegetation and cover types. WSDOT will use the same coffer dam for the south bank of the Coweeman River Bridge construction to isolate the wetland restoration and tidal channel enhancement area.

1.3.5 Removal of Upland Berm

The off-channel habitats of the Coweeman River and Owl Creek are linear and parallel the BNSF track. An upland berm separates the Coweeman River portion from the Owl Creek portion. WSDOT will remove the berm and restore a seasonal hydrologic connection between the River and the Creek at a level between the one-year and two-year design floods. To prevent stranding, the new slopes will be graded at a 2:1 slope.

1.3.6 Habitat Acquisition and Preservation

The FRA and WSDOT will acquire a minimum of 57 acres of wetlands on various parcels of property within 10 miles of the project area. This property will help offset impacts to jurisdictional wetlands as well as the loss of off-channel fish habitat. We estimate at least 30 acres of these wetlands provide off-channel habitat for ESA-listed species from the same populations that will be impacted by this project. Major construction work impacting fish habitat will not commence on the project until property title is acquired by BNSF on behalf of WSDOT. Properties acquired for the project will be transferred to the Cowlitz Tribe before project completion; the Tribe will be the terminal owner/manager of the property.

1.3.7 Interrelated and Interdependent Actions

“Interrelated actions” are those that are part of a larger action and depend on the larger action for their justification. “Interdependent actions” are those that have no independent utility apart from the action under consideration (50 CFR 402.02).

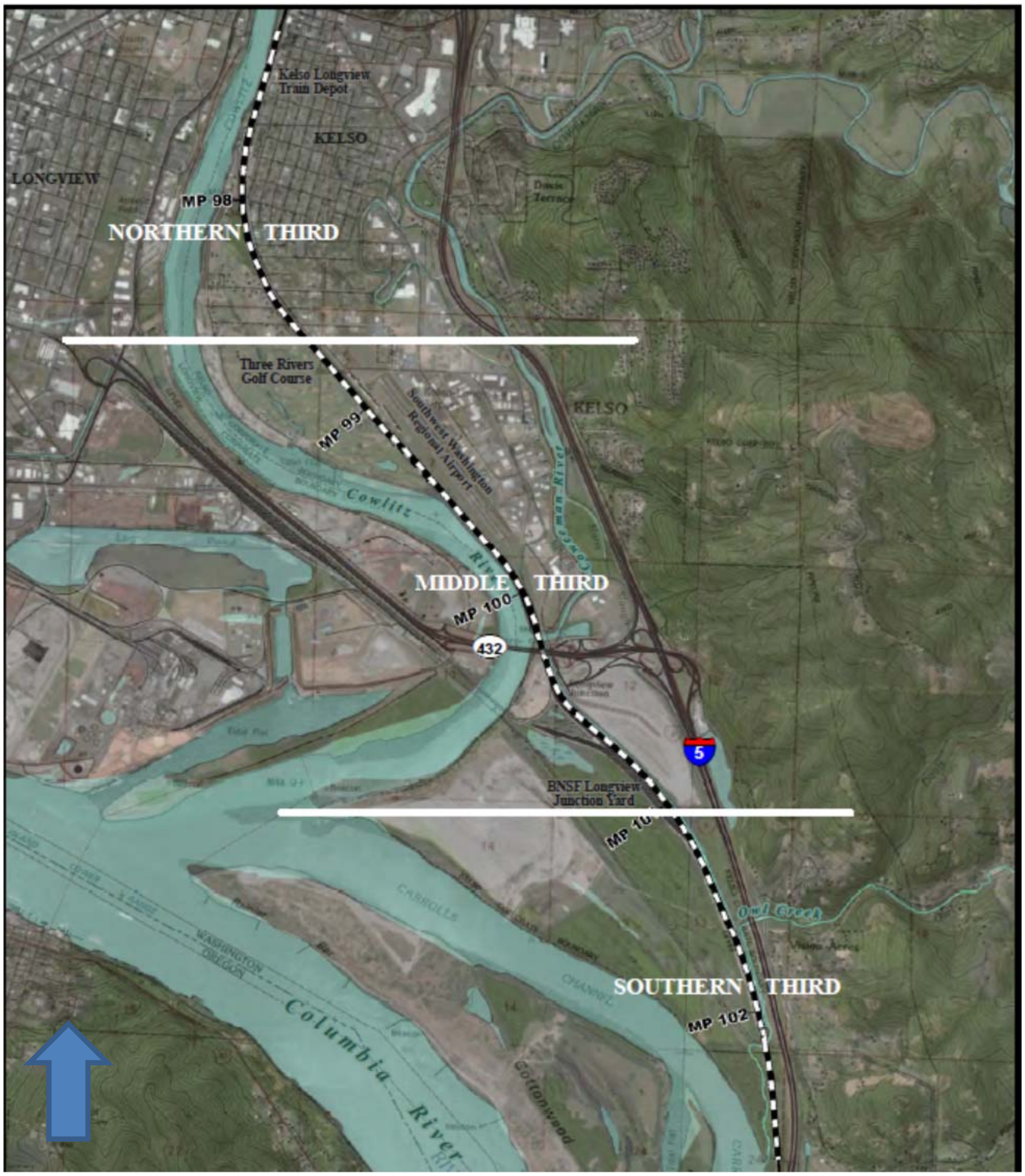
While this project is Task 6 of the 17-task PNWRC Improvement Program between Vancouver, Washington, and the Washington State – Canadian border, each task has independent utility and is not dependent upon each other for their justification. Each task solves a different problem with the current rail system and each will incrementally improve passenger rail service regardless of whether the other tasks are built. Therefore the tasks are not interrelated or interdependent.

1.4 Action Area

"Action area" means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). The action area for this project includes portions of the Cowlitz and Coweeman rivers, Owl Creek, and off-channel wetland habitat connected to the Coweeman River and to Owl Creek (Figure 1). The action area includes portions of the Cowlitz and Coweeman rivers within 328 feet of the new Coweeman River Bridge; based on the extent of effects from impact pile- driving. The action area also includes six acres of Owl Creek, off-channel wetland habitat connected to the Coweeman River and to Owl Creek bound by the extent of fill for the track widening and the extent of turbidity. These areas are occupied by the species listed in Table 1 and are critical habitat for one or more species. This area is also EFH for Pacific salmon. Although the action area is seasonally occupied by upriver species such as MCR steelhead, SR sockeye, and UCR Chinook salmon, most of the fish affected by the proposed action are LCR Chinook salmon, LCR coho salmon, CR chum salmon, and LCR steelhead.

Figure 1. Kelso Martin’s Bluff Project Area

*not to scale



2. ENDANGERED SPECIES ACT: BIOLOGICAL OPINION AND INCIDENTAL TAKE STATEMENT

The ESA establishes a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat upon which they depend. Section 7(a)(2) of the ESA requires federal agencies to insure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or adversely modify or destroy their designated critical habitat. Per the requirements of the ESA, Federal action agencies consult with NMFS and section 7(b)(3) requires that, at the conclusion of consultation, NMFS provides an opinion stating how the agency's actions would affect listed species and their critical habitat. If incidental take is expected, section 7(b)(4) requires NMFS to provide an incidental take statement (ITS) that specifies the impact of any incidental taking and includes non-discretionary reasonable and prudent measures and terms and conditions to minimize such impacts.

2.1 Analytical Approach

This biological opinion includes both a jeopardy analysis and an adverse modification analysis. The jeopardy analysis relies upon the regulatory definition of "to jeopardize the continued existence of a listed species," which is "to engage in an action that would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR 402.02). Therefore, the jeopardy analysis considers both survival and recovery of the species.

The adverse modification analysis considers the impacts of the Federal action on the conservation value of designated critical habitat. This biological opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR 402.02. Instead, we have relied upon the statutory provisions of the ESA to complete the following analysis with respect to critical habitat.[1]

We use the following approach to determine whether a proposed action is likely to jeopardize listed species or destroy or adversely modify critical habitat:

- Identify the range-wide status of the species and critical habitat likely to be adversely affected by the proposed action.
- Describe the environmental baseline in the action area.
- Analyze the effects of the proposed action on both the species and their habitat using an "exposure-response-risk" approach.
- Describe any cumulative effects in the action area.
- Integrate and synthesize the above factors to assess the risk that the proposed action poses to the species and their critical habitat.
- Reach jeopardy and adverse modification conclusions.

[1] Memorandum from William T. Hogarth to Regional Administrators, Office of Protected Resources, NMFS (Application of the "Destruction or Adverse Modification" Standard Under Section 7(a)(2) of the Endangered Species Act) (November 7, 2005).

2.2 Status of the Species and Critical Habitat

This opinion examines the status of each species that would be adversely affected by the proposed action. The status is determined by the level of extinction risk that the listed species face, based on parameters considered in documents such as recovery plans, status reviews, and listing decisions. This informs the description of the species' likelihood of both survival and recovery. The species status section also helps to inform the description of the species' current "reproduction, numbers, or distribution" as described in 50 CFR 402.02. The opinion also examines the condition of critical habitat throughout the designated area, evaluates the conservation value of the various watersheds and coastal and marine environments that make up the designated area, and discusses the current function of the essential physical and biological features that help to form that conservation value.

2.2.1 Status of the Species

Recovery domains (Table 2) are the geographically-based areas NMFS is using to prepare multi-species recovery plans. For each recovery domain, a technical review team (TRT) appointed by NMFS has developed, or is developing, criteria necessary to identify independent populations within each species, recommended viability criteria for those species, and descriptions of factors that limit species recovery.

Table 2. Recovery planning domains identified by NMFS and their ESA-listed salmon and steelhead species.

Recovery Domain	Species
Willamette-Lower Columbia	LCR Chinook salmon UWR Chinook salmon CR chum salmon LCR coho salmon LCR steelhead UWR steelhead
Interior Columbia	UCR spring-run Chinook salmon SR spring/summer Chinook salmon SR fall-run Chinook salmon SR sockeye salmon SR sockeye salmon UCR steelhead MCR steelhead SRB steelhead

The following is a summary of the limiting factors and threats for these two recovery domains (IC-TRT 2006; Ford et al. 2011; UCSRB 2007; NMFS 2009; ODFW and NMFS 2011; LCFRB 2010):

- Degraded estuarine and near-shore marine habitat from the cumulative impacts of land use and flow management by the Columbia River hydropower system;
- Degraded freshwater habitat (floodplain connectivity and function, channel structure and complexity, riparian areas, stream substrate, stream flow, and water quality) from the cumulative impacts of agriculture, forestry, and development;
- Reduced access to spawning and rearing habitat from tributary hydropower projects;
- Hatchery-related effects;
- Harvest-related effects;

- Reduced access to off-channel rearing habitat in the Lower Columbia River;
- Reduced productivity from sediment and nutrient-related changes in the estuary;
- Juvenile fish strandings from ship wakes;
- Contaminants affecting fish health and reproduction;
- Degraded stream flow as a result of hydropower and water supply operations;
- Current or potential predation from hatchery-origin salmonids;
- Fish passage barriers that limit access to spawning and rearing habitats;
- Avian and marine mammal predation in the lower mainstem Columbia River and estuary;
- Predation, competition, and disease from non-native species and out-of-ESU races of salmon and steelhead; and
- Genetic diversity effects from out-of-population hatchery releases.

Species in the Willamette and Lower Columbia (WLC) recovery domain include LCR Chinook, Upper Willamette River (UWR) Chinook, Columbia River (CR) chum, LCR coho, LCR steelhead, and UWR steelhead. The WLC-TRT has identified 107 demographically independent populations of Pacific salmon and steelhead. These populations were further aggregated into strata, groupings above the population level that are connected by some degree of migration, based on ecological subregions. All 107 populations use parts of the mainstem of the Columbia River and the Columbia River estuary for migration, rearing, and smoltification.

Species in the Interior Columbia (IC) recovery domain include Upper Columbia River (UCR) spring-run Chinook salmon, Snake River (SR) spring/summer run Chinook salmon, SR fall-run Chinook salmon, SR sockeye salmon, UCR steelhead, Middle Columbia River (MCR) steelhead, and Snake River Basin (SRB) steelhead. The IC-TRT identified 82 populations of those species based on genetic, geographic (hydrographic), and habitat characteristics. All 82 populations identified use the lower main-stem of the Snake River, the main-stem of the Columbia River, and the Columbia River estuary, or part thereof, for migration, rearing, and smoltification.

Lower Columbia River Chinook Salmon

The LCR Chinook Evolutionary Significant Unit (ESU) includes all naturally-spawned populations of Chinook salmon in the Columbia River and its tributaries; from its mouth at the Pacific Ocean upstream to a transitional point between Washington and Oregon just east of the Hood River; and from the Willamette River to Willamette Falls, Oregon (exclusive of spring-run Chinook salmon in the Clackamas River). The LCR Chinook ESU also includes the progeny of seventeen artificial propagation programs. LCR Chinook populations exhibit three different life history types based on return timing and other features: fall-run (a.k.a. “tules”), late-fall-run (a.k.a. “brights”), and spring-run.

Of the 32 historical populations in the ESU, 28 are extirpated or at “very high” risk. Based on the recovery plan analyses, all of the tule populations are at “very high” risk except one that is considered at “high” risk. Tule harvest management modeling suggests three of the populations (Coweeman, Lewis, and Washougal) are at lower risk. However, even these more optimistic evaluations suggest that the remaining 18 populations are at a substantial risk due to very low natural origin spawner abundance (less than 100 per population), high hatchery origin fractions, significant habitat degradation and increased harvest impacts. However, the overall status, based on the new information, does not indicate a change in their biological risk category since the last status review (Ford et al. 2011).

Columbia River Chum Salmon

This species includes all naturally-spawned populations of chum salmon in the Columbia River and its tributaries in Washington and Oregon, and progeny of three artificial propagation programs. The WLC-TRT identified 17 historical populations of CR chum salmon (Myers et al. 2006). Unlike other species in the WLC recovery domain, CR chum salmon spawn in the mainstem Columbia River.

The vast majority (14 out of 17) of the chum salmon populations remain “extirpated or nearly so.” The Grays River and Lower Gorge populations showed a sharp increase in 2002, but have since declined back to low abundance levels. Chinook and coho salmon populations in the Lower Columbia and Willamette showed similar increases in the early 2000s followed by declines to recent levels, suggesting the increase in chum salmon may be related to ocean conditions. Recent data on the Washougal/mainstem Columbia population are not available, but they likely follow a pattern similar to the Grays and Lower Gorge populations. The overall status, based on the new information considered, does not indicate a change in the biological risk category since the last status review (Ford et al. 2011).

Lower Columbia River Coho Salmon

This species includes all naturally-spawned populations of coho salmon in the Columbia River and its tributaries in Washington and Oregon, from the mouth of the Columbia up to and including the Big White Salmon and Hood rivers; in the Willamette River to Willamette Falls, Oregon; and progeny of 25 artificial propagation programs. The WLC-TRT identified 24 historical populations of LCR coho salmon (Myers et al. 2006). Of the 27 historical populations in the ESU, 24 are at “very high” risk. The remaining three populations (Sandy, Clackamas, and Scappoose rivers) are at “moderate” or “high” risk (Ford et al. 2011). As was noted in the 2005 status review, smolt traps indicate some natural production in Washington populations, though given the high fraction of hatchery origin spawners suspected to occur in these populations, it is not clear that any are self-sustaining (Ford et al. 2011). Overall, the new information considered does not indicate a change in the biological risk category since the last status review (Ford et al. 2011).

Lower Columbia River Steelhead

This species includes all naturally-spawned steelhead populations below natural and man-made impassable barriers in streams and tributaries to the Columbia River between and including the Cowlitz and Wind rivers, Washington and in the Willamette and Hood rivers, Oregon. The ESU also includes progeny of ten artificial propagation programs; but excludes all steelhead from the upper Willamette River basin above Willamette Falls, Oregon, and from the Little and Big White Salmon rivers, Washington.

Summer steelhead return to freshwater long before spawning. Winter steelhead, in contrast, return from the ocean much closer to maturity and spawn within a few weeks. Summer steelhead spawning areas in the Lower Columbia River are found above waterfalls and other features that create seasonal barriers to migration. Where no temporal barriers exist, the winter-run life history dominates. All of the populations increased in abundance during the early 2000s. Most populations have since declined back to levels within one standard deviation of the long- term mean. Exceptions are the Washougal summer run and North Fork Toutle winter run, which are still higher than the long-term average, and the Sandy, which is lower. In general, the populations do not show any dramatic changes in abundance since the 2005 status review (Ford et al. 2011).

Upper Willamette River Chinook Salmon

This species includes all naturally -spawned populations of spring-run Chinook salmon in the Clackamas River and in the Willamette River and its tributaries above Willamette Falls, Oregon. This species also includes the progeny of seven artificial propagation programs. The WLC-TRT identified seven historical populations of UWR Chinook salmon. Only the Clackamas population is “viable” (McElhany et al. 2007). Data since the last status review in 2005 has confirmed the high fraction of hatchery origin fish in all of the populations of this species. The new data have also highlighted the substantial risks of pre-spawning mortality. Although recovery plans target key limiting factors, there have been no significant on-the-ground actions since the last status review to resolve the lack of access to historical habitat above dams. There has not been substantial actions removing hatchery fish from the spawning grounds. Overall, the new information does not indicate a change in the biological risk category since the last status review (Ford et al. 2011).

Upper Willamette River Steelhead

This species includes all naturally-spawned steelhead populations below natural and manmade impassable barriers in the Willamette River, Oregon, and its tributaries upstream from Willamette Falls to the Calapooia River. The WLC-TRT identified five historical populations of UWR steelhead, all with winter run timing (Myers et al. 2006). The UWR steelhead are currently inhabiting many tributaries that drain the west side of the upper Willamette River Basin. Analysis of historical observations, hatchery records, and genetic analysis strongly suggested many of these spawning aggregations are the result of recent introductions and do not represent an historical population. Nevertheless, the WLC-TRT recognized these tributaries may provide juvenile rearing habitat or may be temporarily (for one or more generations) colonized during periods of high abundance. Summer steelhead have become established in the McKenzie River where historically no steelhead existed. Since the last status review in 2005, the UWR steelhead initially increased in abundance but subsequently declined, and current abundance is at the levels observed in the mid-1990s. The Distinct Population Segments (DPS) appears to be at lower risk than the UWR Chinook salmon ESU, but continues to have overall low abundance. The elimination of winter-run hatchery release in the basin reduced hatchery threats, but non-native summer steelhead hatchery releases are still a concern. Overall, the new information considered does not indicate a change in the biological risk category since the last status review (Ford et al. 2011).

Upper Columbia River Spring-Run Chinook Salmon

The Upper Columbia River Spring-run Chinook salmon species includes all naturally-spawned populations of Chinook salmon in all river reaches accessible to Chinook salmon in Columbia River tributaries upstream of the Rock Island Dam and downstream of Chief Joseph Dam in Washington (excluding the Okanogan River), and the Columbia River from a straight line connecting the west end of the Clatsop jetty (south jetty, Oregon side) and the west end of the Peacock jetty (north jetty, Washington side) upstream to Chief Joseph Dam in Washington. It also includes the progeny of six artificial propagation programs. The IC-TRT identified four independent populations of UCR spring-run Chinook salmon in the upriver tributaries of Wenatchee, Entiat, Methow, and Okanogan (extirpated) (IC-TRT 2003; Ford et al. 2011). Increases in natural origin abundance relative to the extremely low spawning levels observed in the mid-1990s are encouraging; however, average productivity levels remain extremely low. Overall, the viability of UCR spring-run Chinook salmon ESU has likely improved somewhat since the last status review, but the ESU is still clearly at “moderate-to-high” risk of extinction (Ford et al. 2011).

Snake River Spring/Summer-Run Chinook Salmon

This species includes all naturally-spawned populations of spring/summer-run Chinook salmon in the main-stem Snake River and in the Tucannon River, Grande Ronde River, Imnaha River, and Salmon River subbasins. It also includes the progeny of fifteen artificial propagation programs. The IC-TRT identified 27 extant and four extirpated populations of SR spring/summer-run Chinook salmon (IC-TRT 2003; Ford et al. 2011). Each of these populations faces a “high” risk of extinction (Ford et al. 2011). Overall, the new information considered does not indicate a change in the biological risk category since the last status review (Ford et al. 2011).

Snake River Fall-Run Chinook Salmon

This species includes all naturally-spawned populations of fall-run Chinook salmon in the main-stem Snake River below Hells Canyon Dam, and in the Tucannon River, Grande Ronde River, Imnaha River, Salmon River, and the Clearwater River. It also includes the progeny of four artificial propagation programs. The IC-TRT identified three populations of this species, although only the lower main-stem population exists at present, and it spawns in the lower main stem of the Clearwater, Imnaha, Grande Ronde, Salmon, and Tucannon rivers. The extant population of Snake River fall-run Chinook salmon is the only remaining population from an historical ESU that also included large main-stem populations upstream of the current location of the Hells Canyon Dam complex (IC-TRT 2003; Ford et al. 2011). The recent increases in natural origin abundance are encouraging. However, hatchery origin spawner proportions have increased dramatically in recent years. Overall, the new information considered does not indicate a change in the biological risk category since the last status review (Ford et al. 2011).

Snake River Sockeye Salmon

This species includes all anadromous and residual sockeye salmon from the Snake River basin, Idaho, and artificially-propagated sockeye salmon from the Redfish Lake captive propagation program. The IC-TRT identified historical sockeye salmon production in at least five Stanley Basin and Sawtooth Valley lakes and in lake systems associated with Snake River tributaries currently cut off to anadromous access (*e.g.,* Wallowa and Payette Lakes), although current returns of SR sockeye salmon are extremely low and limited to Redfish Lake (IC-TRT 2007). Although the captive brood program has been successful in providing substantial numbers of sockeye for use in supplementation efforts, substantial increases in survival rates across life history stages must occur in order to re-establish sustainable natural production (Hebdon et al. 2004; Keefer et al. 2008). Overall, although the status of the Snake River sockeye salmon ESU appears to be improving, the new information considered does not indicate a change in the biological risk category since the last status review (Ford et al. 2011).

The key factor limiting recovery of SR sockeye salmon ESU is survival outside of the Stanley Basin. Portions of the migration corridor in the Salmon River are impeded by water quality and temperature (Idaho Department of Environmental Quality 2011). Increased temperatures may reduce the survival of adult sockeye returning to the Stanley River basin. The natural hydrological regime in the upper main-stem Salmon River basin has been altered by water withdrawals. In most years, sockeye adult returns to Lower Granite Dam suffer catastrophic losses (e.g. greater than 50 percent mortality in one year; Reed et al. 2003) before reaching the Stanley Basin. The cause of these losses is unknown. In the Columbia and Lower Snake River migration corridor, predation rates on juvenile sockeye salmon are unknown. However, terns and cormorants consume 12 percent of all salmon smolts reaching the estuary, and fish consume an estimated 8 percent of migrating juvenile salmon (Ford et al. 2011).

Middle Columbia River Steelhead

This species includes all naturally-spawned steelhead populations below natural and artificial impassable barriers in streams from above the Wind River, Washington, and the Hood River, Oregon (exclusive), upstream to, and including, the Yakima River, Washington (excluding steelhead from the Snake River basin). It also includes the progeny of seven artificial propagation programs. The IC-TRT identified 17 extant populations in this DPS (IC-TRT 2003). There have been improvements in the viability ratings for some of the component populations, but the MCR steelhead DPS is not currently meeting the viability criteria (adopted from the IC- TRT) in the MCR steelhead recovery plan (NMFS 2009). In addition, several of the factors cited by Good et al. (2005) remain as concerns or key uncertainties. Natural origin spawning estimates of populations have been highly variable with respect to meeting minimum abundance thresholds. Straying frequencies into at least the Lower John Day River population are high. Returns to the Yakima River basin and to the Umatilla and Walla Walla Rivers have been higher over the most recent brood cycle, and natural origin returns to the John Day River have decreased. Out-of-basin hatchery stray proportions, although reduced, remain very high in the Deschutes River basin.

Overall, the new information considered does not indicate a change in the biological risk category since the last status review (Ford et al. 2011).

Upper Columbia River Steelhead

This species includes all naturally-spawned steelhead populations below natural and manmade impassable barriers in streams in the Columbia River basin upstream from the Yakima River, Washington, to the U.S.-Canada border. It also includes the progeny of six artificial propagation programs. The IC-TRT identified four independent populations of UCR steelhead, the Wenatchee, Entiat, Methow, and Okanogan rivers (IC-TRT 2003; Ford et al. 2011). All extant populations are considered to be at high risk of extinction (Ford et al. 2011).

The UCR steelhead populations have increased in natural origin abundance in recent years, but productivity levels remain low. The proportions of hatchery origin returns in natural spawning areas remain extremely high across the DPS, especially in the Methow and Okanogan river populations. The modest improvements in natural returns in recent years are probably the result of several years of relatively good natural survival in the ocean and tributary habitats. Overall, the new information considered does not indicate a change in the biological risk category since the last status review (Ford et al. 2011).

Snake River Basin Steelhead

This species includes all naturally-spawned steelhead populations below natural and manmade impassable barriers in streams in the Snake River basin of southeast Washington, northeast Oregon, and Idaho, and from the progeny of six artificial propagation programs. The IC-TRT identified 25 historical populations (IC-TRT 2006; Ford et al. 2011). The IC-TRT has not assessed the viability of this species. The level of natural production in the two populations with full data series and the Asotin Creek index reaches is encouraging, but the status of most populations in this DPS remains highly uncertain. The relative proportion of hatchery fish in natural spawning areas near major hatchery release sites is highly uncertain. There is little evidence for substantial change in ESU viability relative to the previous BRT and IC-TRT reviews. Overall, therefore, the new information considered does not indicate a change in the biological risk category since the last status review (Ford et al. 2011).

2.2.2 Status of Critical Habitats

Willamette and Lower Columbia Recovery Domain

We designated critical habitat in the WLC recovery domain for UWR spring-run Chinook salmon, LCR Chinook salmon, LCR steelhead, UWR steelhead, and CR chum salmon (see Table 1, above). Land management activities have severely degraded stream habitat conditions in the Willamette River Basin. Agriculture and high density urban development have impaired aquatic and riparian habitat, water quality and quantity, and watershed processes. Channelization, dredging, and other activities have reduced rearing habitat by 75 percent. In addition, 37 dams block access to more than 435 miles of spawning habitat. The dams have also altered the temperature regime of the Willamette River and its tributaries, affecting the timing and development of eggs and fry. Agriculture, urbanization, logging, and gravel mining have contributed to increased erosion and sediment loads throughout the basin.

The banks of the Willamette River have more than 96 miles of revetments. Approximately half were constructed by the US Army Corps of Engineers (USACE). Generally, the revetments are in the vicinity of roads or on the outside bank of river bends. The revetments cover 65 percent of the meander bends diminishing the complexity and productivity of aquatic habitats (Gregory et al. 2002c; Gregory et al. 2002b).

Riparian forests have diminished considerably in the lower reaches of the Willamette River (Gregory et al. 2002a). Gregory et al. (2002a) described the changes in riparian vegetation in river reaches from riparian forests to agriculture and other uses. This conversion has reduced shading, wood recruitment, channel complexity, and the quality of salmonid habitats.

On the main-stem of the Columbia River, hydropower projects, including the Federal Columbia River Hydropower System (FCRPS), have significantly degraded salmon and steelhead habitats (Bottom et al. 2005; Fresh et al. 2005; NMFS 2006; LCFRB 2010). The series of dams and reservoirs that make up the FCRPS block an estimated 12 million cubic yards of debris and sediment that would otherwise naturally flow down the Columbia River and replenish shorelines along the Washington and Oregon coasts.

Industrial harbor and port development are also significant influences on the lower Willamette and lower Columbia rivers (Bottom et al. 2005; Fresh et al. 2005; NMFS 2006b; LCFRB 2010). Since 1878, the USACE has dredged 100 miles of river channel within the Columbia River, its estuary, and the Willamette River for navigation channels. Originally 20 feet deep, the USACE now maintains the navigation channel of the lower Columbia River at 43 feet deep and 600 feet wide. The lower Columbia River has five ports on the Washington State side, Kalama, Longview, Skamania County, Woodland, and Vancouver. The ports and associated industrial facilities have contaminated the sediments in the lower Columbia River with high levels of arsenic, polycyclic aromatic hydrocarbons (PAHs), and other pollutants.

The most extensive urban development in the lower Columbia River subbasin is the City of Portland. Outside of this major urban area, the majority of residences and businesses rely on septic systems. Common water quality issues with urban development and residential septic systems include higher water temperatures, lowered dissolved oxygen, increased fecal coliform bacteria, and increased stormwater pollutants (e.g. pesticides and metals).

The Columbia River estuary has lost 62 percent of tidal marsh and 77 percent tidal swamp habitats which are critical to juvenile salmon and steelhead (Sherwood et al. 1990). Edges of marsh areas provide sheltered habitats for juvenile salmon and steelhead where food and shelter from predators is plentiful.

Interior Columbia Recovery Domain

We designated critical habitat in the IC recovery domain for SR spring/summer-run Chinook salmon, SR fall-run Chinook salmon, UCR spring-run Chinook salmon, SR sockeye salmon, MCR steelhead, UCR steelhead, and SRB steelhead (see Table 1, above). Habitat quality in tributary streams in the IC recovery domain varies from excellent in wilderness and roadless areas to poor in areas with heavy agricultural and urban development (Wissmar et al. 1994; NMFS 2009).

Dams, including the FCRPS in the main-stem Columbia River, Bureau of Reclamation tributary projects, and privately owned dams in the Snake and Upper Columbia River basins, block migration for ESA-listed salmon. For example, the construction of Hells Canyon Dam eliminated access to the Burnt, Powder, Weiser, Payette, Malheur, Owyhee, and Boise river basins (Ford et al. 2011), and the Grand Coulee and Chief Joseph dams completely block anadromous fish passage on the upper main-stem Columbia River. Hydroelectric dams modify natural flow regimes, increase water temperature, increase predation rates on juvenile salmon and steelhead, and prevent and delay migration for both adult and juveniles. Physical features of dams such as turbines also kill migrating fish. In-river survival is inversely related to the number of hydropower projects encountered by emigrating juvenile salmon and steelhead.

Similarly, development and operation of extensive irrigation systems and dams for water withdrawal and storage in tributaries have drastically altered hydrological cycles. A series of large dams on the Deschutes River have extirpated salmonid populations by altering flows and blocking access to upstream habitat (IC-TRT 2003). Operation and maintenance of large water reclamation systems such as the Umatilla Basin and Yakima Projects have significantly reduced flows and degraded water quality. Many stream reaches in the IC recovery domain are over-allocated under state water law (i.e. more allocated water rights than the stream flow conditions can support). Water withdrawals increase summer stream temperatures, block fish migration, strand fish, and alter sediment transport (Spence et al. 1996). Reduced tributary stream flow is a major limiting factor for all listed salmon and steelhead species in this area except SR fall-run Chinook salmon and SR sockeye salmon (NMFS 2007a; Ford et al. 2011).

Many stream reaches are listed on the state of Oregon's Clean Water Act section 303(d) list for impaired water temperature. Many areas of rearing and spawning habitat are now unsuitable due to high summer stream temperatures. Removal of riparian vegetation, alteration of natural stream morphology, and withdrawal of water for agricultural and municipal use all contribute to elevated stream temperatures. Contaminants such as insecticides and herbicides from agricultural runoff and heavy metals from mine waste impair water quality in the IC Recovery Domain.

2.3 Environmental Baseline

The "environmental baseline" includes the past and present impacts of all Federal, state, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process (50 CFR 402.02).

The 1980 eruption of Mount St. Helens and the USACE response has significantly altered the conditions in the action area. Sediment from Mount St. Helens continues to deposit in the Cowlitz and Columbia rivers. The USACE dredges these rivers and deposits the spoils throughout the project area in upland, riparian, and wetland environments. The USACE dredged the lower Cowlitz River (RMs 0 to 2.5) most recently in 2007-2008 (USACE 2012). The USACE (1984) identified several disposal sites in the action area, including the Collins Estate and Cottonwood Island. The Collins Estate appears is south of SR 432, west of I-5, and east of the Cowlitz and Columbia rivers. By 1984, the USACE had filled 220 acres of the Collins Estate with sediment dredged from the lower 1.5 miles of the Cowlitz River.

The Spokane, Portland and Seattle Railway, a joint venture by the Great Northern Railway and the Northern Pacific Railway, built the railroad in the action area in 1906. Today, an average of 60 trains travel through the action area daily, including 10 Amtrak passenger trains and approximately 50 freight trains.

Water bodies within the action area include the Columbia, Cowlitz, and Coweeman rivers, Owl Creek, and off-channel habitat connected to the Coweeman River and Owl Creek. The Cowlitz River flows north to south along the west side of the project area through the action area before joining the Columbia River at approximately RM 68. The Coweeman River joins the Cowlitz River at approximately RM 1.2. Within the action area, stormwater from Interstate (I)-5, State Route (SR) 432, and Talley Way and coal dust from freight trains degrades the water quality in these water bodies.

Ecology’s 2012 Water Quality 303d List identified the Cowlitz River as being impaired for temperature (Ecology 2012). The Cowlitz River is designated critical habitat for LCR Chinook salmon, LCR steelhead, Columbia River (CR) chum salmon, and is proposed critical habitat for LCR coho salmon. The Cowlitz River provides spawning, rearing, and migratory habitat for LCR Chinook salmon, LCR steelhead, LCR coho salmon, and CR chum salmon (primary constituent elements [PCEs] 1, 2, and 3 of salmonid critical habitat).

The Coweeman River confluences with the Cowlitz River at RM 1.2. The existing BNSF bridge and the Talley Way bridge span the Coweeman River in the action area. Wetlands tributary to the Coweeman River which run parallel to the BNSF tracks provide off-channel habitat for listed fish species. These wetlands cover approximately 10.5 acres. The BNSF access road from Talley Way to the Longview Junction Yard crosses this habitat. The water is conveyed by a submerged 24-inch culvert and a perched 66-inch culvert at this crossing.

Ecology determined the Coweeman River is impaired for temperature (Ecology 2012).
The tidal influence extends into the lower Coweeman River. LCR Chinook salmon, LCR coho salmon, LCR steelhead, Columbia River and chum salmon, use the Coweeman River within the action area. The Coweeman River provides spawning, rearing, and migratory habitat for LCR Chinook salmon, LCR steelhead, LCR coho salmon, and CR chum salmon (primary constituent elements [PCEs] 1, 2, and 3 of salmonid critical habitat) and spawning, incubation. Because of its proximity to the Columbia River, it also provides habitat for upriver populations of listed salmonids.

Upstream of the project site, Owl Creek flows through a developed residential area, under Old Pacific Highway South, I-5 and a utility access road, and into the project footprint. As Owl Creek flows through the BNSF right-of way, it connects, via a 36-inch concrete culvert below an access road to the Owl Creek Sand Company, to off-channel habitat which runs parallel to the existing tracks. Owl Creek flows south between I-5 and the tracks for approximately 0.5 mile before crossing under the tracks and joining with the Columbia River. There are approximately 311 acres of wetlands associated with Owl Creek in the vicinity of the project.

Owl Creek is critical habitat for LCR Chinook salmon, LCR steelhead, and Columbia River chum salmon and is proposed critical habitat for LCR coho salmon. Owl Creek provides spawning, rearing, and migratory habitat for LCR Chinook salmon, LCR steelhead, LCR coho salmon, and CR chum salmon (primary constituent elements [PCEs] 1, 2, and 3 of salmonid critical habitat). Because of its proximity to the Columbia river, it also provides habitat for upriver populations of listed salmonids.

Of the total of approximately 311 acres of off-channel wetland habitat within the vicinity of Owl Creek, approximately 23 are within the action area. These off-channel wetlands provide habitat for juvenile salmon and steelhead. Off-channel habitat and floodplain areas provide productive early rearing habitat, flood refugia, overwintering habitat, and cover from predators (NMFS 2013). The culverts at the BNSF driveway and the Owl Creek Sand Company road restrict salmonid access to this habitat, and the upland berm blocks the hydraulic connection between the Coweeman River and Owl Creek habitats.

Chinook Salmon

LCR Chinook salmon use the Columbia, Cowlitz, and Coweeman rivers and Owl Creek for spawning, rearing, and foraging. Upriver populations of Chinook salmon use these water bodies for rearing, foraging, and refugia. Adult spring Chinook salmon migrate into the Coweeman River from March to June. Adult summer Chinook salmon migrate between June and July, and adult fall Chinook salmon migrate from mid-August to mid-September. Chinook salmon spawn in the main-stem of the Coweeman River between the Jeep Club Bridge (RM 13). and Mulholland Creek at RM 18.4. No suitable spawning habitat is within the action area. Juvenile spring and summer Chinook salmon outmigrate between December and April. Fall Chinook salmon juveniles out-migrate in late spring and summer.

Coho salmon

LCR coho salmon use Cowlitz River, Coweeman River, and Owl Creek for spawning, rearing, and foraging. Upriver populations of coho salmon use these water bodies for rearing, foraging, and refugia. Coho salmon migrate into the Coweeman River from September to December and out-migrate from February to June. They spawn in November and December, although no suitable spawning habitat is within the action area. Coho salmon migrate in and out of Owl Creek during the same months.

Chum salmon

CR chum salmon use both the Coweeman River and Owl Creek for spawning, rearing, and foraging habitat. Chum salmon migrate into the Coweeman River between October 15 through December 3, and juveniles out-migrate from February to June. Chum salmon migrate in and out of Owl Creek during the same months. No suitable spawning habitat is within the action area.

Steelhead

LCR steelhead salmon use Cowlitz River, Coweeman River, and Owl Creek for spawning, rearing, and foraging. Upriver populations of steelhead use these water bodies for rearing, foraging, and refugia. Steelhead migrate into the Coweeman River from December to April and out-migrate in April and May. No suitable spawning habitat is within the action area. Steelhead migrate in and out of Owl Creek during the same months.

2.4 Effects of the Action

Under the ESA, "effects of the action" means the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline (50 CFR 402.02). Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur.

2.4.1 Suspended Sediment

Turbidity is a measurement of water clarity, and is used by NMFS as a surrogate for the concentration of suspended sediments in the water column. A nephelometric turbidity unit (NTU) is a measurement of turbidity.

Four project activities will suspend sediment and increase turbidity above background level. These activities are 1) the placement of rip- rap on the existing Coweeman River bridge and the installation and removal of the coffer dams for the new Coweeman River Bridge; 2) the isolation and subsequent reconnection of the in-water work areas in the Coweeman River off-channel habitat; 3) the isolation and reconnection of the in-water work areas between July 16 to October 14 for the BNSF driveway culvert replacement, the Coweeman off-channel habitat restoration, the fill for the new track, and the upland berm removal; and 4) the isolation and reconnection of the upland berm removal, the Owl Creek Sand Company road culvert replacement, and the track widening in-water work areas within Owl Creek and its off-channel habitat. The duration of in-water work for each of these activities is constrained to reduce the exposure of fish to increased turbidity. Furthermore, based on standard modeling described in the BA, these activities will generate turbid water within 150 feet or less of the source of suspended sediment. Turbid water should dissipate a short time after occurrence (a few hours to a few days at most). The proximity of three of these activities to the confluence of the Coweeman and Cowlitz Rivers ensures that these effects will be fleeting and the spatial extent of effects will be very small.

Salmonids typically avoid areas of higher suspended sediment which can mean that they displace themselves from their preferred habitats in order to seek areas with less suspended sediment. Fish unable to avoid suspended sediment can experience adverse effects. The severity of effect of suspended sediment increases as a function of the sediment concentration and exposure time (Newcombe and Jensen 1996; Bash et al. 2001). Suspended sediments can cause sublethal effects such as elevated blood sugars and cough rates (Servizi and Martens 1991), physiological stress, and reduced growth rates. Elevated turbidity levels can reduce the ability of salmonids to detect prey, cause gill damage (Sigler et al. 1984; Lloyd et al. 1987; Bash et al. 2001), and cause juvenile steelhead to leave rearing areas (Sigler et al. 1984). Additionally, short-term pulses of suspended sediment influence territorial, gill-flaring, and feeding behavior of salmon under laboratory conditions (Berg and Northcote 1985). Adult and larger juvenile salmonids appear to be little affected by the high concentrations of suspended sediments that occur during storm and snowmelt runoff episodes (Bjornn and Reiser 1991). However, research indicates that chronic exposure can cause physiological stress responses that can increase maintenance energy and reduce feeding and growth (Lloyd et al. 1987; Servizi and Martens 1991).

Based on run time and life history information, some adult LCR Chinook and CR chum salmon, and some juveniles from each of the Columbia Basin listed ESUs and DPSs could be present in the action area during these brief pulses of sediment, for each of the four activities. Some fish present in the action area will be exposed to elevated suspended sediment from each of these actions. While we cannot estimate the number of exposed individuals, pulses of elevated suspended sediment will be so spatially limited and episodic that water clarity will return quickly to background levels, limiting the overall extent and intensity of exposure. At most, some exposed individuals will experience sublethal effects described above. Because of these limitations the number of individuals will be too small to have any influence on population abundance or productivity.

The aquatic habitats affected by suspended sediments are designated critical habitat including freshwater rearing and migration corridors (PCEs 2 and 3) for LCR Chinook, LCR coho (proposed), and CR chum salmon and LCR steelhead. The elevated suspended sediment will temporarily degrade 10 acres of critical habitat. This area includes the Coweeman River, Owl Creek, and the off-channel wetland habitat. Shortly after completion of each element of in-water work, suspended sediment will return to pre-project levels. Therefore, elevated suspended sediment will not cause a long-term reduction in the conservation value of critical habitat.

2.4.2 Pile Driving

For this project, WSDOT will drive steel sheet piles for the new Coweeman River Bridge abutments using vibratory and impact hammers. This work will take place between mid-July and mid-August. WSDOT will install the coffer dams, remove fish, and dewater the work areas prior to driving the piles.

Impact pile -driving can cause levels of underwater sound sufficient to injure or kill fish and alter their behavior (Yelverton et al. 1975; Hasting 1995; Turnpenny et al. 1994; Turnpenny and Nedwell 1994; Popper 2003; Hastings and Popper 2005). Death from barotrauma can be instantaneous or delayed up to several days after exposure. Even when not enough to kill fish, high sound levels can cause sublethal injuries. Fish suffering damage to hearing organs may suffer equilibrium problems, and may have a reduced ability to detect predators and prey (Turnpenny et al. 1994; Hastings et al. 1996). Hastings (2007) determined that a cumulative Sound Exposure Level (cSEL) as low as 183 dB (re: 1 µPa2-sec) was sufficient to injure the non-auditory tissues of juvenile spot and pinfish with an estimated mass of 0.5 grams.

Adverse effects on survival and fitness can occur even in the absence of overt injury. Exposure to elevated noise levels can cause a temporary shift in hearing sensitivity (referred to as a temporary threshold shift), decreasing sensory capability for periods lasting from hours to days (Turnpenny et al. 1994; Hastings et al. 1996). Popper et al. (2005) found temporary threshold shifts in hearing sensitivity after exposure to cSELs as low as 184 dB. Temporary threshold shifts reduce the survival, growth, and reproduction of the affected fish by increasing the risk of predation and reducing foraging or spawning success.

Cumulative SEL is a measure of the sound energy integrated across all of the pile strikes. The Equal Energy Hypothesis, described by NMFS (2007), is used as a basis for calculating cSEL. The number of pile strikes is estimated per continuous work period. This approach defines a work period as all the pile driving between 12-hour breaks. NMFS uses the practical spreading model to calculate transmission loss.

NMFS, USFWS, and WSDOT agreed to interim criteria to minimize potential impacts to fishes from pile- driving noise propagation (FHWG 2008). The interim criteria identify the following thresholds for the onset of physical injury using peak sound pressure level (SPL) and cSEL:

- Peak SPL: levels at or above 206 dB from any hammer strike; and
- cSEL: levels at or above 187 dB for fish sizes of two grams or greater, or 183 dB for fish smaller than two grams.

The primary mechanism for noise transmission during impact pile driving is from the submerged portion of the pile directly into the water column. For this project, WSDOT has eliminated the possibility of this by driving all of the piles within dewatered work areas. A second mechanism for noise transmission, sound flanking, is from the tip of the pile into the substrate and from the substrate into the water column. Several studies of impact pile- driving in dewatered or upland work areas have shown in-water noise levels exceeding the cSEL injury thresholds but below the peak SPL noise levels (Laughlin 2005; 2006; Miner 2008). Impact driving steel sheet piles produces sound levels equivalent to impact driving 24-inch round steel piles (Reyff and Rodkin 2012). While we do not have data on impact driving of sheet piles in dewatered areas, we do have data on impact driving 24-inch steel piles in a dewatered river bed (Laughlin 2005). Using the monitoring results from Laughlin (2005), we estimate the maximum sound levels for a single strike to steel sheet piles will be 199 dB_{peak}, 171 dB_{rms}, and 165 dB_{sel}. Using these values and the strike count data from Reyff and Rodkin (2012) for sheet piles (660 strikes per pile; eight sheet piles per day), we calculated the distance and the area that will be subjected to cSELs greater than or equal to 183dB (fish less than two grams) and 187dB (fish two grams and over). Impact pile driving of the steel sheet piles within the dewatered coffer dams piles will subject the area within 328 feet to cSELs greater than or equal to 183dB.

Adult LCR Chinook and CR chum salmon are likely to be present during mid-July to mid-August when impact pile-driving will be taking place in the action area. Impact pile- driving will occur episodically during July and August. Juveniles from all of the Columbia Basin listed salmon and steelhead populations, with the exception of CR chum salmon, are also likely to be present. Given the relatively low peak SPLs, the sound flanking from this project is unlikely to cause fish mortality and permanent injury. However, we expect any fish which are present within 328 feet to experience sublethal effects such as temporary threshold shifts in hearing sensitivity. We cannot estimate the number of individuals that will experience adverse effects from underwater noise. Furthermore, not all exposed individuals will experience adverse effects. We expect the number to be relatively small since effects will be limited to within 328 feet of the pile.

2.4.3 Fish Handling

WSDOT will remove fish from approximately seven acres of in-water work areas for the construction of the new Coweeman River Bridge, the culvert replacements, and the track widening. Handling stresses fish, increasing plasma levels of cortisol and glucose (Hemre and Krogdahl 1996; Frisch and Anderson 2000). Electrofishing can kill fish or cause physical injuries including internal hemorrhaging, spinal misalignment, or fractured vertebrae. Although potentially harmful to fish, electrofishing is intended to locate fish in the isolated work area for removal to avoid more certain injury. Ninety-five percent of fish captured and handled survive with no long-term effects, and up to five percent are expected to be injured or killed, including delayed mortality because of injury (NMFS 2003).

Numerous studies have shown juvenile salmonid densities in off-channel habitats between 24 and 82 fish per 100 square meters (Foy and Decker 1997; Zaldokas et al. 1997; Bustard 1997). We estimate densities will be 50 fish per 100 square meters or 2,000 fish per acre. Therefore, WSDOT will remove a total of 14,000 fish from the in-water work areas. We expect an injury rate of 0.05 (McMichael et al. 1998). Therefore, approximately 700 of these fish are likely to be injured or killed. The majority of these fish will be juvenile fish from the LCR Chinook salmon, LCR coho salmon, and LCR steelhead populations. We expect juveniles from up-river populations to be handled in far fewer numbers. Adult salmon and steelhead are extremely unlikely to be present inside the coffer dams.

We estimate a smolt- to- adult survival ratio of 0.02 (Smoker et al. 2004; Scheuerell and Williams 2005). This is very conservative because many juveniles are likely to be captured as fry or parr, life history stages that have a survival rate to adulthood that is exponentially smaller than for smolts. Using this conversion rate, 14 adult equivalents will be injured or killed by the fish handling.

2.4.4 Permanent Habitat Loss

Widening the track base to accommodate the new third track and the rip rap placement at the new birdge piers will result in the loss of 5.70 acres of off-channel habitat, 2.78 acres in the Coweeman River system and 2.93 acres in the Owl Creek system. Off-channel habitats are productive rearing habitats for juvenile salmonids. These habitats provide abundant prey, refuge from high flows and turbidity in mainstems, and protection from predators (Sommer et al. 2001; Crouse et al. 1981; Erman 1988). These benefits lead to increased juvenile growth rates and reduced mortality (Limm and Marchetti 2009). The loss of 5.70 acres of off-channel habitat will reduce the productivity of these habitats. The salmon and steelhead populations which spawn in the Coweeman River will have the greatest exposure to this loss of productivity because the 2.78 acres is a significant proportion of the remaining off-channel habitat in the Coweeman River. The impact to Owl Creek spawners will be less severe due to the abundance of off-channel habitat relative to the size of the creek and the number of salmon and steelhead which use it. The 5.70 acre loss is also a small (relative to the total amount of habitat available) but measurable loss of off-channel rearing habitat for Cowlitz River spawners and upriver salmon ESUs and steelhead DPSs.

The 5.70 acre-loss will degrade PCE 2 of LCR Chinook, LCR coho (proposed), and CR chum salmon and LCR steelhead critical habitat. The lack of off-channel habitat is a limiting factor for the recovery of these populations. This loss will reduce the ability of critical habitat to provide for the recovery of these populations.

2.4.6 Mitigation

In order to compensate for the loss of off-channel habitat, the FRA and WSDOT are proposing a suite of mitigation activities to address habitat deficiencies identified by NMFS, WDFW, and the Cowlitz Indian Tribe as well as the recommendations from the Lower Columbia River Salmon and Steelhead ESA Recovery Plan (NMFS 2013). The deficiencies include the following:

1. degraded off-channel habitat (1.29 acre) between the Coweeman River and the BNSF driveway (identified as “wetland H” in the BA);
2. restricted access to the off-channel habitat (9.11 acres) between the BNSF driveway and the upland berm caused by the driveway culverts;
3. the upland berm which blocks the connection between the Coweeman and Owl Creek off-channel habitat; and
4. restricted access to the Owl Creek off-channel habitat caused by the sand company’s road culvert.

To improve “wetland H,” WSDOT will lower the channel elevation and excavate fingers off of the channel between the Coweeman River and the BNSF driveway. This will improve the connection to the Coweeman River and increase the quality and quantity of habitat in this area. As described above, WSDOT will replace the crossing at the BNSF driveway with a fish-passable structure. This will substantially improve access to the remaining 6.35 acres of off-channel habitat (8.85 acres existing minus 2.76 acres of impacts).

The upland berm removal will create 1.5 acre of off-channel habitat, restore the hydrologic connection between the Coweeman River and Owl Creek, and allow for fish passage between the two systems. The replacement of the Owl Creek sand company road culvert will provide unrestricted access to approximately 3.5 acres of off-channel habitat from Owl Creek.

In addition to these improvements, WSDOT will also acquire and protect in perpetuity 57 acres of property in the project vicnity, of which at least 30 acres will be off-channel habitat accessible to juvenile salmon and steelhead.

These habitat improvements will increase the quality and quantity of off-channel habitat for both ESA-listed fish species in the Coweeman River. The salmon and steelhead juveniles currently have restricted access to 10.5 acres of off-channel habitat in the action area. After project construction, they will have access to over 55 acres of off-channel habitat. This increase will enhance growth rates and reduce mortality for juveniles in these populations. The hydrologic connection will also improve the water quality and productivity of this habitat.

Currently, Owl Creek fish have unrestricted access to 45 acres of off-channel habitat. Given the small size of the Creek, off-channel habitat is not likely to be a limiting factor. However, the increase to 55 acres of available off-channel habitat may result in a small increase in growth and survivorship of juvenile salmon and steelhead in Owl Creek.

The Cowlitz River is just downstream from where the off-channel habitats connect to the Coweeman River. The Cowlitz River fish rearing in the Coweeman River will experience the same gains in the quality and quantity of off-channel habitat, but upriver populations will be able to access the improved off-channel habitat either directly from the Columbia River into Owl Creek or by traveling up the Cowlitz River to the Coweeman River.

2.5 Cumulative Effects

“Cumulative effects” are those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Future non-Federal actions will affect water quality in the action area. Stormwater runoff from I-5, SR 432, and Talley Way flow into water bodies within the action area. Presently, less than six acres of this stormwater is treated. Future projects in the action area include Segale Properties retail development site, just north of the linear Coweeman River off-channel habitat (Figure 2).

This property has 82 developable acres. The City of Kelso strongly supports this development, and it is reasonably certain to occur. Untreated stormwater from this development would reduce the water quality in the Coweeman River off-channel habitat.

Exposure to stormwater pollutants causes reduced growth, impaired migratory ability, and impaired reproduction in salmonids and other fishes. The extent and severity of these effects varies depending on the extent, timing, and duration of the exposure, ambient water quality conditions, the species and life history stage exposed, pollutant toxicity, and synergistic effects with other contaminants (EPA 1980). Existing and future stormwater runoff is likely to cause reductions in the productivity of aquatic habitats in the action area.

Figure 2. Segale Properties Retail Development Site
*not to scale

http://www.cbre.us/o/seattle/properties/kelsoland/Pages/kelsoland.aspx

2.6 Integration and Synthesis

The Integration and Synthesis section is the final step in our assessment of the risk posed to species and critical habitat as a result of implementing the proposed action. In this section, we add the effects of the action (Section 2.4) to the environmental baseline (Section 2.3) and the cumulative effects (Section 2.5), taking into account the status of the species and critical habitat (section 2.2), to formulate the agency's biological opinion as to whether the proposed action is likely to: (1) reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing its numbers, reproduction, or distribution; or (2) reduce the value of designated or proposed critical habitat for the conservation of the species.

Individuals from all of the salmon ESUs and steelhead DPSs in Table 1 will be exposed to the stressors from this project. However, individuals from the Cowlitz and Coweeman river populations of LCR Chinook salmon, CR chum salmon, LCR coho salmon, and LCR steelhead will experience most of the adverse and beneficial effects of this project. A small number of individuals from these ESUs and DPS also use the Owl Creek system which will be significantly modified by this project. The upriver ESUs and DPSs use of the action area is limited.

The effects from elevated suspended sediment and impact pile- driving on individual ESA-listed salmon and steelhead will be minor and temporary, due to the small size of the affected areas and the limited duration and sublethal nature of these effects. We do not expect any individual to be permanently injured. The sublethal effects to a very small proportion of these populations use the action area will not influence spatial structure, productivity, abundance or diversity in a way that diminishes viability of the affected populations of ESA-listed salmon and steelhead.

Fish handling will injure or kill approximately 700 juvenile fish (14 adult equivalents).

The project will also have the following effects to off-channel habitat:

1. permanently remove up to six acres of existing off-channel habitat and habitat below the OHWM of the coweeman River;
2. create 1.5 acres of new off-channel habitat;
3. improve the accessibility and quality of 55 existing acres; and
4. acquire and protect into perpetuity at least 30 acres.

2.6.1 Lower Columbia River Chinook Salmon, Columbia River Chum Salmon, Lower Columbia River Coho Salmon, and Lower Columba River Steelhead

The abundance and productivity are currently "low" to "very low" for most populations in these ESUs and DPSs (Ford et al. 2011). The Coweeman River alone has between 3,200 and 5,300 ESA-listed salmon and steelhead spawners per year. The 14 adult equivalents that will be injured or killed will not have a long-term effect on abundance and productivity. The net effects to off-channel habitat will be a long-term improvement to quantity and quality of off-channel habitat available to ESA-listed salmon and steelhead. While up to six acres of habitat will be removed as a result of the action, the action will create, open, improve or protect over 57 acres of off channel habitat. The Lower Columbia River Salmon and Steelhead ESA Recovery Plan identifies the restoration, connectivity, and protection of off-channel habitat as key strategies for recovery of ESA-listed fish species (NMFS 2013).

Overall, the effects of the proposed action; when added to the environmental baseline, status, and cumulative effects; are not reasonably likely to appreciably reduce the abundance, productivity, spatial structure, or genetic diversity of the populations of LCR Chinook salmon, CR chum salmon, LCR coho salmon, and LCR steelhead.

<u>2.6.2 Upper Columbia River spring-run Chinook Salmon, Snake River fall-run Chinook Salmon, Snake River spring/summer-run Chinook Salmon, Upper Willamette River Chinook Salmon, Snake River Sockeye Salmon, Snake River basin Steelhead, Upper Columba River Steelhead, Middle Columba River Steelhead, and Upper Willamette River Steelhead</u>

The status of these species varies widely from moderate risk to critically endangered. However, the individuals from these populations will have limited presence within the action area. While a few individuals are likely to be adversely affected by the proposed action, we do not expect this project to measurably affect the abundance, productivity, spatial structure, or genetic diversity of these populations.

<u>2.6.3 Critical Habitat for Lower Columbia River Chinook Salmon, Columbia River Chum Salmon, Lower Columbia River Coho Salmon, and Lower Columba River Steelhead</u>

The elevated suspended sediments from the project actions will temporarily degrade PCEs 2 and 3(water quality) in the action area. Elevated suspended sediments will not impair the function of these PCEs in the long-term. As described above, the off-channel habitat impacts will substantially increase the function of PCE 2 in the long-term and protect over 30 acres from future degradation. Therefore, the proposed action will not significantly reduce the conservation value of critical habitat in the action area or at the ESU or DPS scale.

2.7 Conclusion

After reviewing and analyzing the current status of the listed species and critical habitat, the environmental baseline within the action area, the effects of the proposed action, the effects of interrelated and interdependent activities, and the cumulative effects, we conclude that our biological opinion for the proposed action is not likely to jeopardize the continued existence of the species listed in Table 1 nor will the proposed action destroy or adversely modify their designated critical habitat.

You may ask NMFS to adopt the conference opinion as a biological opinion when critical habitat for LCR coho salmon is designated. The request must be in writing. If we review the proposed action and find there have been no significant changes to the action that would alter the contents of the opinion and no significant new information has been developed (including during the rulemaking process), we may adopt the conference opinion as the biological opinion on the proposed action and no further consultation will be necessary.

2.8 Incidental Take Statement

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. The ESA defines "Take" as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Regulation define "harm" to include significant habitat modification or degradation that actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering (50 CFR 222.102). Regulation defines "Incidental take" as takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant (50 CFR 402.02). Section 7(b)(4) and section 7(o)(2) provide that taking that is incidental to an otherwise lawful agency action is not considered to be prohibited taking under the ESA if that action is performed in compliance with the terms and conditions of this incidental take statement. In circumstances where we cannot estimate the number of individual fish that would be injured or killed by the effects of the proposed action, we assess the extent of take as an amount of modified habitat and exempts take based only on that extent. This extent is readily observable and therefore suffices to trigger reinitiation of consultation, if exceeded and necessary (see H.R. Rep. No 97-567, 97th Cong., 2d Sess. 27 (1982).

2.8.1 Amount or Extent of Take

Effects of the action will coincide with the presence of ESA-listed ESUs and DPSs of salmon and steelhead such that the incidental take is reasonably certain to occur. With the exception of fish handling, the take described below cannot be accurately quantified as a number of fish because NMFS cannot predict, using the best available science, the number of individuals of listed fish species that will be exposed to these stressors. Furthermore, even if NMFS could estimate that number, the manner in which each exposed individual responds to that exposure cannot be predicted.

In circumstances where NMFS cannot estimate the amount of individual fish that would be injured or killed by the effects of the proposed action, NMFS assesses the extent of take as an amount of modified habitat and exempts take based only on that extent. This extent is readily observable and therefore suffices to trigger reinitiation of consultation, if exceeded and necessary (see H.R. Rep. No 97-567, 97th Cong., 2d Sess. 27 (1982). The extent of injurious levels of underwater noise will be determined by monitoring the noise levels of impact pile driving at approximately 10 meters (or a similar distance) from pile driving. Take will be exceeded if the monitored sound levels or strike count cause cSELs greater than 183 dB to extend further than 328 feet from the sheet piles. The extent of take due to exposure to elevated suspended sediment will be exceeded if for turbidity is visible above background levels more than 150 feet from the in-water activity. If more than six acres of habitat are filled as a result of this project, the extent of take will be exceeded.

In this biological opinion, we determined that incidental take to listed salmon and steelhead will occur from the following actions:

1. visible turbidity up to but not exceeding 150 feet downstream of in-water work;

2. the exposure of areas of the Coweeman and Cowlitz rivers within 328 feet of impact pile driving to in-water noise from impact pile-driving above the injury thresholds;

3. the handling of 14,000 individual listed fish per year of which 700 will be injured or killed; and

4. fill of up to six acres of habitat.

2.8.2 Effect of the Take

In this biological opinion, we determined that the amount or extent of anticipated take, coupled with other effects of the proposed action, is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

2.8.3 Reasonable and Prudent Measures

"Reasonable and prudent measures" are nondiscretionary measures that are necessary or appropriate to minimize the impact of the amount or extent of incidental take (50 CFR 402.02).

The FRA and WSDOT shall:

1. minimize incidental take from elevated suspended sediments;

2. minimize incidental take from impact pile driving;

3. minimize incidental take from fish handling; and

4. minimize incidental take from the habitat loss.

2.8.4 Terms and Conditions

The terms and conditions described below are non-discretionary, and the FRA and WSDOT must comply with them in order to implement the reasonable and prudent measures (50 CFR 402.14). The FRA and WSDOT have a continuing duty to monitor the impacts of incidental take and must report the progress of the action and its impact on the species as specified in this incidental take statement (50 CFR 402.14). If the entity to whom a term and condition is directed does not comply with the following terms and conditions, protective coverage for the proposed action would likely lapse.

The following term and condition implements reasonable and prudent measure 1:

Monitor turbidity during in-water work as specified in the Section 401 of the Clean Water Act certification and report the results of the monitoring to NMFS.

The following term and conditions implement reasonable and prudent measure 2:

a) Use a vibratory hammer to drive the sheet piles to the maximum extent practicable;

b) Monitor the underwater noise levels from at least one sheet pile;

c) Submit an Underwater Noise Monitoring Plan (WSDOT 2013) at least 30 days prior to the start of in-water work; and

d) Submit the noise monitoring results to NMFS within six months of the completion of the in-water work.

The following term and condition implements reasonable and prudent measure 3:

a) Follow WSDOT Fish Exclusion Protocols and Standards (WSDOT 2012) or most the recent NMFS-approved guidance;

b) Submit to NMFS a fish removal plan for the off-channel habitat and the cofferdams at least 14 days prior to the start of in-water work. The fish removal plan will follow NMFS-approved WSDOT Fish Exclusion Protocols and Standards as closely as possible; and

c) Report the number and species of all listed fish handled during in-water work to NMFS within 30 days of work area isolation.

The following term and condition implements reasonable and prudent measure 4:

a) Submit to NMFS the following (reports prepared for the USACE which contain this information will meet these requirements):
    1) Documentation showing the actual acreage of accessible off-channel habitat within the 57-acre wetland property acquisition;
    2) documentation of the property acquisition and transfer to the Cowlitz Tribe;
    3) the final plans for the off-channel restoration (identified as "wetland H" in the BA), the upland berm removal, and the new culverts; and
    4) a post-construction report on all restoration activities, including post-construction site photos.

b) Design and construct the new BNSF driveway and Owl Creek Sand Company road culverts to meet NMFS and the WDFW the water crossing design standards (NMFS 2011; Barnard et al. 2013).

2.9 Reinitiation of Consultation

This concludes formal consultation for the Kelso to Martin's Bluff Task 6 project. As 50 CFR 402.16 states, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained or is authorized by law and if: (1) the amount or extent of incidental taking specified in the incidental take statement is exceeded, (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion, (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action.

2.10 “Not Likely to Adversely Affect” Determinations

Southern Distinct Population Segment Eulachon

No life history stage of eulachon will be present in the Coweeman River during the in-water work window, July 1 to October 31. Eulachon do not use the Owl Creek system. Therefore, they will not be exposed to elevated suspended sediments, underwater noise, or fish handling. Any effects to the species will be discountable.

The Cowlitz River is designated critical habitat for eulachon. The only effects to the Cowlitz River critical habitat will be from underwater noise, when eulachon are not present. Therefore, the effects to eulachon critical habitat will be insignificant.

3. MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT ESSENTIAL FISH HABITAT CONSULTATION

Section 305(b) of the MSA directs Federal agencies to consult with us on all actions or proposed actions that may adversely affect EFH. The MSA (section 3) defines EFH as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” Adverse effect means any impact that reduces quality or quantity of EFH, and may include direct or indirect physical, chemical, or biological alteration of the waters or substrate and loss of (or injury to) benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Ad

Iverse effects on EFH may result from actions occurring within EFH or outside of it and may include site-specific or EFH-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810). Section 305(b) also requires us to recommend measures that can be taken by the action agency to conserve EFH. This analysis is based, in part, on the EFH assessment provided by the FRA and descriptions of EFH for Pacific coast salmon (PFMC 1999) contained in the fishery management plans developed by the Pacific Fishery Management Council and approved by the Secretary of Commerce.

3.1 Essential Fish Habitat Affected by the Project

As described fully in the preceding sections, the following effects to Pacific coast salmon EFH for both Chinook salmon and coho salmon will result from the proposed action:

1. the temporary degradation of 10 acres aquatic habitat from elevated suspended sediment;

2. the permanent loss of six acres of off-channel habitat; and

3. improved access to and quality of 55 acres of off-channel habitat.

3.2 Essential Fish Habitat Conservation Recommendations

The following conservation recommendation addresses impacts from elevated suspended sediment:

Monitor turbidity during in-water work and report the results of the monitoring to NMFS.

The following conservation recommendations address the off-channel habitat impacts:

a) Submit to NMFS the following :
    1) the actual acreage of accessible off-channel habitat within the 57-acre wetland property acquisition;
    2) documentation of the property acquisition and transfer;
    3) the final plans for the off-channel restoration (identified as "wetland H" in the BA), the upland berm removal, and the new culverts; and
    4) a post-construction report on all restoration activities, including post-construction site photos.

b) Design and construct the new BNSF driveway and Owl Creek Sand Company road culverts to meet NMFS and WDFW water crossing design standards (NMFS 2011; Barnard et al. 2013).

Fully implementing these EFH conservation recommendations would protect, by avoiding or minimizing the adverse effects described in section 3.1, above, approximately 65 acres of designated EFH for Pacific coast salmon.

3.3 Statutory Response Requirement

As required by section 305(b)(4)(B) of the MSA, the FTA must provide a detailed response in writing to us within 30 days after receiving an EFH Conservation Recommendation. Such a response must be provided at least 10 days prior to final approval of the action if the response is inconsistent with any of our EFH Conservation Recommendations unless we and the Federal agency have agreed to use alternative time frames for the Federal agency response. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with the Conservation Recommendations, the Federal agency must explain its reasons for not following the recommendations, including the scientific justification for any disagreements with us over the anticipated effects of the action and the measures needed to avoid, minimize, mitigate, or offset such effects (50 CFR 600.920(k)(1)).

In response to increased oversight of the overall EFH program effectiveness by the Office of Management and Budget, we established a quarterly reporting requirement to determine how many conservation recommendations are provided as part of each EFH consultation and how many are adopted by the action agency. Therefore, we ask that in your statutory reply to the EFH portion of this consultation, you clearly identify the number of conservation recommendations accepted.

3.5 Supplemental Consultation

The FRA must reinitiate EFH consultation with NMFS if the proposed action is substantially revised in a way that may adversely affect EFH, or if new information becomes available that affects the basis for NMFS' EFH Conservation Recommendations (50 CFR 600.920(l)).

4. DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

The Data Quality Act (DQA) specifies three components contributing to the quality of a document. They are utility, integrity, and objectivity. This section of the opinion addresses these DQA components, documents compliance with the DQA, and certifies that this opinion has undergone pre-dissemination review.

4.1 Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended users of this opinion are the FRA. Other interested users include [*e.g., permit or license applicants, citizens of affected areas, others interested in the conservation of the affected ESUs/DPS*]. We provided individual copies of this opinion to the FRA. We will post this opinion on the Public Consultation Tracking System web site (https://pcts.nmfs.noaa.gov/pcts-web/homepage.pcts). The format and naming adheres to conventional standards for style.

4.2 Integrity

This consultation was completed on a computer system managed by NMFS in accordance with relevant information technology security policies and standards set out in Appendix III, 'Security of Automated Information Resources,' Office of Management and Budget Circular A-130; the Computer Security Act; and the Government Information Security Reform Act.

4.3 Objectivity

Information Product Category: Natural Resource Plan

Standards: This consultation and supporting documents are clear, concise, complete, and unbiased; and were developed using commonly accepted scientific research methods. They adhere to published standards including NMFS ESA Consultation Handbook, ESA regulations, 50 CFR 402.01 et seq., and the MSA implementing regulations regarding EFH, 50 CFR 600.

Best Available Information: This consultation and supporting documents use the best available information, as referenced in the References section. The analyses in this opinion and EFH consultation contain more background on information sources and quality.

Referencing: All supporting materials, information, data and analyses are properly referenced, consistent with standard scientific referencing style.

Review Process: This consultation was drafted by NMFS staff with training in ESA and MSA implementation, and reviewed in accordance with West Coast Region ESA quality control and assurance processes.

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United States Department of the Interior

FISH AND WILDLIFE SERVICE

Washington Fish and Wildlife Office
510 Desmond Dr. SE, Suite 102
Lacey, Washington 98503

OCT 30 2014

In Reply Refer To:
01EWFW00-2014-F-0383
01EWFW00-2014-F-0399
Xref: 13410-2007-I-0655-R001
13410-2010-I-0143

Megan White, P.E
Director, Environmental Services
Washington State Department of Transportation
310 Maple Park Avenue SE
P.O. Box 47331
Olympia, Washington 98504-7331

David Valenstein
Chief, Environmental and Systems Planning Division
Federal Railroad Administration
1200 New Jersey Avenue, SE
Washington, DC 20590

Dear Ms. White and Mr. Valenstein:

This letter transmits the U. S. Fish and Wildlife Service's (Service) Biological Opinion (Opinion) based on our review of the proposed Tasks 5 (New Siding) and 6 (Kelso to Longview Junction) of the Kelso to Martin's Bluff Improvements Project located in Cowlitz County, Washington, and its effects on the Columbia River Distinct Population Segment of Columbian white-tailed deer (*Odocoileus virginianus luecurus*) in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*). Your April 30, 2014, request for formal consultation on Task 5 was received on May 5, 2014, and your April 25, 2014, request for formal consultation on Task 6 was received on May 1, 2014.

Although these two Tasks are independent of each other and each has independent utility, they are very similar, located in the same general area, and are likely to generate the same, if not substantially similar, effects. For these reasons, and to reduce workload, the Service decided to batch the consultations for these Tasks in the enclosed Opinion.

This Opinion is based on information provided in the April 2014 and August 2013 Biological Assessments, and other sources of information. A complete record of this consultation is on file at the Service's Washington Fish and Wildlife Office in Lacey Washington.

You also requested concurrence with your determination that the proposed action "may affect, but is not likely to adversely affect" streaked horned lark (*Eremophila alpestris strigata*) and, with respect to Task 6, yellow-billed cuckoo (*Coccyzus americanus*). We have interpreted these determinations to apply to both Tasks. Based on the information provided in the Biological Assessments and according to the rationale provided in the enclosed document, we provide a concurrence with your determination of "may affect, but is not likely to adversely affect" for streaked horned lark and yellow-billed cuckoo. Your determination for Columbian white-tailed deer was "may affect, likely to adversely affect." The enclosed Opinion addresses the adverse effects to Columbian white-tailed deer.

If you have any questions about this letter or our joint responsibilities under the Endangered Species Act, please contact Bill Vogel at (360) 753-4367, Mike Lisitza (206) 515-3855, or Mark Miller (360) 534-9347, of this office.

Sincerely,

FM Thomas L. McDowell, Acting Manager
Washington Fish and Wildlife Office

Enclosure

Endangered Species Act - Section 7 Consultation

Biological Opinion

Consultation for

Tasks 5 and 6 of the Kelso to Martin's Bluff: High-Speed Passenger Rail Improvement Project

U.S. Fish and Wildlife Service Reference Numbers:
01EWFW00-2014-F-0383
01EWFW00-2014-F-0399

Agency:	Federal Railroad Administration, U.S. Department of Transportation; and Rails Division, Washington State Department of Transportation
Consultation Conducted By:	U.S. Fish and Wildlife Service Washington Fish and Wildlife Office

~~Thomas~~ L. McDowell, Acting Manager
Washington Fish and Wildlife Office

Oct. ~~Nov.~~ 30, 2014
Date

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ACROYNMS AND ABBREVIATIONS

Service	U.S. Fish and Wildlife Service
Opinion	Biological Opinion
DPS	Distinct Population Segment
CWTD	Columbian white-tailed deer
ESA	Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*)
WSDOT	Washington State Department of Transportation
BNSF	Burlington Northern Santa Fe
JBH NWR	Julia Butler Hansen National Wildlife Refuge
NWR	National Wildlife Refuge
ODFW	Oregon Department of Fish and Wildlife
HLS	Hair Loss Syndrome
WDFW	Washington Department of Fish and Wildlife
WDNR	Washington State Department of Natural Resources
HCP	Habitat Conservation Plan
VHF	Very High Frequency
Plan	Collision Reduction Plan
Project	Tasks 5 and 6 of the Kelso to Martin's Bluff Improvement Project
FRA	Federal Railroad Administration

INTRODUCTION

This document represents the U. S. Fish and Wildlife Service's (Service) Biological Opinion (Opinion) based on our review of the proposed Tasks 5 and 6 of the Kelso to Martin's Bluff Improvement Project (Project) located in Cowlitz County, Washington, and its effects on the Columbia River Distinct Population Segment (DPS) of Columbian white-tailed deer (*Odocoileus virginianus luecurus*)(CWTD) in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (ESA). Your April 30, 2014, request for formal consultation on Task 5 was received on May 5, 2014, and your April 25, 2014, request for formal consultation on Task 6 was received on May 1, 2014.

This Opinion is based on information provided in the April 2014 and August 2013 Biological Assessments, and other sources of information. A complete record of this consultation is on file at the Service's Washington Fish and Wildlife Office in Lacey, Washington.

CONSULTATION HISTORY

On March 21, 2013, Service staff attended a meeting with staff from Washington State Department of Transportation (WSDOT) regarding Federal Railroad Administration funding projects through the American Recovery and Reinvestment Act of 2009 that would facilitate travel from Eugene, Oregon, to Vancouver, British Columbia, as part of the Pacific Northwest Rail Corridor Program. The meeting focused on three individual projects proposed for the Kelso to Martin's Bluff general area: Tasks 4, 5, and 6. These tasks would occur within an approximately 19-mile corridor in Southwestern Washington. While these projects had previously been analyzed together, Federal Railroad Administration determined that these projects had independent utility and therefore separated these tasks into separate projects. On March 28, 2013, after internal discussion, Service staff recommended reconsidering the effects determination for CWTD as they had been recently released in the general vicinity.

Task 5: New Siding in Kalama Rail Yard

Your letter dated September 12, 2013, and enclosed Biological Assessment, dated August 14, 2013, was received by our office on September 24, 2013. On March 21, 2014, the Service responded indicating that we were unable to concur with your determination that the proposed project would "not likely adversely affect" CWTD. On April 7, 2014, Service staff and WSDOT staff held a conference call to discuss the project and information concerning CWTD. Your subsequent April 30, 2014, request for formal consultation on Task 5 was received on May 5, 2014.

One of these projects (known as the "Kelso to Martin's Bluff Task 4: Toteff Siding Extension") is in the same work corridor as Task 5. The Task 4 Project will be constructed prior to Task 5 Project. While the improvements to switches, turnouts, and signalization for Task 4 has separate and independent utility from Task 5, both projects will address the goals of corridor improvement within this section of the Burlington Northern Santa Fe (BNSF) mainline. On July 17, 2014, the Service concurred with a “may affect, not likely to adversely affect” determination for CWTD regarding Task 4 (01EWFW00-2014-I-0408).

Task 6: Kelso to Longview Junction

Coordination occurred with Service staff between August 26 and September 12, 2013, through e-mail and by telephone. A site visit occurred on January 23, 2014, with Service staff. WSDOT’s April 25, 2014, request for formal consultation on Task 6 and April 2014 Biological Assessment were received on May 1, 2014. Task 6 would upgrade existing track and add a third main track between Kelso and the Longview Junction. This project and Task 5 would have very similar effects to CWTD.

Combined Consultation

On April 28, 2014, Service staff met to discuss Tasks 5 and 6. It was determined that the major effects to CWTD for both projects will occur as a result of increased and expedited high-speed passenger trains, the final level of which is dependent on the completion of both projects. Therefore, the Service decided to address Tasks 5 and 6 (hereafter referred to as the Project) in a single Opinion. WSDOT was notified of the Service’s intent to prepare a single Opinion and expressed concerns that the timing of consultation be met for the earlier of the two Tasks.

During May, Service staff had several discussions with staff from Julia Butler Hansen National Wildlife Refuge for the Columbian White-tailed Deer (JBH NWR) regarding telemetry data. On June 12, Service staff met with WSDOT staff to discuss the kind of information that could be gleaned from telemetry data as well as the limitations of current data to the project at hand. During June and July, Service staff held a series of discussions regarding how to estimate the number of CWTD that may be injured or killed as a result of this project. Preparation of the Opinion began in August 2014.

On August 27, a partial draft of the Opinion (Introduction, Status of the Species, Environmental Baseline) was shared with experts on CWTD within the Service. On September 17, a complete draft of the Opinion was shared with Service experts.

Between May and October 2014, we worked with WSDOT to avoid and minimize effects to streaked horned lark (*Eremophila alpestris strigata*). WSDOT and Federal Railroad Administration agreed to avoid accessing suitable habitat from April 1 to September 15 and to avoid visual and noise disturbance for areas within 100 meters of suitable nesting habitat from April 15 to September 1.

CONCURRENCE

Streaked Horned Lark

Species Distribution

The current range of the streaked horned lark includes the Washington coast and lower Columbia River islands, including airports and dredge-deposition sites and industrial sites near the Columbia River (Rogers 2000, pp. 37; Pearson and Altman 2005, pg. 23). Streaked horned larks require open landscapes with substantial areas of flat bare ground and sparse low-stature vegetation primarily comprised of grasses and forbs for nesting (Pearson and Hopey 2005, p. 27). These areas may be 300 acres or more in size (Converse et al. 2010, p. 21), or can have smaller amounts of suitable prairie habitat if it is located adjacent to open areas (e.g., islands in the Columbia River) (77 FR 61946). Wintering streaked horned larks use habitats that are very similar to breeding habitats, with most streaked horned larks migrating to the Willamette Valley for the winter (Pearson et al. 2005).

Historical nesting habitat for streaked horned lark included grasslands, estuaries, and sandy beaches in British Columbia, dune habitats along the coast of Washington, prairies in western Washington and western Oregon, and sandy beaches and spits of the Columbia and Willamette rivers. Today, streaked horned larks nest in native prairies, coastal dunes, agricultural fields, wetland mudflats, sparsely vegetated edges of grass fields, recently planted Christmas tree farms, grazed pastures, gravel roads and road shoulders, airports, and dredge-disposal sites in the lower Columbia River (Altman 1999, p. 18; Pearson and Altman 2005, p. 5; Pearson and Hopey 2005, p. 27). On the Washington coast, there are four known breeding sites for streaked horned lark: (1) Damon Point; (2) Midway Beach; (3) Graveyard Spit; and (4) Leadbetter Point in Grays Harbor and Pacific Counties. On the lower Columbia River, streaked horned larks breed on several of the sandy islands downstream of Portland, Oregon (Pearson and Altman 2005, pp. 4-6).

Species Occurrence in the Action Area

WSDOT surveyed potentially suitable streaked horned lark nesting habitat in Pacific, Wahkiakum, Cowlitz, and Clark Counties on December 17, 2013 and December 20, 2013. They observed streaked horned larks in an area of dredge-soil disposal southwest of the State Route 432 and Interstate 5 interchange near Talley Way, Washington. Based on the presence of suitable nesting habitat and observed nesting behavior in April and May, 2013, they determined that streaked horned larks were likely nesting at that site (WSDOT 2014).

Effects to the Species

Streaked horned larks establish territories and breed from late March to early August (Pearson and Altman 2005, pg. 9, Pearson and Hopey 2005, pg. 11, Moore 2011, pg. 32). Noise and visual disturbance to nesting and foraging behaviors are the only potential effects because WSDOT will not remove suitable nesting habitat or access suitable habitat between April 1 and September 15. The project will not permanently impact or remove suitable nesting habitat or impact the food base. The following activities influence streaked horned lark behavior (Pearson and Hopey 2004): mowing, moving vehicles (including off-road vehicles), model airplane flying, shooting fireworks, dog walking, and gatherings of people or vehicles. Disturbances of more than an hour may result in nest abandonment.

Pearson and Altman (2005, page 14) found activities within 100 feet of nesting streaked horned larks are more likely to cause flushing events than more distant activities. In order to further reduce the likelihood that streaked horned larks will abandon their nests or flush as a result of human noise disturbance activities, WSDOT has agreed to avoid all project activities that could result in nest abandonment within 328 feet of potentially suitable nesting habitat between April 15 and September 1. Due to the lack of suitable nesting habitat within the project footprint and the timing of the project activities, the impacts to streaked horned larks are discountable. Therefore, we concur with your determination that streaked horned larks are "not likely to be adversely affected" by the proposed action.

Western Yellow-Billed Cuckoo

Species Distribution

The Service listed the western DPS of the yellow-billed cuckoo (*Coccyzus americanus*) as threatened on October 3, 2014 (79 FR 59992-60038). In the Pacific Northwest, including Oregon, Washington, and British Columbia, Canada, the western yellow-billed cuckoo was formerly fairly common in willow and cottonwood forests along the Willamette and lower Columbia rivers in Oregon and Washington, and in the Puget Sound lowlands of Washington.

In Washington, the last confirmed breeding records of western yellow-billed cuckoos are from the 1930's, and it is likely that cuckoos no longer breed in the State. Incidental sightings of the species have occurred throughout the state, and the possibility of a vestigial breeding population may still exist. Recent sightings have been documented in the cottonwood forests along the Columbia River, the most recent being at the Sandy River delta in 2012. The available data suggest that if western yellow-billed cuckoos still breed in Washington, the numbers are extremely low, with pairs numbering in the single digits.

Species Occurrence in the Action Area

There are relatively small patches of willow and cottonwood forest in the project action area that might be suitable habitat for western yellow-billed cuckoo. However, the last confirmed breeding records of western yellow-billed cuckoos in Washington State are from the 1930's, and it is likely that cuckoos have been extirpated as a breeder in the State.

Effects to the Species

Given the extremely low probability that western yellow-billed cuckoo occur within the action area, and the relatively small amount of suitable habitat in the project action area, the potential project impacts to western yellow-billed cuckoo are discountable. Therefore, we concur with your determination that yellow-billed cuckoo are "not likely to be adversely affected" by the proposed action.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The proposed action is a cooperative project between WSDOT and BNSF. The rail line is owned and operated by the BNSF, which is a private corporation. The Federal nexus for this project is American Recovery and Reinvestment Act of 2009 funds administered by the Federal Railroad Administration who would not have control or authority over rail freight operations (including the number of freight trains operated along the line) and would not have control or authority over the use of the private corporation's property. This project is part of the Pacific Northwest Rail Corridor Improvement Program of projects identified to enhance intercity passenger rail service. The Pacific Northwest Rail Corridor Improvement Program includes 17 individual tasks between Vancouver, Washington, and the Washington State - Canadian border. Rail improvements analyzed under this Opinion include two tasks that together will be conducted on about 9 to 9.5 miles of BNSF rail lines.

The BNSF tracks are chronically congested in the Project location, which affects both freight rail traffic and passenger rail service in western Washington. This portion of the BNSF mainline has been the subject of over 20 years of proposed design improvements and upgrades to approximately 20 miles of track on this regional rail corridor. The key features of the past proposals have incorporated signal and track-switching upgrades, closure of at-grade crossings, and the construction of a third mainline. This Opinion addresses two of three rail-improvement projects that are currently being proposed in the Kelso/Kalama area (Tasks 5 and 6). All three projects have independent utility and have been submitted to the Service as separate projects for ESA Section 7 consultation.

Tasks 5 and 6 are creating a new third main track in each location and associated switches and signals. The new track is intended to provide improved high-speed passenger rail service with reduced travel time and increased frequency between Seattle, Washington, and Portland, Oregon. More specifically, the projects are intended to result in two additional round-trip, high-speed passenger rail trains per day. Currently, the equivalent of five round-trip passenger rail trains travels the tracks each day (i.e., two 1-way Coast Starlight trains, four current round-trip Cascades Amtrak trains). Following completion of the Tasks, two additional round-trip Cascades Amtrak service trains, for a total of seven round-trips, will go through the area each day. Additionally, the project is expected to reduce the trip time from Seattle to Portland by ten minutes and improve passenger service reliability to 88 percent. Additional passenger rail trips could have been scheduled without the proposed improvements, but would not have met the desired goals of increased reliability and reduced trip time.

Utility-infrastructure upgrades are also proposed to occur within the construction foot-prints. These will include, but not be limited to, electrical, natural gas, and communications/fiber optic lines throughout the work areas. This work would be conducted by outside (non-BNSF) utility contractors, but under the direction of BNSF along with their general contractor, and would be fully compliant with the BMPs and environmental permit conditions for both projects.

The projects at Task 5 and 6 will include some vegetation removal and will also include grading and various construction actions. Work will involve heavy equipment and power tools and may occur at any time of the year. A variety of actions will be taken to protect aquatic and wetland habitats.

This project is creating a new rail facility on a private right-of-way owned and operated by a private freight operator, BNSF. The project is designed to deliver specific outcomes for passenger rail service that will result in increased ridership. BNSF and WSDOT have agreed to partner on the construction of rail infrastructure that will reduce conflict between passenger and freight trains. The current rail line provides service for approximately 70 freight train trips per day.

Changes in the number of freight trains entering or leaving the Ports are not expected as a result from the upgrades. Potential future increases in freight traffic are, however, possible as freight-transportation demand is projected to nearly double by 2035. If present market trends continue, railroads will be expected to handle an 88 percent increase in tonnage during that same period (USDOT Strategic Plan 2010-2015.). Unlike passenger rail service, freight-rail mobility through the corridor is dependent upon factors totally independent of a third main track. These factors include access to ports, port and commodity scheduling, and other regional and global economic forces. Therefore, we do not believe it is reasonably certain to expect changes in the capacity or type of freight-rail trips in this corridor due to the passenger-rail infrastructure improvements associated with this project.

The projects will increase the capacity of the existing rail line for passenger service. The projects propose to add 4 more passenger train trips per day (2 early in the morning and 2 late in the evening) in the immediate future. The Project will allow increased speeds through turnouts, improved track conditions on the existing two mainline tracks, and generally free-up the new third mainline to be used by high-speed intercity passenger trains. Average speed of passenger trains will increase as many passenger trains will no longer need to slow down or stop to accommodate freight-train traffic. It will also reduce delays to passenger trains by allowing them to avoid freight trains entering or leaving the Port. Peak speeds are not anticipated to change for passenger trains as peak speeds are controlled by shape and condition of the track and a variety of other factors. However, passenger trains will be moving somewhat faster through areas with CWTD following the projects than they would have in the absence of these improvements.

Given these projected outcomes, it is reasonable to assume that passenger rail ridership will increase as the faster and more-frequent passenger rail service becomes more convenient and desirable. Amtrak, with ridership at record levels of 31.2 million passengers for fiscal year 2012, predicts those numbers could increase to 60 million by 2050 (operation lifesaver web site *http://oli.org/rail-safety* - checked August 21, 2014). Increased ridership may be accommodated in a variety of ways including: 1) Fewer empty seats in each car; 2) Additional cars on each train; and 3) Additional trains. Therefore, additional passenger trains (beyond the 2-round trips proposed) may be added in the future, but due to this uncertainty were not addressed in the biological assessments prepared for either task. Other than the two round-trips discussed above, new passenger train trips would comprise new information and potential additional effects beyond what is analyzed herein and may therefore warrant reinitiation of consultation.

Increased development may occur in the projects' action area, but not as a result of the construction of the third mainline track. The projects do not include any destination features such as passenger platforms, associated parking, stations, etc. as this is a pass-through section of passenger rail service.

In summary, Tasks 5 and 6 will result in increased passenger-train trips as well as increased average speeds for all passenger trains. However, according to WSDOT and the respective requests for consultation, there is no projected change to freight train numbers or speeds as a result of the proposed tasks, nor are there any anticipated effects to the level of development as a result of the proposed tasks.

Conservation Measures

Many conservation measures will provide for the protection of soil, aquatic, and wetland resources. The most-pertinent measures for CWTD include:

- Permanent removal of existing, established native vegetation will be restricted to what is required for direct construction, such as construction of a retaining wall, establishment of a new rail grade, installation of new track, and creation of safe signal and crossing sight distances for the completion of the projects.

- Existing established vegetation areas that will only be temporarily impacted may be trimmed back for work access and safety, but will not be grubbed.

These measures will reduce the loss of vegetated areas within and immediately adjacent to the project footprint.

Action Area

The action area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). In delineating the action area, we evaluated the farthest reaching physical, chemical, and biotic effects of the action on the environment. In assessing these farthest reaching effects, we examined the entire Pacific Northwest Rail Corridor of Vancouver, British Columbia, to Eugene, Oregon, (467 miles), but were unable to establish a relationship between the proposed projects and increased traffic beyond the Seattle to Portland segments. Therefore, we limited our assessment to areas between Seattle and Portland.

The Action Area for these projects includes the following:

1. Footprint of construction;
2. Staging and access areas;
3. Extent of noise from construction – approximately 1,196 feet from construction and staging footprints;
4. Aquatic extent of runoff – Impacts from culvert work and the unavoidable wetland fill as well as retaining wall construction are not expected to have any upstream impacts or to extend more than 100 feet downstream from the point of construction;
5. Extent of noise from additional trains – approximately 1,650 feet from tracks between Portland and Seattle. The Service notes that locomotive horns are required to be 96-110 dB(A) at 100 feet forward of the locomotive (49 CFR 229.129) and are required to be deployed at specified times and durations (49 CFR 222). Trains (including clatter and wheel squeal) generally generate about 83 dB or more at 100 feet depending upon condition of the track, rail track discontinuities, speed on curves, and other factors. Locomotives generally generate less than 83 to 85 dB due to regulations (49 CFR 229.121). Factors that affect how sound attenuates include weather, relative humidity, and the surrounding environment. Predictions become less reliable where topography is irregular or beyond 1,650 feet (CTA 2011); and
6. Impact Danger Zone – corridor from Seattle to Portland modified by passing train traffic or for a distance in which a deer can be struck by train or any of the equipment, lading, or strapping hanging from the train. Trains may overhang rail by 3 or more feet; but, loose strapping and shifted lading may create a hazard up to 25 feet from rail. Because the project will affect the number and speed of passenger trains, lading and strapping will seldom be an issue. However, deer in proximity of tracks may panic and run in front of train or may run into the side of the train. Therefore, the danger zone includes an area extending approximately 25 feet on each side of the rail from Seattle to Portland.

However, the relevant portion of the action area for this analysis is that part within the current and foreseeable potential range of the CWTD. Therefore, we further focused our assessment on the corridor described above from Longview/Kelso to the developed portions of Vancouver, Washington.

Description of Action Area within Potential CWTD Range

The tracks are used by BNSF, Amtrak, Union Pacific Railroad, the Longview switching company, and industry owners. Congestion in and around the rail yards along with infrequent cross-over opportunities in the action area results in an inflexible rail system and passenger train delays. Construction activities will take place in areas that have been previously disturbed by either the original construction of the tracks in the late 1800s or by routine and regular maintenance of the right-of-way for freight and passenger rail operations. The tracks are part of the north/south mainline rail corridor from British Columbia, Canada, to Southern California and near the terminus of an east/west mainline rail corridor from the mid-west to west coast ports. The siding and lead tracks within the Project provide rail service to industrial areas at the Port.

Task 5 Footprint

The Task 5 physical footprint is within the existing right-of-way of a mainline interstate railroad which is generally 100 feet, but varies from 125 feet to 150 feet in some locations.

Existing vegetation is comprised of wetland/upland areas that have been historically disturbed by highway, railroad, and industrial development. Some work areas currently are composed of invasive grasses/weeds, shrubs, and some small trees that are generally less than 12-inch diameter at breast height. Other construction areas are existing rail-grade or existing flat, non-vegetated graded areas currently utilized by BNSF for maintenance vehicle parking, access, and other maintenance actions. Current land uses in the Project area are related to the interstate highway and rail transportation corridor and associated commercial/industrial activities.

The north end of the Project is more disturbed. The area to the west of the BNSF right-of-way in this section is highly developed with Port grain elevators and other industrial facilities. This area is either paved or gravel covered and generally void of vegetation. There are no undeveloped or complex forested areas, and open areas are sparsely vegetated with grasses.

The south end of the Project is relatively undisturbed except for the existing two mainline tracks and public roads (Toteff/Dupont Road crossing the tracks and becoming Port Road). Upland vegetation in this area is more native with diversity of both species and type of habitat. The rail-grade embankments and upland areas are covered with Douglas-fir (*Pseudotsuga menziesii*), Oregon ash (*Fraxinus latifolia*), Oregon white oak (*Quercus garryana*), western red cedar (*Thuja plicata*), red alder (*Alnus rubra*), and invasive grasses/weeds. Wetland areas are on both sides of the BNSF right-of-way and vegetation is comprised of red osier dogwood (*Cornus stolonifera*), willow (*Salix spp*.), stinging nettles (*Urtica dioica*), black cottonwood (*Populus trichocarpa*), Himalayan blackberry (*Rubus armeniacus*), and reed canary grass (*Phalaris arundinacea*).

Task 6 Footprint

The northern third of the project area, which extends from the Kelso-Longview Train Depot to Douglas Street to the south, is located among predominantly urbanized land uses with the Cowlitz River to the east. Urbanized land uses include retail, office, and commercial uses within the Kelso downtown commercial core surrounding the Kelso-Longview Train Depot; high-density residential, commercial, and manufacturing generally comprise the middle section; and low-density residential at the southern end of this northern third.

Vegetation within the northern third of the project area is generally limited to low-growing herbaceous vegetation along the existing track structure, such as scouring rush horsetail *(Equisetum hyemale)* and Himalayan blackberry with patches of shrubs and deciduous or evergreen trees at the toe of the track structure. The exception to this is a forested wetland adjacent to the east side of the existing track structure, between Hawthorne Street and South River Road, dominated by deciduous tree species such as red alder, Oregon ash, and black cottonwood.

The middle of the project area, from Douglas Street south to the BNSF Longview Junction, is predominantly property zoned for recreational, industrial, and commercial land uses. At present, this property remains sparsely vegetated by Scot's broom *(Cytisus scoparius)* and other weedy species. Talley Way and associated stormwater infrastructure has been extended into this property.

Vegetation within this middle third of the project area is generally comprised of weedy herbaceous and shrub vegetation within the upland areas along the track structure with patches of red alder and black cottonwood. Vegetation along the east side of the project area within this section is limited, apart from that maintained by the Three Rivers Golf Course. Few trees are established within the riprap protection along the existing track structure. Patches of deciduous and coniferous trees are maintained along the perimeter of fairways and along the eastern perimeter of the Three Rivers Golf Course where it abuts the BNSF right-of-way.

The southern third of the project area, south of the BNSF Longview Junction, is predominantly comprised of a broad wetland complex zoned for industrial land use. Interstate Highway 5 is located to the east and parallels the project area.

Vegetation within this southern third of the project is generally associated with the broad wetland complex. However, an upland berm extends from the southern end of a large commercial property along the east side of the BNSF Longview Junction and connects to the existing track structure. Vegetation throughout this upland berm is dominated by weedy species such as Scot's broom and Himalayan blackberry.

Remainder of Action Area within Potential CWTD Range

From State Route 4 to U.S. Highway 432, industrial and commercial development dominates areas west of the tracks. East of the tracks, the area is primarily mixed residential / forested with some openings. The forest appears to be primarily mixed conifer and deciduous with some areas dominated by younger deciduous forests. The topography is generally rolling.

From U.S. Highway 432 to the Kalama River Road, areas east of the tracks are mixed residential / forest as described above, except that Interstate 5 is immediately adjacent to the tracks. To the west of the tracks, there are limited areas of vegetated land between the river and the tracks, but Cottonwood Island is also west of much of this section. There is some industrial development west of the tracks near the Kalama River Road at the south end of this section.

In the area from the Kalama River Road to Oak Street, the west side of the tracks is dominated by industrial development from the tracks to the river. The areas east of the tracks are mixed residential / forest.

From Oak Street through the town of Kalama, there is development on both sides of the tracks with little to no vegetated lands between Interstate 5 and the River.

From the town of Kalama to Martins Island, there is mixed residential / forest in areas east of Interstate Highway 5. The tracks occupy a narrow strip of land between Interstate 5 and the River with some industrial development and some vegetated lands and wetlands.

Beginning just north of Martins Island, and continuing south almost to the town of Woodland, the tracks are located in the median of Interstate 5. In this section, there are low-lying vegetated lands and fields west of the Interstate and mixed residential / forest east of the Interstate. The southern end of this section, known as Martin's Bluff, is steeper than in other areas.

Through the Town of Woodland, residential, commercial, and industrial development is found east of the tracks and some agricultural and industrial development and agricultural fields are found west of the tracks.

South of Woodland, low-lying vegetated lands are found west of the tracks and areas to the east are composed of mixed residential / forest and the tracks are increasingly far from Interstate 5 at the southern portion of this area.

South of the Lewis River, there are substantial amounts of cover and forested lands immediately adjacent to the tracks on both sides. There is a hill slope to the east of the tracks with mixed residential / forest further to the east. In this area, there are substantial amounts of vegetated lands on both sides of the tracks.

Ridgefield, Washington is located east of the tracks and low-lying vegetated lands are found west of the tracks.

South of Ridgefield, there are vegetated lands on both sides of the tracks until Campbell Lake. From Campbell Lake south, mixed residential / forest habitat occurs with increasing densities of homes and decreasing amounts of cover. The low-lying vegetated lands west of the tracks become more dominated by wetlands and fields, and have fewer areas of cover.

From Salmon Creek south, the areas to the east of the tracks are dominated by development, while the areas west of the tracks are dominated by fields and Lake Vancouver. Just south of Lake Vancouver, there is no longer any substantial amount of vegetated lands that could be suitable habitat for CWTD.

In summary, the portion of the action area that was further analyzed for effects to CWTD is a linear corridor that contains the tracks from Kelso to Vancouver, Washington. The tracks pass through areas of industrial activity, rural residential development, and vegetated areas. Other than a few bridges, the tracks are primarily located at ground level.

ANALYTICAL FRAMEWORK FOR THE JEOPARDY AND ADVERSE MODIFICATION DETERMINATIONS

Jeopardy Determination

In accordance with policy and regulation, the jeopardy analysis in this Opinion relies on four components: (1) the *Status of the Species*, which evaluates the CWTD rangewide condition, the factors responsible for that condition, and its survival and recovery needs; (2) the *Environmental Baseline*, which evaluates the condition of the CWTD in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the CWTD; (3) the *Effects of the Action*, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the CWTD; and (4) *Cumulative Effects*, which evaluates the effects of future, nonfederal activities in the action area on the CWTD.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed Federal action in the context of the species' current status, taking into account any cumulative effects, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the species in the wild.

The jeopardy analysis in this Opinion emphasizes consideration of the rangewide survival and recovery needs of the CWTD and the role of the action area in the survival and recovery of the CWTD. It is within this context that we evaluate the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

STATUS OF THE SPECIES - COLUMBIA RIVER DPS OF THE COLUMBIAN WHITE-TAILED DEER

For detailed information about the Columbian white-tailed deer (CWTD), please consult the Recovery Plan (USFWS 1976, 1977, and 1983), the final rule delisting the Douglas County (Roseburg, OR) DPS (68 FR 43647), and the 5-year review of the Columbia River DPS (USFWS 2013a). For information about white-tailed deer in general, we recommend White-tailed Deer: Ecology and Management (WMI 1984).

Species Description

The CWTD (*Odocoileus virginianus leucurus*) is the western-most of the 38 subspecies of *Odocoileus virginianus*, the white-tailed deer, a species with a continuous geographic distribution that extends from Canada to South America, including most of the continental United States (Whitehead 1972). White-tailed deer like other members of the family *Cervidae* are herbivorous hoofed animals that derive the vast majority of their nutrition from eating plants. Deer are ruminants and are able to extract nutrients from plant-based food by fermenting plant material via bacterial action in a specialized 4-chambered stomach prior to digestion. The white-tailed deer species has tremendous genetic variation. White-tailed deer are generalists and can adapt to a wide variety of habitats and conditions. They respond to threats by either hiding, running, or sneaking away.

CWTD resemble other white-tailed deer subspecies, ranging in size from 85 to 100 pounds for females and 115 to 150 pounds for males (ODFW 1995, p 2). Generally, the species displays a red-brown color in summer and gray in winter, with distinct white rings around the eyes and a white ring just behind the nose. Its tail is relatively long, brown on top with a white fringe and white underneath (Verts and Carraway 1998, p 479).

Legal Status

On March 11, 1967, the Columbian white-tailed deer was listed in the Federal Register as an endangered species under the Endangered Species Preservation Act of 1966 (32 FR 4001). At that time, the subspecies was believed to occur only along the Columbia River, whereas the population in Douglas County was believed to be hybridized with the Columbian black-tailed deer (*O. hemionus columbianus*)(ODFW 1995). On March 8, 1969, the Service again published in the Federal Register (34 FR 5034) a list of fish and wildlife species threatened with extinction under the Endangered Species Conservation Act of 1969. This list again included the CWTD. On August 25, 1970, we published a proposed list of endangered species, which included the CWTD, in the Federal Register (35 FR 13519) as part of new regulations implementing the Endangered Species Conservation Act of 1969. This rule became final on October 13, 1970 (35 FR 16047). Species listed as endangered on the above-mentioned lists were automatically included in the Lists of Endangered and Threatened Wildlife when the Endangered Species Act was enacted in 1973.

The CWTD Recovery Plan was prepared in 1976 and revised in 1977 and again in 1983 (USFWS 1983). In 1976 and 1977, the recovery plan referred to the "potential subpopulation near Roseburg, OR" and indicated that it was uncertain whether these deer were CWTD or hybrids with black-tailed deer. In 1978, the State of Oregon determined that white-tailed deer in the Roseburg area belonged to the Columbian subspecies (ODFW 1995). This determination resulted in the Roseburg (Douglas County) population being considered as endangered, together with the Columbia River population. The two populations of CWTD were treated separately in the 1983 revision of the Recovery Plan. These two populations are apparently remnants of a population that once occurred continuously along the Columbia, Cowlitz, and Willamette Rivers (Nowak 1991 p 1387).

In 1996, the Service developed its Policy Regarding the Recognition of Distinct Vertebrate Population Segments under the Endangered Species Act (61 FR 4722). Beginning in 1999, the Service proposed to treat CWTD as two separate and distinct population segments (DPSs) and to delist the Douglas County DPS (near Roseburg, OR). In 2003, following a series of proposals, comment periods, and peer reviews, the *O. v. leucurus* subspecies was separated into two separate DPSs on the basis of demographic and genetic dissimilarities: the Douglas County DPS and the Columbia River DPS.

The Douglas County and Columbia River populations are considered significant under our policy based on two factors. First, the loss of either of the Douglas County or Columbia River population would result in a significant gap in the range of the subspecies. The loss of either population would substantially constrict the current range of the subspecies. Second, each population has genetic characteristics that are not found in the other population (Gavin and May 1988). Because the Douglas County and Columbia River populations of the CWTD are discrete and significant, they warrant recognition as separate DPSs.

As a result of recovery efforts, the Douglas County DPS grew to over 6,000 animals and was delisted in 2003; while the status of the Columbia River DPS was left unchanged (68 FR 43647–43659). The Columbia River DPS continues to be classified as endangered under the Endangered Species Act. The most recent 5-Year Status Review for CWTD recommended reclassification of the Columbia River DPS from endangered to threatened (USFWS 2013a). To date, no critical habitat has been designated for the CWTD.

The Service is currently considering reclassification of the Columbia River DPS of CWTD as threatened, because the status has improved, the down-listing criteria have been met, and threats have decreased since listing to a point where no threat puts the DPS at risk of extinction. The Service currently recognizes six subpopulations: Tenasillahe Island, Puget Island, Westport/Wallace Island, Mainland JBH NWR, Ridgefield NWR, and Upper Estuary Islands. The main threats continuing to affect CWTD populations throughout its range are habitat fragmentation, loss, and modification, though these are less of a threat than previously thought. The Service believes that CWTD are no longer at risk of extinction and therefore do not meet the definition of endangered, but are still threatened.

Status and Distribution

Historical Status and Distribution

The historical distribution of the CWTD extended west from the Cascade foothills in the Willamette Valley of Oregon to the coast, and north from Roseburg, Oregon, to south of the Puget Sound in Washington (USFWS 1983). Early accounts indicate CWTD were locally common, particularly in riparian areas along major rivers (Crews 1939, p. 5). In 1806, Lewis and Clark observed and recorded the presence of white-tailed deer ("common deer") along the Columbia River from the present location of The Dalles, Oregon to Astoria, Oregon on the coast (Gavin 1984 p 487). In 1829, Douglas described a new species of white-tailed deer (Douglas 1829). Douglas claimed that these deer were common along the Columbia River and in the fertile prairies along the Cowlitz and Willamette Rivers (Douglas 1829 p 331). Historically, CWTD occupied a range of approximately 23,170 square miles west of the Cascades Mountains; from Grants Pass, Oregon, in the south to The Dalles, Oregon, in the east and along the Cowlitz River to the north (Smith 1985). Within this broader range, the subspecies was formerly distributed throughout the bottomlands and prairie woodlands of the lower Columbia, Willamette, and Umpqua River basins in Oregon and southern Washington (Bailey 1936; Verts and Carraway 1998).

The decline in CWTD numbers was rapid with the arrival and settlement of pioneers in the fertile river valleys (Gavin 1978). Conversion of brushy riparian land to agriculture, urbanization, uncontrolled sport and commercial hunting, and perhaps other factors apparently caused the extirpation of CWTD over most of its range by the early 1900s (Gavin 1978). By 1940, a population of 500 to 700 CWTD along the lower Columbia River in Oregon and Washington, and a disjunct population of 200 to 300 in Douglas County, Oregon, survived (Crews 1939; Gavin 1984; Verts and Carraway 1998). These two remnant populations remain geographically separated by about 200 miles, much of which is unsuitable or discontinuous habitat.

Current Status and Distribution

The historical range of the Columbia River DPS has been reduced to its current range of approximately 93 square miles (Smith 1985, p. 247) in limited areas of Clatsop and Columbia Counties in Oregon, and Cowlitz, Wahkiakum, and now Clark Counties in Washington. Within this range, it now exists on national wildlife refuges, nearby islands, and some lowlands in the lower Columbia River (Nowak 1991 p 1387) and occupies approximately 16,000 acres with a 2014 population estimate of about 850 deer. There are six identified subpopulations: the JBH NWR Mainland, Tenasillahe Island, Puget Island, Wallace Island/Westport, the Upper Estuary Islands, and Ridgefield NWR subpopulations. Current estimates by subpopulation are displayed in Table 1 and additional information concerning their approximate distribution is contained in Figure 1.

Table 1. Most recent estimated number of Columbian white-tailed deer by subpopulation.

Subpopulation[1]	**Estimated Number of Deer**
Puget Island	227
Tenasillahe Island	160
Westport/Wallace Island	175
JBH NWR Mainland	88
Upper Estuary Islands [2]	145
Ridgefield NWR	48
Approximate Total	**843**

[1] Surveys conducted in 2010, 2011, 2013 and 2014. Above numbers provided by JBH NWR staff, data from previous year's surveys can be found in the 5-year review (USFWS 2013a). Some estimates are derived by using Forward Looking Infra-Red (FLIR) instruments and adjusting the number of CWTD according to the information about the relative abundance of CWTD and black-tailed deer derived from trail cameras.

[2] Upper Estuary Islands includes Cottonwood Island.

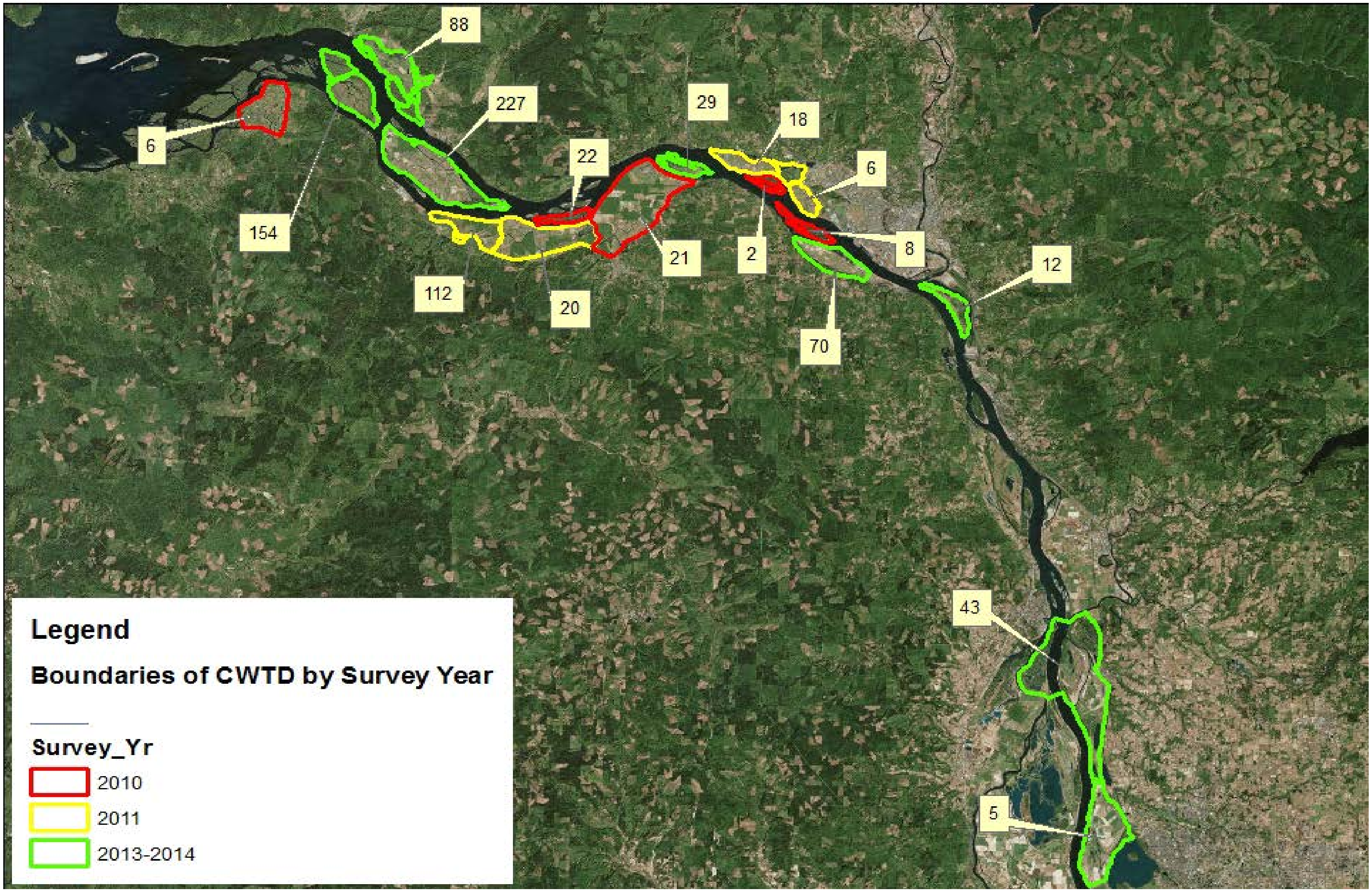

Figure 1. Columbian white-tailed deer estimated numbers and their distribution within subpopulations provided by survey year.

Life History

Although white-tailed deer can live up to 20 years, their lifespan in the wild is typically limited to less than 6 years. One Service study of CWTD showed a median age at death of 3 years for bucks and 5 years for does (Gavin 1984, p. 490). Does can reach sexual maturity by age 6 months or when their weight reaches approximately 80 pounds, however their maturation and fertility depends on the nutritional quality of available forage (Verme and Ullrey 1984, p. 96). Breeding will occur from mid-September through late February, and the peak of the breeding season, or rut, occurs in November. Fawns are born in the early summer after an approximate 200-day gestation period. In their first pregnancy, does usually give birth to a single fawn, though twins are common in later years if adequate forage is abundant (Verme and Ullrey 1984, p. 96).

CWTD fawning begins in early June and ends in mid- to late July. Peak fawning occurs in mid- to late June. Habitats used for fawning include tall grass fields and other habitats that provide thermal and hiding cover and are located away from other CWTD. CWTD does often select closed canopy habitats, including poplar (*Populus spp*) plantations and dense coniferous forests as fawning sites. After giving birth, the female displays normal activities, but returns several times a day to nurse the newborn fawns. Young fawns generally rest or hide during the day in or near the location where they were born. Fawns typically are weaned and become relatively independent after 10 weeks, although some may continue nursing into the fall (USFWS 1983). CWTD typically do not gather in large herds, but remain in small family groups or singles.

<u>Habitat Use and Selection</u>

The following discussion is primarily based on information presented in the CWTD Recovery Plan (USFWS 1983) and the 5-year review (USFWS 2013a). The CWTD typically inhabits forested areas along waterways and generally selects areas that offer both food and cover. Areas forested with Sitka spruce (*Picea sitchensis*) and a grass understory are used most frequently; however, in the summer, CWTD preferentially inhabit mixed forests of western red cedar, red alder, and parkland habitat with a grassy understory. CWTD density has been shown to be greatest in areas where woodland cover was around 50 percent. However, the CWTD can thrive in areas with various ratios of canopy cover. The most-important aspect of habitat appears to be the available food supply within or close to escape cover. While the CWTD frequents bottomlands, its local distribution is not limited by elevation if other suitable habitat characteristics are present (USFWS 1983).

Ricca (1999) found that the areas of concentrated use within a CWTD's home range were generally located within about 650 feet of streams, which confirms earlier work (Smith 1981) suggesting that habitat type is less important than distance to a stream. It is unclear whether this relationship is due to the presence of water, or the dense cover often associated with streams. Open areas such as grasslands and oak savanna are often used for feeding between dusk and dawn (Ricca 1999). Observations suggest that fawns on the JBH NWR Mainland are most-often associated with pastures of tall, dense reed canary grass and tall fescue (*Festuca arundinaceae*), as well as mixed deciduous and spruce forest (USFWS 1983, Brookshier 2004).

Communities providing both cover and forage were more heavily utilized than were communities providing cover or forage alone. Communities providing forage alone were used most near adjacent cover. Canada thistle (*Cirsium arvense*) provided cover in summer and allowed deer to utilize previously unused areas (Suring and Vohs 1979 p 616-617). Habitat-use values for reed canary grass (*Phalaris arundinaceae*) and improved pasture communities were relatively low throughout the year.

<u>Food Habits</u>

We would anticipate that the smaller rumen volume to body volume ratio in CWTD, like other small deer, would mean that CWTD require high-quality forage. The diet of CWTD consists of forbs (broad-leaved herbaceous plants), shrubs, grasses, and a variety of other foods such as lichens, mosses, ferns, seeds, and nuts (L. Whitney, pers. comm. 2001).

Foraging habitat used by the CWTD is generally located in proximity to forest cover and varies greatly with the season (USFWS 2013b). The CWTD is a generalist in diet, utilizing both forage and browse. Typical forage includes meadow foxtail (*Alopecurus spp)*, orchard grass (*Dactylis glomerata*), reed canary grass, tall fescue, mannagrass (*Glyceria spp*), yarrow (*Achillea millefolium*), red clover (*Trifolium pretense*), and buttercup (*Ranunculus repens*). Typical browse includes evergreen blackberry (*Rubus laciniatus*), Pacific ninebark (*Physocarpus capitatus*), red-osier dogwood (*Cornus stolonifera*), salal (*Gaultheria shallon*), and western red cedar. We also suspect that CWTD readily utilize other species of clover, blackberry, and palatable forbs and grasses. Twenty-five to fifty percent of the CWTD's diet can be composed of woody browse species. In a study by Dublin (1980), essentially all browse consumed was non-woody browse (such as blackberry leaves). CWTD consumption of browse species appears to increase in the fall, while grasses and forbs are the most-important food items in the spring and summer. Dublin (1980) concluded that CWTD on the JBH NWR selected for browse in every season except spring and selected for forbs in all seasons. CWTD selected against grass in autumn, winter, and spring.

Annually, the diet of the CWTD on JBH NWR consists of roughly one third browse, one third grasses, and one third forbs. However, no single food type is exclusively consumed even when abundant, suggesting that the CWTD prefers or requires a variety of food items at all times of the year. Optimum CWTD habitat will contain a variety of food types that are abundant at different times of year (Meyers 2009).

A diet and nutrition study was conducted by JBH NWR staff from 1996 to 1998 (USFWS 2010c). Fecal nitrogen and DAPA (2,6, diaminopimelic acid) values (Davitt and Nelson 1984; Kie and Burton 1984) for CWTD showed seasonal variation but indicated adequate dietary protein and energy for growth and reproduction. Phosphorus and calcium availability also appeared sufficient. Selenium showed marginal deficiency during some months, but these deficiencies can be counterbalanced with adequate vitamin E, which was abundant. Deficiencies of other trace elements such as iodine, copper, zinc, and cobalt are possible, but would be difficult to assess because the requirements of deer for these elements are not known.

Population Density and Home Range

Observations of marked CWTD at JBH NWR mainland indicate that individual CWTD had the same home range in successive years (Gavin 1979; Gavin 1984). CWTD generally distribute across the landscape and do not herd, but their home ranges often overlap (P. Meyers pers. comm. 2010b as cited in USFWS 2013b). The average home range was 391 acres for does and 475 acres for bucks (Gavin 1984 p 490). The area travelled by a CWTD in any 24-hour period was considerably smaller. The density of CWTD in a given habitat can range from 25 to 75 CWTD per square mile, and is very habitat dependent, with higher-quality suitable habitats supporting a higher density of CWTD than lower-quality suitable habitats. Biologists at JBH NWR believe that the ideal density for the CWTD on the refuge is approximately 40 CWTD per square mile in high-quality habitat (P. Meyers pers. comm. 2010b as cited in USFWS 2013b). Adult CWTD are not migratory and their home ranges tend to be very stable in space and time (WDFW 2004).

Dispersal

White-tailed males tend to disperse at about 1 year of age just prior to fawning as their mothers prepare for the new fawns; as such, late May and early June are times of peak dispersal and mortality. Young does may be separated from their mothers during fawning, but later may rejoin their mothers and share home ranges for 1 to 2 years. Yearling bucks, however, are much more likely to disperse longer distances. Vogel (1983 p 33) reported that 46 percent of the yearling male carcasses collected during a study in Montana were collected during a 4-week period of late May to early June. A similar trend was found by Puglisi et al. (1974). Peak dispersal times for white-tailed deer in Montana include prior to the fawning season and again during the fall rut (Vogel 1983). Meyers (P. Meyers, pers. comm. 2010a) reported that CWTD bucks probably disperse in the fall around the rutting season while looking for breeding opportunities.

In a Pennsylvania study of white-tailed deer, most dispersal (95 to 97 percent) occurred during two 12-week periods: spring, when yearling males still closely associate with related females, and prior to fall breeding season, when yearling males closely associate with other breeding-age males. Spring dispersal distances were greater than fall dispersal distances, suggesting that adaptive inbreeding-avoidance dispersal requires greater distance than mate-competition dispersal (Long et al. 2008). CWTD move between the subpopulations and this type of movement promotes gene flow between the subpopulations and is, therefore, an important facilitator of genetic mixing (P. Meyers, pers. comm. 2010a).

Movement Patterns

In general, deer appear most active at sunrise and sunset (Montgomery 1963; Vogel 1983, 1989; Beier and Mccullough 1990; Hayes and Krausman 1993). Vogel (1983 p 40-45) found that white-tailed deer were crepuscular and nocturnal. He also found that nocturnal activity was related to lunar illumination and weather conditions, with white-tailed deer being more active during nights with substantial lunar illumination. The pattern of nighttime activity was particularly pronounced in the summer and fall, compared to the winter; a pattern that was also reported by Skinner (1929), Montgomery (1963), Progulske and Duerre (1964), and McCaffery and Creed (1969). The pattern of activity during winter days was to be expected in Montana and other areas where winters are severe and deer may be active during the warmer part of the day, especially where high-quality agricultural-based food was available.

In addition, deer are likely to be active diurnally less often when occupying areas near human activity. Vogel (1983 p 63) also found that deer were less likely to be active during the day with increasing amounts of human disturbance. As human disturbance increased (as indicated by increasing housing density), home ranges became more linear as white-tailed deer concentrated their activity along linear riparian areas and associated cover (Vogel 1989).

The amount of daily activity and movement in white-tailed deer varies depending on habitats being utilized, disturbance, gender, and season. Based upon experience, daily movements of white-tailed deer may vary from less than a mile to over 5 miles per day. In some cases, white-tailed deer use different areas in the summer compared with the winter. In addition, deer are prone to make occasional excursions outside their home range. Such excursions are often more pronounced in males and appear to be motivated by the breeding season (Karns et al. 2011). Adult male deer venturing on excursions are highly vulnerable to hunter harvest, antagonistic encounters with competing males, and other mortality factors in areas where they are less-intimately familiar (Swenson 1982).

Anecdotal information from observers indicates that CWTD may approach the tracks, skirt along the tracks for a short distance, and then return to the refuge and that this behavior is seldom observed during the day (J. Heale pers. comm. 2014). It is too early to make conclusive statements about how CWTD will use their new range.

Population Trends

The declining population trend seen in the JBH NWR Mainland subpopulation in past decades was largely the result of overpopulation that occurred in the years after the area became a refuge. During 1985 to 1988, the JBH NWR Mainland subpopulation ranged from 410 to 500 animals, which represented a density of about 117 to 143 deer per square mile (USFWS 2013a). JBH NWR has undergone declines that the other subpopulations have not. When only considering the other subpopulations, the overall population shows a more stable trend (USFWS 2013a). Two subpopulations, Puget Island and Westport/Wallace Island, have maintained relatively large and stable numbers over the last three decades. Puget Island farmers and ranchers often implement predator control on their lands. A large portion of Westport/Wallace Island is owned and managed by one individual family and has implemented intensive predator control as part of their land-management practices.

In 1975 and 1976, most marked females 2 years and older were pregnant or later observed with fawns, yet most fawns did not survive until November. Twins were rarely observed, and there were no indications of breeding by female fawns (Gavin 1984 p 491), which is indicative of poor nutrition. The low fawn survival and lack of productivity by 1-year-old females resulted in low annual recruitment. Since 1986, Tenasillahe Island, Puget Island, and Westport subpopulations have had an average fawn:doe ratios of 0.36 or more. Over the last 5 years, Tenasillahe Island, Puget Island, Westport, and JBH NWR Mainland have had fawn:doe ratios over 0.37.

Puget Island and Westport/Wallace Island have maintained populations of three to four times the viable standard for most of the last 30 years. Initial analysis from a minimum viable population model (Skalski 2012) suggests that the probability of extinction for the Columbia River DPS with 3 subpopulations of 50 CWTD each is less than 1 percent over the next 50 years. In addition, given the current population distribution, the model suggests a less than 1 percent likelihood of extinction for this DPS over the next 100 years (USFWS 2013a).

Factors of Decline at Listing

The CWTD was extirpated throughout most of its historical range by 1900. The main factor in its decline was human-caused habitat modification from clearing of wooded land for agriculture, the draining of beaver ponds, dike building and channelization of water, and fire suppression. Unregulated hunting of the CWTD also likely played a role in its decline.

Current Factors Affecting the Status of the Species

Additional threats identified since listing include flooding and the spread of invasive plants that reduce food availability (USFWS 1983). Potential threats to the CWTD outlined in the Recovery Plan include continued degradation of CWTD habitats through habitat removal, alteration, and development; vehicle collisions; and predation. The discussion below examines current threats to the DPS.

<u>Habitat Loss and Degradation</u>

Loss of habitat is suspected as a key factor in historical CWTD declines, as more than 30,000 acres of habitat along the lower Columbia River were converted for residential and agricultural use from 1870 to 1970 (NPCC 2004). Over time, CWTD were forced into habitat that was fragmented, wetter, and more “lowland” than what would be ideal for the species. The recovery of the Douglas County, Oregon, DPS reflects the availability of more-favorable habitat (managed upland oak savannah) and land-use practices (intensive sheep grazing with very high levels of predator control). Though limited access to high-quality upland habitat in the Columbia River DPS remains the most-prominent hindrance to CWTD recovery, the majority of habitat loss and fragmentation has already occurred. Much of the current population exists on reclaimed land behind levees. There is interest in removing some levees for fish and wetland habitat restoration. Efforts to remove levees in certain areas, such as Westport, would represent a significant loss of habitat. While this remains a concern, other significant future changes to currently available habitat for the Columbia River DPS is not anticipated.

The persistence of invasive species, especially reed canary grass, has reduced forage quality over much of the CWTD range but it remains unclear as to how much this change in forage quality is affecting the overall status of CWTD. While CWTD will eat the reed canary grass, it is not a preferred forage species. It is only palatable for about 2 months in spring if it is not managed. The amount of reed canary grass can be controlled by frequent repeated mowing during the growing season as well as by grazing (TNC 2004), but these techniques do not seem to be effective unless combined with other techniques (WRCGMWG 2009). Grazing by cattle has been used on JBH NWR lands to control the growth of reed canary grass along with tilling and planting of pasture grasses and forbs. This management entails a large effort that will likely be required on a continual basis unless other control options are discovered. This effort also requires an intensive system of fencing. Reed canary grass is often suppressed in agricultural and suburban landscapes, but remote areas, such as the upriver islands, experience little control. Reed canary grass thrives in wet soil. Increased groundwater due to sea-level rise or subsidence of diked lands may exacerbate this problem by extending the area impacted by reed canary grass. However, where groundwater levels rise high enough, reed canary grass will be drowned out and eradicated, though this rise in water level may also negatively affect CWTD and their preferred forage. The total area occupied by reed canary grass in the future may therefore decrease, remain the same, or increase, depending on topography and/or land management.

The Service has also focused recovery efforts on acquiring new habitat and has seen an increase in the amount of habitat specifically protected for the benefit of CWTD. Furthermore, habitat in many areas of the Columbia River DPS has improved over time through targeted restoration efforts that increased the quality of browse, forage, and cover. The greatest restoration effort has occurred on JBH NWR Mainland, followed by Tenasillahe Island and Crims Island. Finally, CWTD now have access to the upland areas at Ridgefield NWR and it is expected that they will respond positively to the higher-quality habitat. Overall, although the threat of habitat loss and modification from development still remains, it is much lower than previously thought and does not put the Columbia River DPS of CWTD at risk of extinction.

Predation

Young fawns are extremely susceptible to predation; high levels of predation from coyotes (*Canis latrans*) have led Refuge staff to adopt coyote-control measures. The poor fawn survival of the Columbia River DPS of CWTD may also be indicative of poor habitat quality. The scientific literature on wild cervids tends to show that deer and elk in favorable (medium to high quality) habitat are rarely depressed by predation. Coyote population estimates do not exist for the Columbia River DPS area.

While coyote predation exerts strong influence over fawn recruitment, Phillips (2009) observed that long-term gains in population size may require management efforts that emphasize survival across age-classes, or at a minimum include strategies for increasing doe survival, rather than focusing only on fawn recruitment. The focus for managing a successful population should include addressing doe survival as well as fawn recruitment. Doe survival relies more heavily on the availability of nutritious forage than avoiding predation alone. An intermediate focus on coyote control (and monitoring of predation by other species such as bobcat), used in conjunction with long-term improvement of habitat conditions, should yield larger and quicker population increases. Managing predation and habitat to enhance across-age-class survival will provide the most benefit to the Columbia River DPS of CWTD.

Since the listing of CWTD, the Service and our partners have developed improved ability to implement predator management. The positive effects to subpopulations resulting from predator management demonstrate that the effect of predation to a subpopulation can be mitigated on accessible USFWS-managed lands. While predation remains a potential threat to subpopulations if predator management is not in place, predation is manageable for some of the major subpopulations and does not put the DPS at risk of extinction.

Vehicle Collisions

Collision with vehicles remains a concern, especially with respect to newly translocated CWTD. In 2010, 15 CWTD were translocated to Cottonwood Island, Washington, from Westport, Oregon. Seven of those translocated CWTD were killed by collisions with vehicles on U.S. Highway 30 in Oregon and on Interstate 5 in Washington (Cowlitz Indian Tribe 2010 as cited in USFWS 2013c). There were several vehicle strikes that went unreported to authorities (pers.com. E. White, Cowlitz Indian Tribe as cited in USFWS 2013c). JBH NWR personnel recorded 4 CWTD killed by vehicle collisions in 2010 along Highway 4 and on the JBH NWR Mainland. These were deer that were either observed by Refuge personnel or reported directly to the JBH NWR. The Washington Department of Transportation removes road kills without reporting species details to the JBH NWR, so the actual number of CWTD struck by cars in Washington is probably higher. Since the 2013 translocation, Oregon Department of Fish and Wildlife (ODFW) has requested that Oregon Department of Transportation personnel assigned to stations along U.S. Highway 30 report any CWTD mortalities that they find. So far, they have been contacting the Oregon State Police or ODFW staff when they find CWTD with collars or ear tags. It is uncertain if the Oregon Department of Transportation staff report un-marked CWTD mortalities (D. VandeBergh, pers. comm. 2013 as cited in USFWS 2013a). Given that the JBH NWR Mainland currently supports approximately 88 CWTD, 4 or more collisions per year could be a significant source of adult mortality for that subpopulation. The threat of deer collisions may increase over time as CWTD are translocated closer to urban areas and agricultural areas see increased housing development, but it is unlikely to rise to the level of putting the DPS at risk of extinction in the foreseeable future.

Illegal Killing

While overharvest of CWTD historically contributed to CWTD population decline, all legal harvest has ceased. Just after the establishment of the JBH NWR, poaching was not uncommon. Public understanding and views of CWTD have gradually changed, however, and poaching has decreased. However, there were two cases of suspected illegal killing of 2013 translocated deer that occurred off the refuge.

If subpopulations should decline, poaching could have an impact on CWTD numbers and would need to be monitored. Regulations and enforcement are in place to protect the CWTD; however, poaching still occurs and the level of poaching is not a threat that can be completely alleviated. Overall, the threat of overutilization has likely decreased since the development of the Revised Recovery Plan and does not put the Columbia River DPS at risk of extinction.

Regulatory Mechanisms

Based on an analysis of the existing regulatory mechanisms, the Service has found a diverse network of laws and regulations that provide varied protections to the CWTD and its habitat rangewide. Specifically, CWTD habitat that occurs on National Wildlife Refuges is protected under the National Wildlife Refuge System Improvement Act of 1997. On Federal lands, the ESA protects both the species and its habitat. However, protection of CWTD habitat on nonfederal lands is not required by any such regulations, unless it would rise to the level of "take" for individual CWTD (as defined under the ESA). "Take" of CWTD is prohibited on all lands without a permit from the Service. NEPA requires a rigorous analysis of impacts from activities with a Federal nexus. Additionally, the CWTD receives some protection under State laws in Washington and Oregon. Both Oregon and Washington have regulations that protect Columbia River DPS CWTD from direct harm, but do not offer protection to CWTD habitat. The Service's 5-year review (USFWS 2013a) concluded that adequate regulatory mechanisms are in place to protect the species, now and in the foreseeable future.

Flooding

While the JBH NWR Mainland subpopulation has shown the ability to increase beyond the assessed carrying capacity of approximately 125 individuals, it has been hit with catastrophic flooding events that have led to the loss of up to 50 percent of the subpopulation. Direct mortality from flooding has been low during prior floods, but indirect mortality has been more significant. High waters push deer to the elevated roadways, making them susceptible to vehicle strikes, and deer move off their normal home ranges into off-refuge areas with unfamiliar dangers, such as dogs or unfamiliar predators. The imminent threat of dike failure led the Service, in early 2013, to implement an emergency translocation of 37 CWTD from the JBH NWR Mainland to Ridgefield NWR in an effort to limit the potential adverse effects that a dike failure would have on the subpopulation (USFWS 2013a).

While flooding has caused short-term population declines, the population has returned to prior levels within a few years. Flooding is a threat to CWTD habitat when grazing and fawning grounds become inundated for prolonged periods, and the risk of large flooding events could increase with impacts of climate change. In the past, significant flooding events have caused large-scale CWTD mortality and emigration from the JBH NWR Mainland (USFWS 2007). The JBH NWR Mainland has experienced three storm-related floods since 1996. These flooding events have been associated with a sudden drop in population numbers and recovery during the following few years. During some chronic historical flooding events, CWTD have left low-lying areas and did not return (particularly in areas which continued to sustain frequent flooding, for example Karlson Island).

A large proportion of occupied CWTD habitat is land that was reclaimed from tidal inundation by construction of dikes and levees for agricultural use in the early twentieth century (USFWS 2010c). In recent years, there has been interest in restoring the natural tidal regime to some of this land, mainly for fish-habitat enhancement. This restoration could pose a threat to CWTD in certain areas where the majority of the subpopulation relies upon the reclaimed land. Since 2009, three new tide gates were installed on the JBH NWR Mainland to increase fish passage and facilitate drainage in the event of another large-scale flood. Because of the imminent failure at a point of erosion in the Steamboat Slough Road dike, a setback dike is scheduled for completion in fall of 2014. When this dike is complete, the original dike under Steamboat Slough Road will be breached and the estuarine buffer created will provide additional protection from flooding to the JBH NWR Mainland. It is important to note however that breaching of the old dike will result in the loss or degradation of about 70 acres of CWTD habitat.

Disease

The Revised Recovery Plan lists *necrobacillosis* (hoof disease) as a primary causal factor in CWTD mortality on the JBH NWR (USFWS 1983). *Fusobacterium necrophorum* is identified as the etiological agent in most cases of hoof disease, although concomitant bacteria such as *Arcanobacterium pyogenes* may also be at play (Langworth 1977; Chirino-Trejo et al. 2003). Damp soil or inundated pastures increase the risk of hoof disease among CWTD with foot injuries (Langworth 1977). Among 155 carcasses recovered from 1974 to 1977, hoof disease was evident in 31 percent (n=49) of the cases, although hoof disease only contributed directly to 3 percent (n=4) of CWTD mortalities (Gavin et al. 1984).

Of the 49 CWTD captured from the JBH NWR Mainland and Puget Island in 2013, none displayed evidence of hoof disease and 22 displayed some evidence of hoof abnormalities in 2014. All but 1 of the 22 deer were translocated. However, with the increased threat of flooding events predicted by climate models and the possible increase in groundwater levels due to sea-level rise, hoof disease presents a persistent threat.

Hair Loss Syndrome (HLS) in Columbian black-tailed deer was first described in western Washington in 1995 and in northwest Oregon from 2000 to 2004 (Biederbeck 2004). The condition is caused by a heavy infestation with a Eurasian louse of poorly defined taxonomic status in the genus *Damalinia* (Cervicola). The normal hosts of this louse are European and Asian deer and antelope, which are not seriously affected by the lice. In contrast, when native deer become infested, they tend to develop a hypersensitivity (severe allergic) reaction to the lice, which causes irritation and inflammation of the skin, and excessive grooming by the deer. Excessive grooming, biting, scratching, and licking affected areas ultimately leads to loss of the guard hairs in those affected regions, leaving yellow or white patches along the sides. Infestations are heaviest during late winter and early spring, and many affected deer, especially fawns, die during this time. The geographical distribution of HLS has steadily expanded since its first appearance and now affects deer throughout their range in western Washington and western Oregon.

This condition is found most commonly among deer occupying low-elevation agricultural areas (below 600 feet elevation). While a higher instance has been found in black-tailed deer, cases in CWTD were observed. Most cases (72 percent) of HLS were detected in the Saddle Mountain Wildlife Management Unit in northwest Oregon. Among black-tailed deer, 13 percent of those surveyed in the Saddle Mountain Wildlife Management Unit showed symptoms of HLS, while only 7 percent of CWTD were symptomatic. Additionally, cases were identified in CWTD only in 2002 and 2003. CWTD captured during translocations in recent years have occasionally exhibited evidence of hair loss. On the JBH NWR, HLS is most often observed among fawns and yearlings during winter months (USFWS 2010c). HLS is not thought to be highly contagious, nor is it considered to be a primary threat to CWTD survival, although it has been associated with deer mortality (Biederbeck 2002, 2004). Reports of HLS among black-tailed deer in Washington have indicated significant mortality associated with the condition.

In 2006, a high number of Yakima area mule deer (*Odocoileus hemionus hemionus*) mortalities were reported with symptoms of HLS (WDFW 2010). In Yakima and Kittitas counties, the mule deer population has decreased an estimated 50 percent since the arrival of the lice. The lice involved in that infestation were identified as *Bovicola tibialis,* yet another exotic old world species with fallow deer (*Dama dama*) as the normal host.

Parasite loads were tested in 16 CWTD on the JBH NWR Mainland and Tenasillahe Island in February of 1998 (Creekmore and Glaser 1999). All CWTD tested showed evidence of the stomach worm, *Haemonchus contortus*, in fecal samples. Lung worm (*Parelaphostrongylus* spp.) and trematode eggs, possibly from liver flukes (*Fascioloides* spp.) were also detected. These results are generally not a concern among healthy populations, but for a population under nutritional stress, such as the Columbia River DPS of CWTD with less than optimal forage and habitat quality available, a high parasite load can increase the likelihood of mortality, especially among fawns (Creekmore and Glaser 1999).

Diseases naturally occur in wild ungulate populations. Diseases such as hoof disease or HLS can often work through a population without necessarily reducing the overall population. When compounded with additional stressors such as poor quality forage, flooding, etc., diseases could potentially affect long term productivity and viability. However, the threat of disease does not in itself put the Columbia River DPS of CWTD at risk of extinction.

<u>Hybridization</u>

New information has surfaced regarding the genetic associations of the northwestern white-tailed deer subspecies (*Odocoileus virginianus ochrorous*) (found in northeastern Oregon and eastern Washington) and the Douglas County and Columbia River CWTD populations since the publication of the revised Recovery Plan (USFWS 1983). Piaggio and Hopken (2009) studied mitochondrial DNA (mtDNA) and microsatellite loci to determine the genetic relationships and diversity of northeastern Oregon white-tailed deer and the two DPSs of CWTD. The study suggests that the three deer populations were once connected, and found that the Douglas County and Columbia River DPS populations each had a greater genetic similarity toward the northeastern Oregon population than to each other. The genetic isolation between the Douglas County and Columbia River DPS populations has led to a decrease in observed genetic diversity in each population compared to the northeastern Oregon population.

Although deer from both CWTD DPSs appear to be more closely related to *O. v. ochrorous* deer than to each other, the three populations have been isolated for some time and have lost a large proportion of shared diversity through genetic drift (Piaggio and Hopken 2009). Even though there are genetic similarities between the various subspecies, taxon listings under the ESA are based not only on genetics but also on morphologic/morphometric differences, biogeography, behavior, and ecology.

There has been concern that hybridization with *O. hemionus* is threatening the genetic integrity of *O. v. leucurus* (Nowak 1991 p 1387). There is strong circumstantial evidence that CWTD occasionally interbreed with black-tailed deer. Suring (1974) observed interspecific mating behavior and Gavin noted apparent hybrid deer (Nowak 1991 p 1387). Coloration of the dorsal surface of the tail, length of the tail, and facial characteristics were used by Davidson (1979) to classify 179 deer observed on the JBH NWR mainland. Nearly one third of the deer classified were thought to exhibit hybrid characteristics. None of the 48 deer classified on Puget Island or 37 deer classified on 5 other islands exhibited hybrid characteristics.

Hybridization with black-tailed deer was not considered a significant threat to the Columbia River DPS of CWTD at the time of the development of the Revised Recovery Plan (USFWS 1983). However, later studies raised concerns over the presence of black-tailed deer genes in the isolated Columbia River DPS population. Gavin and May (1988) found evidence of hybridization in 6 of 33 samples of CWTD on the JBH NWR Mainland and surrounding area by analyzing electrophoretic loci. A later study employing mtDNA analysis revealed evidence of hybridization on Tenasillahe Island, but not the JBH NWR Mainland (Piaggio and Hopken 2009). On Tenasillahe Island, 32 percent (n=8) of deer tested and identified as CWTD contained black-tailed deer haplotypes.

Translocation efforts have at times placed CWTD in areas that support black-tailed deer populations. While few black-tailed deer inhabit the JBH NWR Mainland or Tenasillahe Island, the Upper Estuary Islands population may experience more interspecific interactions. Aerial FLIR survey results in 2006 detected 44 deer on the 4-island complex of Fisher/Hump and Lord/Walker. Using the proportion of CWTD to black-tailed deer sightings on trail cameras on these islands, refuge biologists estimated that at most, 14 of those detected were CWTD (USFWS 2007). Piaggio and Hopken (2010) showed no hybridization in any of the samples collected on Crims, Lord, and Walker Islands. They believed that hybridization was not a contemporary phenomenon but found evidence of a historical introgression event. Based on their data, they believed that this hybridization event was restricted to Tenasillahee Island. However, black-tailed deer haplotypes are present on Tenasillahe, the JBH NWR Mainland, and Puget Island. Hybridization has been documented and could be more prevalent than the limited studies have indicated (Meyers, P. pers. comm. 2014).

Therefore, it seems that although hybridization can occur between CWTD and black-tailed deer, it may not be a common event. The actual threat of hybridization has probably not changed since listing the CWTD. However, hybridization can affect the genetic viability of the Columbia River DPS and additional research regarding hybridization could give broader insight to the implications and occurrence of this phenomenon, and how it may influence subspecies designation.

Climate Change

Climate change is an atmospheric response to high carbon dioxide levels caused by Federal and nonfederal actions that has significant implications on weather that will likely influence the condition of species and alter (lessen or magnify) the effects of human proposed actions on species.

Although climate change and rising sea levels will not put the Columbia River DPS at risk of extinction in the foreseeable future, they could potentially represent a long-term future threat to CWTD occupying low-lying habitat that is not adequately protected by well-maintained dikes. Climatic models have predicted significant sea-level rise over the next century (Glick et al. 2007). Rising sea levels could degrade or inundate current habitat, forcing CWTD to move out of currently used habitat along the Columbia River into marginal or more-developed habitat. A rise in groundwater levels could lower forage quality and allow invasive plants to expand their range into new areas. Maintaining the integrity of existing flood barriers that protect CWTD habitat will be important to the recovery of the Columbia River DPS until greater numbers of CWTD can be relocated to upland habitat. The JBH NWR Mainland has experienced three storm-related floods since 1996. While this could be a cluster of storms in the natural frequency of occurrence, it could also indicate increased storm intensity due to climate change. These flooding events have been associated with a sudden drop in the CWTD population, which then slowly recovers. An increased rate of occurrence of these events, however, could hinder recovery and permanently reduce the numbers and distribution of this subpopulation. The potential for increased numbers of flooding events could also lead to increases in the occurrence of hoof disease and other deer maladies. There are no known existing regulatory mechanisms currently in place at the local, State, national, or international level that effectively address these types of climate-induced threats to CWTD habitat.

The National Wildlife Federation has employed a model to predict changes in sea level in Puget Sound, Washington, and along areas of the Oregon and Washington coastline. The study predicted an average rise of 2.26 feet in the Columbia River region, compared to a global average rise of 0.92 feet by 2050 (Glick et al. 2007). The local rise in sea level translates into an estimated loss of over 11,000 acres of undeveloped dry land by 2050. Tidal and inland fresh marsh habitats also face high losses according to this model. By 2050, these low-lying habitats could lose from 17 to 37 percent of their current area due to an influx of saltwater. In addition, since the JBH NWR Mainland and Tenasillahe Island were diked in the early 1900s, the land within the dikes has subsided, causing the land in those areas to drop to a level near or below groundwater levels. This in turn has degraded CWTD habitat quality. Although saltwater intrusion does not extend this far inland, the area experiences 7- to 8-foot tidal shifts due to a backup of the Columbia River. Sea-level rise may further increase groundwater levels in both of these areas, as well as other areas occupied by CWTD. The long-term stability of the Columbia River DPS of CWTD may rely on the availability of and access to high-quality upland habitat protected from the effects of sea-level rise; however, in the foreseeable future, climate change is not a threat that puts the Columbia River DPS at risk of extinction.

Conservation Needs of the Species

Habitat Needs

CWTD evolved as a prairie edge/woodland-associated species with historically viable populations that were not confined to river valleys. CWTD were then extirpated in all but two areas of their historical range: the Columbia River DPS area and the Douglas County DPS area. The remnant Columbia River DPS population has been forced by anthropogenic factors (residential and commercial development, roads, agriculture, etc., causing fragmentation of natural habitats) into the lowland areas it now inhabits. Urban, suburban, and agricultural areas now limit population expansion, and existing occupied areas support densities of CWTD indicative of moderate to low-quality habitats, particularly lower lying and wetter habitat than that with which the species would typically be associated. CWTD need continued protection of remaining habitats and improvement in habitat quality. Forage quality, cover, and secure habitats are all necessary for CWTD.

Population Needs

As mentioned above, the most-important requirements for the survival of the CWTD population appear to be an adequate quantity and quality of habitat with an available food supply within or close to escape cover, and habitat that is secure. According to the Revised Recovery Plan for the CWTD (USFWS 1983), full recovery of the species (to a condition where delisting of the DPS would be warranted) would occur when a minimum of 400 CWTD are distributed in at least three viable subpopulations located on suitable, secure habitat. To meet the down-listing criteria, only two viable and secure subpopulations are required. Habitat is considered secure according to Recovery Plan criteria only when it is free from adverse human activities in the foreseeable future and relatively safe from natural phenomena that would destroy its value to CWTD (e.g., areas prone to flooding). The Revised Recovery Plan indicates that, for a CWTD subpopulation to be classified as viable, the minimum population size of that subpopulation must remain above 50 deer (in November) in secure habitat. The total population of the Columbia River DPS of the CWTD is currently estimated at approximately 850 animals. As of the 5-year review, there were three viable subpopulations of CWTD: Tenasillahe Island at 90 deer, Puget Island at 159 deer, Westport/Wallace Island at 163 deer. These subpopulations now number about 160, 227, and 175 respectively. Two of these viable subpopulations, Tenasillahe Island and Puget Island subpopulations, are located on what is considered "secure" habitat (USFWS 2013a). Recovery goals listed in the Recovery Plan for the CWTD (USFWS 1983) include ensuring the viability of each subpopulation and securing the habitat of extant subpopulations of the CWTD. Quality of habitat is a limiting factor for CWTD subpopulations. The deer that are located in higher-quality habitat have consistently higher population rates (Puget Island and Wallace Island/Westport). At the time of the 5-year review, the Service stated that "future recovery efforts must focus on securing high-quality upland habitat for the species".

According to the 5-year review (USFWS 2013a), the translocation of CWTD to Ridgefield NWR is expected to result in the stabilization and subsequent viability of the new secure CWTD subpopulation at Ridgefield NWR. Meanwhile, the JBH Mainland has recovered to 88 deer, and the setback levee is currently being completed. This, in addition to a small expansion of the Ridgefield subpopulation will result in two additional viable and secure subpopulations in the Columbia River DPS, effectively satisfying the delisting criteria for the DPS laid out in the Revised Recovery Plan (1983).

Conservation Strategy and Current Management

The Columbia River Distinct Population Segment of the CWTD is federally endangered and CWTD are State endangered in Washington and listed as a "sensitive-vulnerable" species in Oregon. Management of CWTD is guided by the revised recovery plan (USFWS 1983).

The CWTD working group consists of representatives from the Service's Refuge and Ecological Services offices, the Cowlitz Indian Tribe, the Washington Department of Fish and Wildlife (WDFW), and the ODFW. The group has been meeting on a regular basis for several decades to discuss recovery priorities and actions, and continues to have monthly conference calls and occasional meetings to discuss and coordinate CWTD recovery in general. Current management focuses on reducing mortality, securing high-quality habitat, and increasing the distribution and number of deer within subpopulations.

Current Condition of the Species

The Columbia River DPS of the CWTD is currently estimated to contain about 850 individuals occurring along the lower Columbia River in Wahkiakum and Cowlitz Counties, Washington, and Clatsop and Columbia Counties, Oregon. CWTD within the Columbia River DPS are distributed in six subpopulations. Because deer will disperse beyond home ranges, CWTD may be found outside of the geographical boundaries of these six subpopulations – but the six subpopulations represent the substantive population groups within the Columbia River DPS. Each of the subpopulations is geographically separated by major channels of the Columbia River.

CWTD are currently impacted or are likely to be impacted in the foreseeable future by one or more of the following factors: 1) habitat loss and degradation of habitat; 2) low fawn and doe survival (including predation and vehicle collisions); and 3) flooding and its associated effects to habitat and to individual deer.

Initial analysis from a minimum viable population model (Skalski 2012) suggests that the probability of extinction for the Columbia River DPS with 3 subpopulations of 50 CWTD each is less than 1 percent over the next 50 years. In addition, given the population distribution at that time, the model suggests a less than 1 percent likelihood of extinction for this DPS over the next 100 years (USFWS 2013a). However, we now have all six subpopulations at or above 50, four of which are 140 or more. CWTD in the Columbia River DPS currently exceed the targets for down-listing to threatened status. While the population has fluctuated over time, the range of the DPS has greatly expanded as a result of translocation efforts, and deer subpopulations now occupy habitat within the action area.

ENVIRONMENTAL BASELINE

Regulations implementing the ESA (50 CFR 402.02) define the environmental baseline as the past and present impacts of all Federal, State, or private actions and other human activities in the action area. Also included in the environmental baseline are the anticipated impacts of all proposed Federal projects in the action area that have undergone section 7 consultation, and the impacts of State and private actions which are contemporaneous with the consultation in progress.

Status of the Species in the Action Area

The area where deer could be affected by the proposed action is comprised of areas within the current and future range of the CWTD between Portland and Seattle along and adjacent to the tracks where noise and other physical and chemical changes may be found. Specifically, the action area includes land within the project footprint and within 1,196 feet where construction noise may be heard. It also includes lands outside the project footprint that lie along the tracks within the range of the CWTD (e.g., Kelso to Vancouver Lake). These specifically include the areas adjacent to tracks along Ridgefield NWR in Clark County as well as other portions of Cowlitz and Clark County that are along the tracks. In those areas, deer could be affected within 1,640 feet on either side of the track through noise and could be struck and injured if within 25 feet of the tracks.

Distribution

Within and adjacent to the action area, CWTD are located in two general areas: 1) Ridgefield NWR and adjacent ownerships; and 2) Other areas along the Columbia River including lands near Cottonwood Island. Following historical extirpation, it has only been recently that CWTD have again been found in these areas, directly and indirectly as a result of translocations to Ridgefield NWR and Cottonwood Island. A translocation program began in 2009 that relocated several deer to Cottonwood Island, located in the Columbia River to the west of the projects. A second translocation of deer to Cottonwood Island occurred during 2013. The CWTD on Cottonwood Island are likely comprised of approximately 10 to 20 individuals who often move off the island (E. White pers. comm. 2013 as cited in Shannon & Wilson, Inc. 2014; and K. Brenner pers. comm. 2014). CWTD were relocated to Ridgefield NWR in 2013 and 2014. The current estimates are 43 CWTD on or adjacent to Ridgefield NWR with an additional 5 further to the south near Vancouver Lake.

We anticipate that the distribution of CWTD will continue to change as they pioneer new areas that are now available to them. For instance, CWTD were released on only portions of Ridgefield NWR but are anticipated to become distributed throughout the refuge as well as neighboring private and public lands

CWTD have been located around the Talley Way Industrial Area. However, deer do not appear to make much use of the habitat between the existing tracks and Interstate 5 (Meyers, P. pers. comm. 2013 as cited in Shannon & Wilson, Inc. 2014), except for some use in a small area between the tracks and interstate south of the industrial area (Brenner, K., pers. comm. 2014). CWTD also make use of the Owl Creek area and unmarked fawns have been documented in the area. CWTD from Cottonwood Island appear to be using the habitat to the west and southwest of Task 6 (Brenner, K., pers. comm. 2014).

Cottonwood Island is approximately 3.5 miles downstream (e.g., north) from the Task 5 work corridor. At the most upstream end of Cottonwood Island, a nearly 0.25 mile-wide portion of Carroll's Slough separates the island from the Kalama Flats, a preserved conservancy area about 2 miles north of the Kalama River and the north end of the Task 5 work area. Between Kalama Flats and the Task 5 work area is an industrial complex of over 200 acres bounded by the

Columbia River to the west and the BNSF mainline tracks/Interstate 5 corridor to the east. Several deer have been observed from time-to-time using habitats around the port of Kalama, but the Project work corridor and BNSF right-of-way do not generally provide the type of vegetated areas that normally would be considered "suitable" habitat. While CWTD may occasionally wander into the work area from adjacent areas, it is unlikely for CWTD to spend a considerable amount of time in these areas or to depend on these areas for any of their life-history requirements. Suitable habitat exists within the action area, and to a much lesser extent within the project sites.

Numbers and Reproduction

The historical decline in the action area and extirpation of CWTD from the action area was due to the same factors that were addressed in the Status of the Species section. Following the translocations of 2014, there were estimated to be 48 CWTD on Ridgefield NWR or to the south, as well as an unknown number on the mainland near Cottonwood Island.

The highest densities of CWTD in the actions area in the foreseeable future are expected to be along Ridgefield NWR. Ridgefield NWR is located near the town of Ridgefield, Washington, and is comprised of 5,218 acres of marshes, grasslands, and woodlands of which about 3,800 acres are terrestrial habitat, or almost 6 square miles. If translocations are successful, it is possible that CWTD numbers may rise to a high level prior to establishing a long-term balance with their habitat. In addition, there are additional areas off the refuge where CWTD have already traveled and may continue to expand, as well as areas CWTD have not yet accessed but may eventually reach and occupy. It is feasible that deer on and adjacent to Ridgefield NWR may peak at 500 or more (approximately 100 deer per square mile in some locations and less in some others). Long-term numbers would more-likely fluctuate around 120 to 240 CWTD (approximately 20 to 40 deer per square mile).

Factors Affecting the Species in the Action Area

Primary factors affecting the current status of the species in the action area are historical declines and extirpation, followed by recent translocations and movements of CWTD. Below we review other potential factors that are currently operating or may operate on CWTD populations in the foreseeable future.

Habitat Loss and Forage Quality

We do not anticipate that these factors will be substantially different than described in the Status of the Species section.

Ridgefield NWR is separated into five units, including the Carty, Roth, and Bachelor Island units where the translocated CWTD were first released in early 2013. The Carty Unit supports mixed deciduous habitat with oak savannah comprising a large portion of the unit. The area contains some areas of moderate to sparse reed canary grass, with upland meadows supporting a variety of grasses and forbs. This area also contains large areas of dry soils above the normal flood level. The Roth unit represents more of a parkland mosaic, with dense deciduous tree stands and open meadows. The topography within this unit consists of fingers of high ground separated by swales. The three remaining units (Bachelor Island, River S, and Ridgeport Dairy) all contain large areas of low-lying meadow or seasonally-flooded wetlands with pockets of woody cover. Most of the open areas in the River S and Bachelor Island units consist of low-lying meadows and wetlands. Adjacent to Ridgefield NWR is a mix of suburban residential, fields, and cover that may also provide habitat to CWTD.

Other lands located near Kalama (e.g., Kelso to Woodland) are also now home to some CWTD. These areas are similar to Ridgefield NWR in that there are some secure lands nearby as well as a variety of habitat types. These deer apparently originated from Cottonwood Island. However, in comparison to Ridgefield NWR, we anticipate fewer deer to occupy these mainland areas in the long term.

It remains to be seen how CWTD adjust to their new habitats and how these provide for their nutritional needs. However, there do appear to be a wide variety of habitats available on the refuge (and adjacent upland areas) as well as on lands near Kalama (e.g., Kelso to Woodland) that may support CWTD.

Disease, Parasites, Predation, and Biological Interactions

We do not anticipate that these factors will be substantially different than described in the Status of the Species section.

Stabilization of the new subpopulation at Ridgefield NWR would eventually lead to a range expansion of CWTD into areas away from the release sites. Currently black-tailed deer occur in nearly all of the areas that the CWTD may eventually occupy. As CWTD population expands, it is expected that a certain level of habitat partitioning will occur, and that black-tailed deer will be replaced in marginal habitats that are more suited to CWTD. CWTD may be exposed to other animals and therefore diseases and parasites as they pioneer more “urban/suburban” areas.

Genetics and Hybridization

We do not anticipate that these factors will be substantially different than described in the Status of the Species section.

As CWTD population expands, it is expected that a certain level of habitat partitioning will occur, and that black-tailed deer will be replaced in marginal habitats that are more suited to CWTD. However, this may also result in additional opportunity for hybridization as this change in species composition progresses.

Collisions

CWTD near Kalama and Ridgefield NWR may be exposed to a higher level of vehicle and train traffic and larger highways than they have experienced elsewhere in their range. We anticipate that vehicle collisions may represent a higher proportion of the annual mortality than was seen in other subpopulations. We anticipate that train collisions may not be as frequent as vehicle collisions, but there is a dearth of information on this subject. We do note that other than a few bridges, the tracks are located at ground level with little to no provisions for wildlife crossing, and therefore, little amelioration of the probability of collision.

WSDOT (2009) estimated that an average of between 55 and 92 trains per day will travel through the Kelso to Martin's Bluff corridor. The 55 trains is a 2008 estimate. The 92 trains is the estimate for the average daily number of trains in 2028. Other estimates have been that 70 freight trains use the corridor each day. However, much of this is freight train traffic which may be much slower, albeit with a wider strike area. Freight trains run at all times of the day and night. We anticipate that that the strike rate for freight trains would be somewhat less than for high-speed passenger trains. (Refer to the Effects of the Action section for an explanation of the considerations in developing collision rates). We estimate that 2 to 4 CWTD may be struck each year by freight trains.

Passenger trains (Coast Starlite and Amtrack Cascades) that currently run may strike deer as well, even without the additional speed resulting from this project. Even without the additional trains added by this project, the existing schedule includes morning trains and trains running beyond sunset, a time when strikes become increasingly probable. If we consider that morning and evening trains have the highest probability of striking a deer, we estimate that 0.5 to 1 CWTD may be struck each year by existing passenger trains without the additional effects of the project described below.

In total, up to 2 to 5 CWTD may be struck annually in the foreseeable future regardless of whether the project occurs. This estimation is for the existing condition of traffic with the newly introduced CWTD, and what would continue into the future if the project did not happen.

Illegal Purposeful Killing

We do not anticipate that these factors will be substantially different than described in the Status of the Species section. However, the proximity of pioneering CWTD to areas of dense human population may lead to increased rates of illegal killing as their range expands. Deer translocated to Cottonwood and Ridgefield have experienced 2 known and 1 suspected poaching events. This is a high rate compared to rates of suspected poaching in established areas. It is likely that events such as these will decrease as people become more educated to the presence and status of CWTD, but as deer enter new areas there will be a period of education where poaching will probably be more likely, but still low enough not to significantly affect the population. We believe that illegal killing will be more likely off Ridgefield NWR than on it.

Flooding

We do not anticipate that these factors will be substantially different than described in the Status of the Species section.

Climate Change

Climate change is an atmospheric response to high carbon dioxide levels caused by Federal and nonfederal actions that has significant implications on weather that will likely influence the condition of species and alter (lessen or magnify) the effects of human proposed actions on species. The anticipated effects within the action area are the same as discussed in the Status of the Species section.

Ongoing Management

Several releases of CWTD have occurred on Ridgefield NWR and Cottonwood Island. CWTD from Cottonwood Island have reached adjacent mainland areas. At least one additional future release is being planned for Ridgefield NWR. Concurrently, the USFWS is working with Wildlife Services to conduct predator control on Ridgefield NWR. Translocation of additional CWTD to Ridgefield NWR is anticipated to improve the numbers and genetic diversity of CWTD on Ridgefield NWR. Source areas have abundant numbers of CWTD and would be expected to return to normal numbers within 2 years or less.

Capture attempts are not always successful (Sullivan et al. 1991; White and Bartmann 1994; Haulton et al. 2001) and during an unsuccessful attempt the deer will still be harassed through disturbance. Even when a deer is successfully captured, some negative responses would occur due to the stress of capture attempts and the stress of release to an unfamiliar location. Translocation can also result in deer injury and mortality. The Service takes all reasonable precautions to avoid and minimize injury and to maximize an animal's chance of survival following release.

Post-release mortality is less understood than capture mortality. When the muscle is exerted, its metabolism changes from aerobic to anaerobic and it uses stored energy in the muscles. This leads to a series of physiological changes. This process, known as exertional myopathy or capture myopathy, is considered a noninfectious disease of animals characterized by degenerative or necrotizing damage to skeletal and cardiac muscles associated with physiologic imbalances after extreme exertion and stress (Williams and Thorne 1996). In mammals, the disease has been documented primarily in ungulates after capture or restraint, hence common use of the more-restrictive term "capture myopathy".

Because deer are given antibiotics and supplements, they often have better survival than resident deer. But that can be offset by mortality resulting from unfamiliar surroundings (e.g., vehicle strikes or poor nutrition). Clark (USFWS 1988) translocated 64 deer from Puget Island in 1986-1988 and found no higher mortality than the baseline rate of resident deer (USFWS 2005). Expected natural annual mortality is 20 percent for does and 40 percent for bucks (Gavin 1984).

However, post-release mortality can vary widely due to deer condition and factors at the release site. Post-release mortality may include capture myopathy, or less direct and poorly understood mechanisms such as increased predation or accidents. The Service takes steps during capture attempts and during handling and transport to reduce the stress to CWTD. Steps taken during these stages can significantly alter the rate and severity of myopathy, and may also help reduce other causes of post-release mortality.

Translocation represents a redistribution of deer within the Columbia River DPS and has established the Ridgefield subpopulation. It has also facilitated the establishment of home ranges north of Ridgefield NWR near the Kalama River. In association with such translocations, control of predators has been conducted to support fawn and doe survival. Ultimately, these management actions should enhance the distribution and viability of the Columbia River DPS of CWTD and result in a net benefit to the population. These management actions are expected to contribute to the conservation of the Columbia River DPS by establishing additional viable and secure subpopulations.

<u>Regulatory Mechanisms</u>

Although there is no State Endangered Species Act in Washington, the Washington Fish and Wildlife Commission has the authority to list species (RCW 77.12.020) and they listed CWTD as endangered in 1980. State listed species are protected from direct take, but their habitat is not protected (RCW 77.15.120). Under the Washington State Forest Practices Act the Washington State Forest Practices Board has the authority to designate critical wildlife habitat for State listed species affected by forest practices (WAC 222-16-050, WAC 222-16-080), though there is no critical habitat designated for CWTD. The WDFW hunting regulations remind hunters that CWTD are listed as endangered by the State of Washington (WDFW 2014, p. 16, 18, 81, and 82). This designation means it is illegal to hunt, possess, or control CWTD in Washington. This designation adequately protects individual CWTD from direct harm, but offers no protection to CWTD habitat.

The Washington State Legislature established the Forest Practices Act in 1974 (Chapter 76.09 RCW). The Forest Practices Act formed the Forest Practices Board and gave them the authority to develop rules to implement the Forest Practices Act and to amend the rules as necessary. The Washington State Department of Natural Resources (WDNR) is responsible for implementing the Forest Practices Rules and is required to consult with WDFW on matters relating to wildlife, including CWTD. The Forest Practices Rules do not specifically address CWTD under critical habitats (WAC 222-16-080), but they do address threatened and endangered species under their "Class IV-Special" rules (WAC 222-10-040; WDNR 2014, pp. 10-2 to 10-3). If a landowner's forestry-related action would "reasonably…be expected, directly or indirectly, to reduce appreciably the likelihood of the survival or recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species…" the landowner would be required to comply with the State's Environmental Policy Act guidelines before they could perform the action in question. These guidelines can require the landowner to employ mitigation measures or they may place conditions on the action such that any potentially significant adverse impacts would be reduced. Compliance with the Forest Practices Rules does not substitute for or ensure compliance with the Federal ESA; however a permit or consultation under ESA is recognized by the Forest Practices Rules. A permit system for the scientific taking of State-listed threatened and endangered wildlife species is managed by the WDFW.

The WDNR manages 1.8 million acres of forested Trust land under a multiple species Habitat Conservation Plan (HCP). Their HCP technically includes the CWTD, as their land ownership overlaps the range of the deer. Some of these lands are leased to private entities for agricultural uses (WDNR 1997, p. III-51). However, the WDNR HCP does not address agricultural activities and the leasing of agricultural lands. Any take of CWTD that may result from agricultural activities on those lands, is not authorized under the HCP. Some non-timber resource activities that occur on the forested lands are covered to the extent that impacts to CWTD do not exceed the levels of impact present in 1996. At the time of signing of the HCP, WDNR also leased lands to the JBH NWR. However, those lands have since been purchased by the Service. Three other HCPs address CWTD through a habitat-based approach, but are located in areas well outside the current distribution of CWTD (and most likely outside the historical distribution) and are therefore unlikely to affect CWTD in the foreseeable future.

Conservation Role of the Action Area for the Species

The action area is a relatively small area that is long and narrow and contains only small amounts of habitat suitable for CWTD. The most-important roles of the action area are to: 1) Provide connectivity of habitats on either side of the tracks; and 2) Minimize the tracks contribution to direct mortality of CWTD so that the Ridgefield NWR subpopulation and Upper Estuary Islands subpopulation can continue to increase in numbers and distribution and support the function of the DPS.

Current Condition of the Species in the Action Area

Stabilization of the new subpopulation at Ridgefield NWR and nearby mainland areas would eventually lead to a range expansion of CWTD into some human-dominated landscapes. Such expansion represents a return to the historical range, but also may lead to human/animal interaction in areas away from the release sites. Currently, the number of CWTD in the Ridgefield NWR subpopulation is below objectives and may receive additional supplementation from other subpopulations in the foreseeable future. It remains to be seen how the deer adjust to this area and the quality of forage the area will provide. Active predator management may improve fawn survival. The action area contains habitat for CWTD and in some places, hiding cover is present on both sides of the tracks indicating a heightened potential for crossings; however, there are few safe places for CWTD to cross the tracks.

EFFECTS OF THE ACTION

The regulations implementing the ESA define “effects of the action” as “the direct and indirect effects of an action on the species or habitat together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline” (50 CFR 402.02).

Effects to Individual CWTD

The proposed action may potentially result in short-term and long-term effects to CWTD. Below we examine potential effects such as direct injury, habitat loss, and disturbance. These potential effects are described in greater detail in the following sections.

The proposed actions for Tasks 5 and 6 are similar and involve the following components:

- Construction
    - Clearing, vegetation removal, or management
    - Grading and substrate movement
    - Track installation
    - Installation of switches, lights, and minor infrastructure
    - Utility improvements
    - Construction-generated noise
- Operation
    - Operation of switches, signaling devices, lights, etc.
    - Operation of rail yard including trains stopping and starting, assembling of trains, shunting of cars (switching),
    - Intermodal yard operations, including the transfer of containers.
- Routine maintenance of infrastructure
    - Routine repairs (similar to construction)
    - Minor repairs (similar to operation)
    - Cleaning and upkeep
    - Track and infrastructure inspections
    - Other routine maintenance such as snow or debris clearing
    - Unscheduled operations as a result of equipment or infrastructure malfunctions
- Other Effects
    - Increased average speed
    - Increased train trips
    - Increased noise from increased train trips and increased average speed

<u>Exposure Analysis</u>

The exposure analysis presents the set of resources (species, populations, individuals, life stages or forms, or habitat elements) that are present in the action area and that are likely to be exposed to the action. These resources co-occur with the stressors caused by the proposed activities conducted in areas occupied by CWTD. This analysis provides a foundation for determining whether the action could result in a response by CWTD. The Response Analysis will then further analyze stressors to which CWTD may be exposed.

CWTD within and adjacent to the Action Area

Currently, the number of CWTD within the action area is relatively few. However, translocation of additional CWTD is planned for the 2014-2015 season and should help increase the numbers of CWTD on Ridgefield NWR. The introduced population will likely expand in numbers and distribution in the coming years. Populations of introduced large herbivores tend to increase to peak abundance following introduction to a new range, crash to a lower abundance, and then increase to a carrying capacity lower than the peak abundance (Leopold 1943; Riney 1964; and Caughley 1970). Typical irruption patterns of other introduced populations would lead us to anticipate an increasing number of CWTD with an eventual dense population for a period of time, followed by a decrease to a number in better balance with available habitat. Following the initial growth and decline periods, we would anticipate that the population would then remain relatively stable or fluctuate more mildly.

Populations of 70 to 100 deer per square mile, or more, are possible during such a peak population. But long-term densities would more likely stabilize /fluctuate around approximately 20 to 40 deer per square mile. Action area south of Kelso extends for 30 to 40 miles, including some areas that we would not anticipate to see deer on a regular basis. From Martins Bluff northward, suitable habitat may not be of the same quality as further south and may be quite isolated by the Columbia River and Interstate 5. However, CWTD in areas surrounding this northern portion of the action area may also increase in numbers and occupy a sizeable range along the tracks with some potential for crossings and interaction with trains. This area extends for about 16 miles south of Kelso to Martin's Bluff.

Another 16 miles of track south of Martins Bluff extends through or adjacent to potentially suitable habitat, and in some cases through higher-quality habitat. CWTD in the action area may occur on the tracks or within 25 feet of the tracks from time to time and may therefore be exposed to risk of being struck. CWTD deer in the action area may occur in habitats within 1,650 feet of the tracks and may be exposed to additional noise. Affected deer may include adults and fawns. Refer to the Anticipated Adverse Effects section for more details regarding timing and level of exposure to risk of being struck.

CWTD within the Work Zones

CWTD have been observed in the areas surrounding Task 5 and Task 6. However, in both Task 5 and Task 6 work areas, deer use is not anticipated to be frequent or persistent due to the lack of habitat and presence of industrial activity. While CWTD may occasionally wander into the work area from adjacent areas, it is unlikely for CWTD to spend a considerable amount of time in these areas or to depend on these areas for any of their life-history requirements. Introduced CWTD are present in areas surrounding each of the Tasks but are unlikely to be on tracks and in the train yard during the proposed construction, operation, and maintenance activities.

Activities with a Discountable Likelihood of Adverse Effects

Injury from Construction, Operation, or Maintenance Activities: None of these actions are anticipated to result in direct injury or contact with deer as the likelihood of deer being present in the construction area during construction is extremely unlikely and, even if they were present in the work area, it would be extremely unlikely that they would be co-located with the proposed activities and injured by such operations. Therefore, injury to CWTD from construction, operation, or maintenance activities is discountable. However, CWTD may be found throughout the area surrounding construction, operation, and maintenance activities. Effects from noise and disturbance are discussed below.

<u>Response Analysis</u>

This response analysis focuses on actions and their stressors that are likely to result in exposure to individual CWTD.

Activities Likely to Cause Insignificant Effects to Individual CWTD

The following actions are anticipated to result in only insignificant effects (i.e., effects that are not able to be meaningfully measured, detected, or evaluated) for the reasons discussed below.

Vegetation Removal from Construction, Operation, and Maintenance: There is currently little to no suitable habitat within the work areas and no grading, clearing, or grubbing is proposed in areas that have the potential to degrade suitable deer habitat. Construction, operation, and maintenance activities will remove vegetation but not in an amount that would be meaningful to the needs of any individual CWTD. Vegetation removal will be minimal and will occur in areas unlikely to be regularly used by CWTD.

Disturbance from Construction, Operation, and Maintenance: Noise, vibration, and human presence from construction, operation, and maintenance would have an insignificant effect on CWTD because there is little suitable habitat within the work areas and therefore CWTD are not expected to be in the work areas during such work. There have only been limited CWTD sightings in or near the work areas. CWTD have the ability to readily move away from areas of disturbance. Deer are resilient to disturbances and often habituate to local noises and regular activities. They seem to habituate to noises and vehicle / equipment presence more readily than to presence of humans on foot. Even if CWTD do exhibit some response to such disturbance, minor amounts of increased vigilance, small-scale movement, and increased use of cover are not likely to negatively affect individual CWTD.

Disturbance from Passenger Train Traffic: Noise from trains may vary in intensity and attenuation. In general, estimates for noise from locomotives may be approximately 83 dB at 100 feet (49 CFR 229.121). Other factors contributing to the noise include passing of trains on parallel tracks; movements on curved track sections which can generate wheel squeal; and passing of trains over rail track discontinuities such as switches, frogs, special track work, hot boxes, dragging equipment, wheel-impact detectors, joints for signalization, and at-grade intersections with roads and other rail infrastructure. Tracks in need of repair (loose joints, rough rail, ground settlements) can increase the noise from passing trains. Audible warning devices of all types (e.g., horns and whistles), whether mounted on the train or near at-grade road crossings may generate additional noise. Train horns, by regulation, must be 96 to 110 dB at 100 feet (49 CFR 229.129). Attenuation is affected by the weather, relative humidity, surrounding environment, and other factors and may be highly variable at greater distances. For distances greater than 1,650 feet or where topography is very irregular, the use of prediction methods for rail-traffic noise is not recommended (CTA 2011).

Increased rail traffic (4 trips per day) will result in some increased noise; however, it would only occur in one location for a short period of time each time a train passed and would occur within the corridor where such noise is a regular occurrence. Increased average speeds may increase noise, such as wheel squeal and clatter, but may also decrease noise from acceleration and deceleration. Increased average speed may decrease the amount of time that any one particular point is exposed to noise. Maximum speed would not change. Therefore, we believe it is remote and speculative to attribute any additional noise to poorly understood increases in average speed.

Deer are resilient to disturbances and often habituate to local noises and regular activities. The minor amount of increased noise from additional train trips through a corridor (with substantial existing train traffic) is not likely to elicit meaningful responses from individual CWTD. Therefore, we anticipate that if CWTD are present in surrounding areas, noise from additional train traffic would not have a measurable effect on CWTD.

Barrier effects: Whether roads act as barriers is largely unknown for most taxa even though such information seems critical in developing species management programs, especially for declining populations (Shepard et al. 2008). Forman and Alexander (1998) summarize some of the investigations on wildlife regarding barrier effects. Ito et al. (2005) documented a distinct barrier effect of railroad tracks in Mongolia when examining gazelles; they did not document any gazelles crossing the tracks. Dyer et al. (2002) found late winter barrier effects were evident as caribou crossed actual roads 6 times less frequently than simulated road networks.

Barriers are likely with less-mobile species, lower profile species, and roads that are wide and heavily used. As an example, it would not be surprising to see barrier effects manifest themselves when examining frogs and snakes, or certain mustelids. Regarding larger species such as ungulates and large carnivores, some species have behavioral patterns that may increase the likelihood of barrier effects. For instance, barrier effects may be greater in gregarious ungulates where factors such as group cohesion may influence animal decisions. However, white-tailed deer have shown a propensity to feed along roads and to cross roads (successfully and unsuccessfully). While transportation corridors may serve as a filter for white-tailed deer, we do not consider them complete barriers.

The tracks through most of the action area already exist and have been in use for many years. The corridor already receives significant traffic by both passenger and freight trains. The marginal change in traffic volume and speed of passenger trains is not likely to influence any barrier effect that may be ongoing. We do not anticipate that the tracks will become an increasing barrier as a result of the proposed actions. Therefore, we believe any barrier effects from the proposed action will be so small as to not be measurable.

Actions Likely to Cause Adverse Effects to Individual CWTD

Of all recorded wildlife-vehicle accidents in the United States, the vast majority involve deer, especially white-tailed deer (Hubbard et al. 2000). Increased injury or death of CWTD from deer-train strikes are the main factor that we have identified that could reasonably occur from the proposed projects. There are two factors that may cause increased strikes: 1) increased number of passenger train trips (including the timing of those trips); and 2) increased average speed of all passenger train trips. In both cases, the factors affecting deer are a result of modifications to passenger train traffic.

There is a certain level of strikes that would be anticipated to occur even if additional train trips were not added and existing train trips continued to travel at their current speeds. Our analysis in this Opinion will focus on the effects of the proposed Federal actions, which limits our analysis to the factors changed by the proposed projects - increased train trips and increased average speed. The proposed projects are not necessary for continuation of passenger train traffic at the current level or for continuation of freight traffic. Effects from the existing ongoing level of train traffic are considered to be in the environmental baseline for the CWTD (discussed above) and will be considered again later during an assessment of population-level effects.

Increased Train Trips

In order to assess the likelihood of strikes, we examined factors such as number of additional trips and timing of additional trips. We also needed to examine the likelihood of deer being present on the tracks which is a function of the frequency and duration of crossings or presence on tracks. Other than the possibility of some elevated sections of track over bridges, there are no absolute barriers to CWTD along the action area and deer can, and eventually will, go almost anywhere in the action area. However, we do recognize that some portions of the track may have higher likelihoods of collision than other portions.

Risk of collision varies with traffic (volume, timing, and speed), animal density and movement patterns, and the proximity of preferred habitats. Below we examine these and some additional factors that are likely to contribute to the probability of train - deer interactions either by affecting the likelihood and duration of CWTD on the tracks, or the probability of collisions if the CWTD are on the tracks.

<u>Amount of tracks within potential range of deer</u>: From Kelso to Martins Bluff vegetated areas near the tracks are limited, and may be quite isolated by the Columbian River and Interstate 5. However, there is some potential for deer to cross the tracks and subsequent interaction with trains. This area extends for about 16 miles south of Kelso to Martin's Bluff.

In addition, another portion of the tracks up to 16 miles in length south of Martins Bluff extends through or adjacent to vegetated areas. South of the Lewis River, these tracks are adjacent to about a mile of land north of the Ridgefield NWR, and then for the next approximately 7.5 miles, Ridgefield NWR lies west of the tracks. South of Ridgefield NWR, there is another approximately 2.5 miles of tracks that have vegetated areas to the west.

The vast majority of the tracks in the action area are at ground level. There are only a few bridges over rivers and large streams and no other sections of elevated tracks. Therefore, almost all 32 miles of track may experience some probability of trains striking deer, yet the probabilities are likely influenced by the habitats through which the tracks pass.

Adjacent habitat and potential to affect track usage: While deer and deer-vehicle collisions may be widespread, their occurrence is not randomly distributed across the landscape. Certain road sections ("hotspots") and certain times of day have a much higher occurrence of wildlife–vehicle collisions than one would expect if these types of collisions would be truly random in time or space (Huijser et al. 2007). Studies show road kills tend to be spatially aggregated with a small percentage of locations accounting for a large proportion of kills (Puglisi et al. 1974, Bashore et al. 1985, Hubbard et al. 2000, Malo et al. 2004). A similar trend was seen on Hokkaido Island, Japan, by Ando (2003) when examining deer collisions caused by trains. A majority of the kills (97 percent) within the 7-km long study area occurred within a 2 km section of track.

Areas with high risk of collisions can be predicted to a fair degree from vegetation and topography. Forest cover and its proximity to the road are also important predictors of collision risks with other ungulates, such as white-tailed deer in Illinois and Pennsylvania (Puglisi, Lindzey and Bellis 1974; Bashore et al. 1985; Finder et al. 1999) and roe deer in Austria and France (Kofler and Schulz 1987 as cited in Seiler 2005; Berthoud 1987 as cited in Seiler 2005). Foraging deer are often killed between fields in forested landscapes and between wooded areas in open landscapes (Bellis and Graves 1971, Romin and Bissonette 1996.); as deer in open landscapes concentrate near cover while deer in forested landscapes concentrate on foraging opportunities.

Yet the effect of forest habitat depends on the composition of the wider landscape; where preferred habitat is extensive and common, deer accident sites were more randomly distributed (Allen and McCullough 1976; Bashore et al. 1985; Feldhamer et al. 1986). White-tailed deer and vehicle collisions are typically associated with mixed landscapes that provide cover (forests, shrub land) as well as food (more open areas with grasses, herbs, crops, but also young trees)(Finder et al. 1999, Huijser et al. 2007). A high heterogeneity and diversity of the landscape, proximity to cover, and the occurrence of edge habitat (transitions from cover to more open habitat), riparian habitat, and shrub land are strongly associated with the presence of white-tailed deer and white-tailed deer-vehicle collisions (Finder et al. 1999, Huijser et al. 2007, Puglisi et al. 1974, Mundinger 1979, Leach 1982, Arno et al. 1987, Leach and Edge 1994, Nielsen et al. 2003, and Rogers 2004).

Many studies have shown that linear landscape elements, such as riparian corridors, ditches, steep slopes, or ridges, as well as fences, may funnel animals alongside or across the roadway, increasing the probability of collision (Bashore et al. 1985, Feldhammer et al. 1986, Madsen et al. 1998 as cited in Seiler 2005, Finder et al. 1999, Hubbard et al. 2000). Gunson and Cleveneger (2003) did not find that the presence of a waterway drainage perpendicular to the roadway was a significant factor related to mortalities in all watersheds. This can largely be explained due to the presence of a bridge associated with some of the water crossings, which may have provided a tunnel for wildlife to traverse the highway. In addition, many of the water crossings were associated with steep topography typical of mountain landscapes, which may cause animals to travel the highway corridor in search of more-level crossing locations. Gunson and Clevenger (2003) found that habitat was useful as a predictive variable, but its effects differed by watershed conditions.

The relationship between slopes and collisions is uncertain (Huijser et al. 2008). Carbaugh (1970) found that deer favored steep declines and inclines and rarely used level areas. By contrast, Malo and others (2004) found that lateral embankments, especially with guardrail, negatively correlated with collisions. Alexander and Waters (2000) found that slopes less than 5 degrees were optimal for wildlife movement, but that west to south facing slopes were also indicative of locations with wildlife movement. Pellet (2004) found that on a section of Interstate 90 near Bozeman, Montana, as the absolute mean slope increased up to 19.5 percent, ungulate vehicle collisions decreased; while further increases in slope led to an increase in collisions. This may have been due to the fact that steeper slopes are found near Interstate 90 in areas connecting mountainous areas (Bridger and Gallatin Range) and are frequent travel corridors. In the Gallatin Valley, most of the land is flat and fertile. Moderate slopes are generally found in areas with less-fertile soils and fewer deer; and steeper slopes are found where ridgelines meet the Interstate. In the Gallatin Valley, riparian corridors and areas of cover were more influential than slopes in determining roadkill locations (Vogel, W., pers. comm. 2014).

Studies on wildlife and roads have demonstrated the potential for the effect of steep embankments on the potential for wildlife-vehicle collisions. In general, wildlife-vehicle collisions are substantially less likely when there is a topographic break between the roadway or railway and the surrounding landscape. Kusta et al. (2011) found, “Findings of body residues occurred in those sections where the line does not form a distinct height barrier, whether with its embankment or ditch. All killed individuals of roe deer (*Capreolus capreolus*) and European hare (*Lepus europaeus*) were found on open, flat sections of the track, in the vicinity of which the animals stayed over the long term.” The areas where animals “stayed over the long term” were areas near the croplands where they fed at night.

The slope on the sides of the railroad bed throughout much of this corridor is a likely factor affecting CWTD movement. In some areas, the slopes are very steep on one side (the uphill side), in other areas, there is also a steep slope on the downhill side. There are also places where the tracks have two uphill sides (where the tracks are built in a depression e.g., lower than immediately surrounding lands), or two downhill sides (where the tracks are built on a berm).

As we analyzed the actions area we considered that CWTD appear to show a preference for gentle terrain and cover. In open habitats when cover is available, deer-vehicle collisions are also more prevalent near cover which deer often use when traveling.

Below we analyze the tracks by sections to assess likelihood of deer use, likelihood of crossings, and available alternatives to crossing tracks. However, there are no absolute barriers to CWTD along the action area and deer can, and eventually will, go almost anywhere in the action area with the possible exception of some elevated sections.

<u>Kelso to Lewis River</u>: About 1.2 miles south of State Route 432 there is a road that goes under the tracks and another 0.5 mile south of that crossing, there is a bridge over a stream. The tracks

then go over the Kalama River on a bridge and, almost 0.5 miles to the north of the river the Kalama River Road goes over tracks. The Kalama River Bridge does not span any substantial amount of habitat on either side of the river, but deer have apparently been going under the bridge. There is a small island under the Interstate bridges that at least one deer uses frequently. Oak Street, just north of Kalama, crosses the tracks on an overpass. South bound lanes of Interstate 5 go over tracks at 0.4 mile north of Martin Island and again at the Dike Access Road near Woodland, Washington. The tracks then cross the Lewis River 1.5 miles east of its confluence with the Columbia River, but do not span any substantial amounts of habitat.

In most of this section, tracks have limited habitat along them due to the adjacent Interstate 5, Columbia River, industrial lands, and other factors. There are some small areas that would likely harbor deer. From Burke Island to the Lewis River (west of Woodland), the tracks pass through a mainly agricultural area, however, this area has relatively sparse cover for deer.

This section has some habitat and has had deer observed in this area. Proximity to Cottonwood Island and small areas experiencing current use will likely mean that there will be some deer using this area in the future. We anticipate the use of this area will be light in comparison to other sections of track further to the south; however, how deer use differing habitat patterns on either side of the interstate and railway may be difficult to predict and may depend on factors we have not yet considered.

<u>Lewis River to Town of Ridgefield</u>: Vegetated areas occur on both sides of the tracks along much of this section, although terrain is quite steep in some places and many areas west of the tracks are dominated by wetlands or open water. There are no apparent crossing structures in this section, with the exception of a possible culvert 1 mile north of the town of Ridgefield. However, the size of this culvert is not known.

This section has portions where the terrain is not excessively steep and there is cover on both sides of the tracks. We anticipate deer will use this area, but use will be unevenly distributed due to wetlands and terrain. Areas to the east of the tracks that may harbor deer include Lake Rosannah and associated woodlands as well as the intermixed residential wooded areas.

We consider this 2- to 3-mile section to be an area of concern. A cursory assessment of habitat conditions, including terrain, cover, land and water, and other factors that could hinder movements indicate three areas of probable crossings (Figures 2 and 3). From north to south, these crossings are: 1) 0.4 mile long and moderate probability; 2) 0.4 mile long and higher probability; and 3) 0.03 mile long and moderate probability. Other areas in this section may also be crossed by deer or be used by deer. The third, southern-most crossing area has a potential culvert of unknown size on its northern edge.

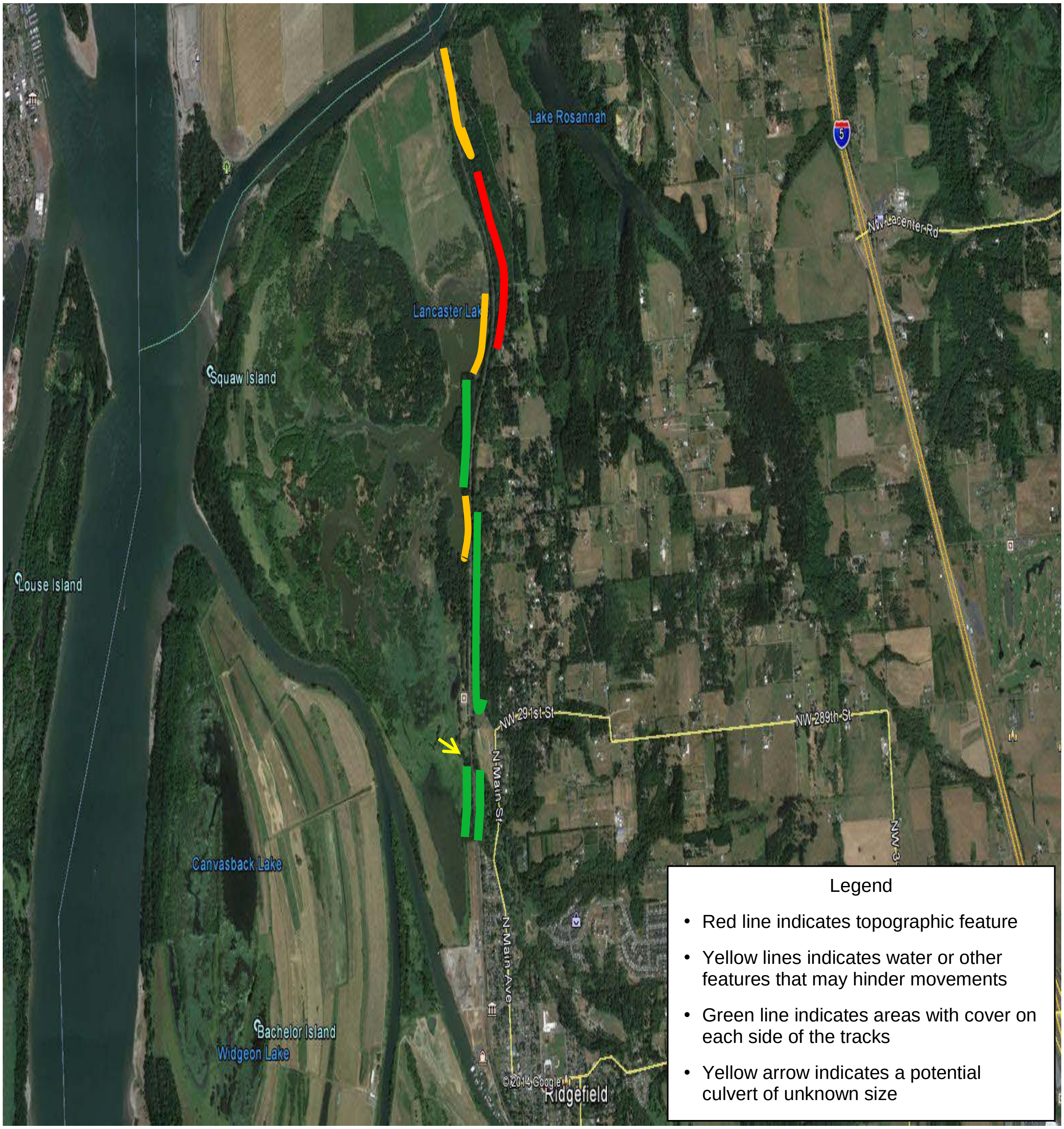

Figure 2. Assessment of Barriers and Permeability - Lewis River to Ridgefield

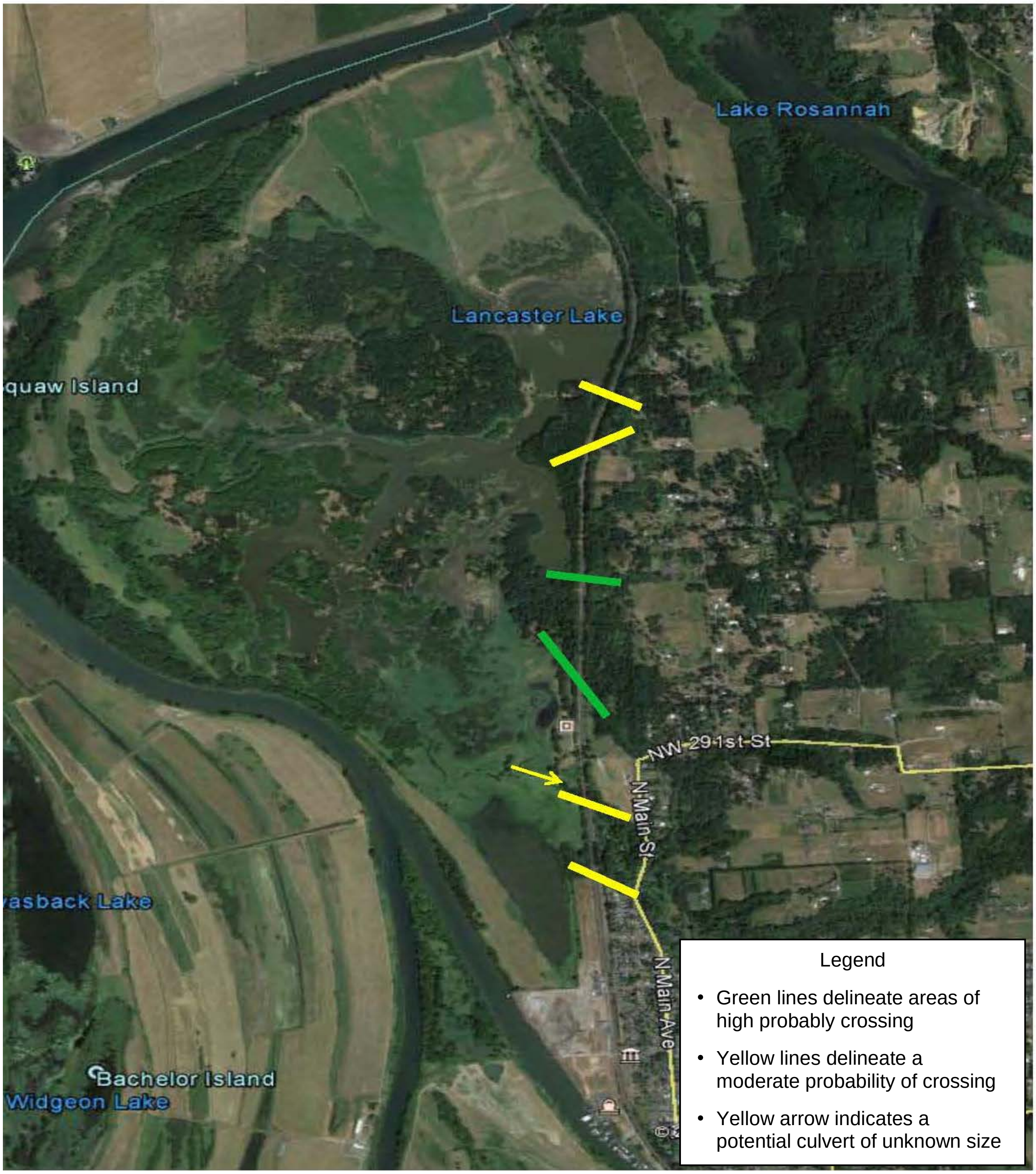

Figure 3. Assessment of Likelihood of Crossing - Lewis River to Ridgefield

Town of Ridgefield to Campbell Lake: There are significant areas of cover east of the tracks between Long Lake and Campbell Lake. Several draws are crossed by the tracks in the general area of Bowers Slough, but the areas between the draws are rather steep. Much of this section of track is bounded on the west side by the Vancouver Lake outlet. Therefore, in addition to crossing the tracks, deer would need to swim the outlet to access any substantial areas of habitat beyond the small amounts between the tracks and the outlet. However, CWTD move freely across the outlet. There is a bridge at 1.6 miles south-southwest of the town of Ridgefield and apparently a large culvert at 1.4 miles south-southwest of the town of Ridgefield.

We consider this 2- to 3-mile section to be an area of concern. Cursory assessment of factors that could hinder movements indicates three areas of probable crossings (Figures 4 and 5). All three of these crossings (number 4 through 6 from north to south) are 0.2 mile long and of higher probability. If the Vancouver Outlet is a substantial factor affecting deer movements, these crossings may only be moderate in probability. Other areas in this section may also be crossed by deer or be used by deer. Probable crossing area 5 potentially has a culvert of unknown size and crossing area 6 appears to have a bridge. The bridge may serve as an alternative to crossing the tracks.

Campbell Lake to Vancouver Lake: The tracks go over a bridge at NW Fales Road east of Campbell Lake and there is likely a large culvert near the north end of Green Lake. A box culvert road underpass exists near south end of Green Lake and there is another bridge across Salmon Creek near the Clark County Wastewater Treatment Facility.

While the concern about deer use of tracks in portions of this section may not be as high as some of the areas to the north, we consider approximately 3.5 miles of this section to be an area of concern. Cursory assessment of factors that could hinder movements indicates two areas of probable crossings (Figure 6 and 7). Crossing 7 is 0.2 mile long and of high probability while crossing 8 is only 0.1 mile or less and is of moderate probability.

Most of the track in this section is bordered on the west by either Green Lake or the Vancouver Lake outlet. We anticipate the use of this area will be light in comparison to other sections of track further to the north; and, therefore, the chances of deer-train interactions in this section are relatively low.

Summary of adjacent habitat and potential to affect track usage: Our assessment indicates 16 miles of track in which deer use of tracks is most likely (Martin's Bluff and South), although some use of the tracks will also occur between Martin's Bluff and Kelso. Between Martin's Bluff and Vancouver, the probability of deer use is relatively low along about 7.5 miles of track, slightly higher along about 3.5 miles, and higher along about 5 miles of track. Habitat conditions appear most suitable to deer on both sides of the track within a 2- to 3-mile section of track north of the town of Ridgefield, Washington, and another 2- to 3-mile section south of Ridgefield. An additional area of concern would be the next 3.5 miles of track to the south between Campbell Lake and Salmon Creek. Deer-train interactions appear most likely within these 5 to 8.5 miles of track ("Areas of concern"), even though deer could possibly be affected over a larger area.

Figure 4. Assessment of Barriers and Permeability - Ridgefield South

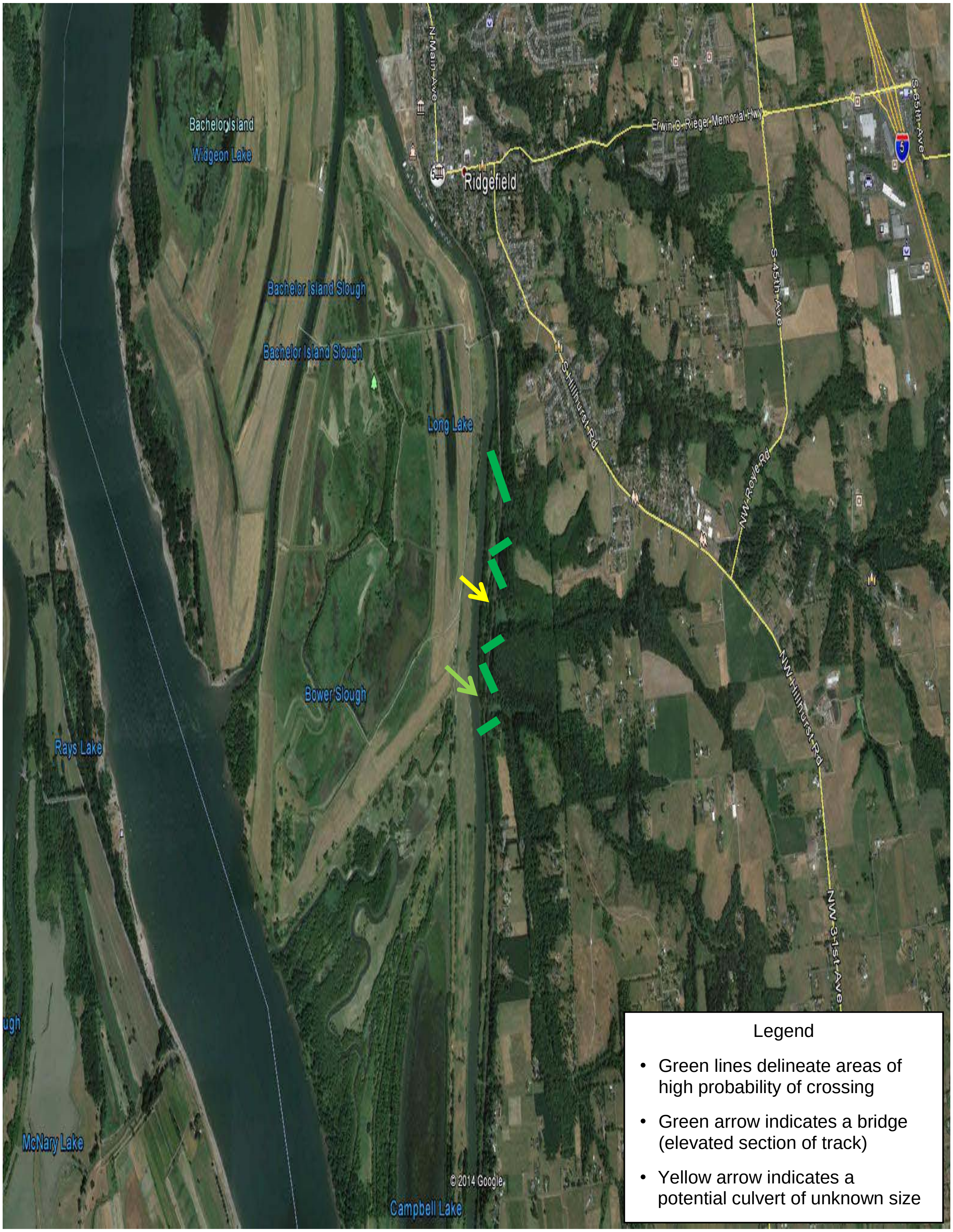

Figure 5. Assessment of Likelihood of Crossing - Ridgefield South

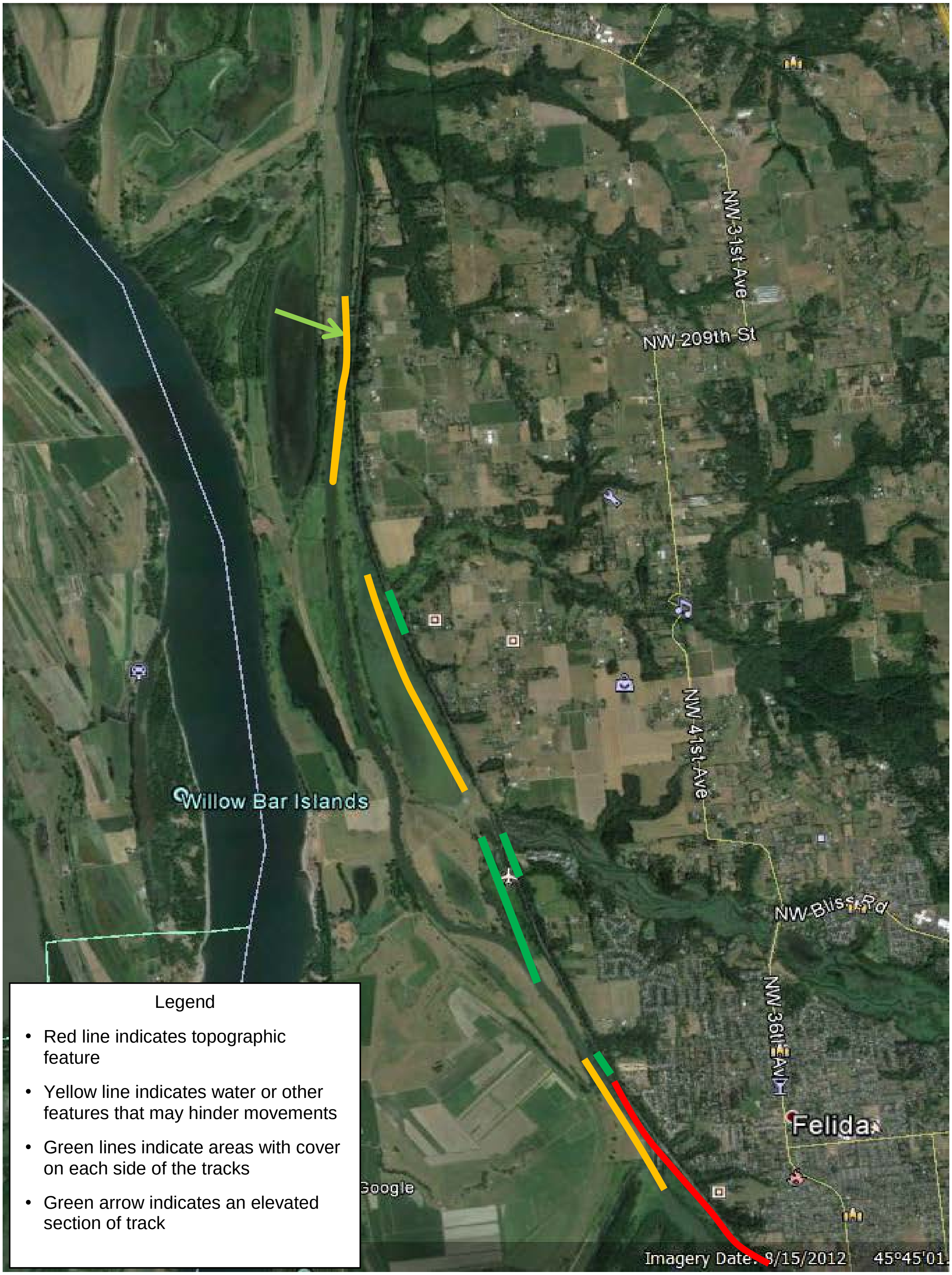

Figure 6. Assessment of Permeability and Barriers - South of Campbell Lake

Figure 7. Assessment of Likelihood of Crossing - South of Campbell Lake

We then focused on these 8.5 miles of "area of concern" and attempted to identify probable crossing areas within those areas of concern. Within the concern areas north of Campbell Lake totaling about 5 miles, we have identified six probable crossing areas comprising 1.0 mile with a high probability of crossings and 0.8 mile with moderate probability of crossings. In the area of concern between Campbell Lake and Salmon Creek about 3.5 miles in length, we identified 2 small probable crossing areas (0.2 mile high probability and 0.1 mile of moderate probability). In our subsequent analysis, we intend to rely on the estimates of 8.5 miles of concern areas, and 2.1 miles of probable crossing areas to assist us in estimating deer-train interactions.

We anticipate that crossings are likely to be relatively less frequent along most of the track than in certain other areas (probable crossing areas) where topographical and vegetative conditions are conducive to crossing. Other studies have also shown that a high portion of crossings may occur in a very small part of the landscape. We also tried to consider features such as bridges over riparian areas and/or areas where tracks are elevated, as well as other features at streams (e.g., box culverts) but were unable to obtain information about size, design, and location of such crossings.

<u>Documented deer usage</u>: Deer movements have been documented in the action area. These data are from Very High Frequency (VHF) collars and Global Positioning System (GPS) collars. GPS collars take frequent locations when satellites can be reached and represent a more complete dataset of the 24-hour day. VHF collars require staff on the ground and data are collected only 1 to 3 times a week usually around midday, whereas most crossings are likely to occur at dusk or dawn.

Existing telemetry data for relocated CWTD indicate that CWTD are likely travelling parallel to the tracks on Ridgefield NWR far more than crossing the tracks. This has also been supported by anecdotal observations. It is unclear whether they are avoiding tracks or the bank below the tracks, or whether they are merely showing preference for the vegetation types in the lowlands.

CWTD were translocated to Ridgefield NWR and Cottonwood Island during winter of 2013 and 2014. Both VHF collars and GPS collars were deployed. The most appropriate data are those collected from the GPS collars as they represent a fairly complete picture of deer movements over an entire day. They were programmed to attempt relocation every 2 hours and were mostly successful, with an average of about 11 relocations per day. When they failed to get a relocation or two, it led to some relocations being separated by 4 to 8 hours.

While the GPS observations represent a better dataset than the VHF data, they still contain some inherent bias. First, these data only represent does. Bucks tend to move more, especially during rut, and have slightly larger home ranges. Second, these data only represent 8 individuals, only 2 of which were from Cottonwood Island. Third, these data are from adult deer. Younger animals reaching adulthood may have a higher tendency to disperse. Finally, these data are from translocated deer. Translocated deer spend an initial period exploring soon after translocation and again just prior to fawning. This may increase the likelihood of crossing a track. Overall these data may not represent true crossing rates deer with established home ranges. Out of 8 does fitted with GPS collars, 3 crossed nearby railroad tracks during the period of observation. These 3 animals crossed multiple times.

Of the 2 does collared on Cottonwood Island, both crossed the train tracks at some point. The first crossed 5 times within an 8-day period and did not cross again, however this deer ended up being struck by a vehicle on Interstate 5, which runs parallel and near the train tracks. We monitored this doe for 154 days for a rate of 0.03 crossings per day. The second Cottonwood doe crossed 22 times in 499 days (0.04 per day), however this deer discovered a bridge over the Kalama River, and we think it was crossing under the tracks in the water for most of the crossing events.

Of 6 Ridgefield does fitted with GPS collars, 1 crossed nearby railroad tracks 6 times and 5 never crossed at all. All crossings for this doe occurred over a 15-day period within 30 days of being translocated, and then did not cross anymore. This deer died of natural causes at 168 days (1927 points) for a rate of 0.04 crossing per day over that 168-day period. Highest crossing rates were from evening and early night, and late morning (Table 2).

Table 2. Crossing times for CWTD crossing train tracks near Cottonwood Island and Ridgefield NWR, 2013–2014.

Time of Day	**00:01–04:00**	**04:01–08:00**	**08:01–noon**	**12:01–16:00**	**16:01–20:00**	**20:01–midnight**
Number of Crossings	4	2	6	4	10	7

Deer that did not cross tracks were simply less likely to be in the vicinity of tracks. The likelihood of a deer crossing the tracks is probably most affected by whether its home range is near a track or overlays a track. Obviously those deer that have home ranges away from a track have little opportunity to cross. Timing was another factor. Of the 3 deer that crossed the tracks, one only crossed within a 15-day period during 30 days of release and another only crossed within an 8-day period.

The VHF data should be viewed with caution as it contains many inherent biases, the greatest of which is that these data were collected 1 to 3 times per week during daytime hours, generally midday within about a 4-hour timeframe. As such, these data only reflect where a deer was at midday, about once per week. While this can lead to a general idea of home range over time, it misses any nighttime or crepuscular activity. In addition, detecting a track crossing requires the deer to move across the track and stay there for a week, or that by chance the deer happens to be located on the other side of the track the following week. Finally VHF data are from triangulation and can have a comparatively large amount of error associated with some of the relocations. Each point has a unique error around it depending on distance and angles of triangulation. The VHF data suggest a higher rate of individuals crossing tracks than the GPS data for Ridgefield deer and a similar rate of crossing for Cottonwood deer. However, the VHF sampling scheme does not represent a full picture of deer movement and any rates of crossing from this data are not likely to reflect true crossing rates.

The telemetry data indicate that CWTD that have crossed the tracks in some fashion were within or near riparian corridors and that riparian corridors (i.e., bridges) may have been used more than other areas for crossing the tracks and Interstate 5. We anticipate that when available nearby and when CWTD have a choice, CWTD may prefer riparian under-crossings as opposed to going up and over a potentially steep and rocky railroad grade.

Unfortunately, the existing telemetry data is relatively new and is only tracking deer that have been translocated from other parts of their range. These deer are relatively naive in their use of this habitat and are still present at lower densities. Usage patterns may shift substantially in the next few years as additional deer are translocated and as the population increases from reproduction. Deer that are more familiar with their surroundings may develop patterns that include crossings or deer that pioneer habitats east of the tracks may incorporate crossings into daily or seasonal movements.

Deer Density: The relationship between deer population density and the number of collisions seems intuitive, but this is not necessarily the case (Waring et al. 1991, Lehnert et al. 1998). Generally, increases in density of deer are likely to result in additional strikes. We anticipate that the density of deer will remain relatively low on the mainland from the Cowlitz River to the Lewis River due to dearth of habitat and relatively high level of development adjacent to the tracks. However, we do anticipate continued use by deer especially considering the proximity to Cottonwood Island.

We further anticipate density of deer will be at low levels south of Campbell Lake. We believe low densities will occur because of small amount of cover within vegetated areas and the linear narrow shape of many vegetated areas. Also this area will likely experience substantial use by humans as indicated by a high density of development and residential areas nearby. Between the Lewis River and Campbell Lake, we anticipate that a combination of reintroductions and reproduction of existing deer will establish a subpopulation on Ridgefield NWR and adjacent areas. Following the translocations in spring 2014, there were estimated to be 43 CWTD on Ridgefield NWR, 5 CWTD south of Ridgefield, as well as an unknown number near Cottonwood Island. However, additional translocations are planned for the 2014-2015 season.

The highest densities of CWTD in the action area in the foreseeable future are expected to be along Ridgefield NWR or adjacent areas. Ridgefield NWR is located near the town of Ridgefield, Washington, and is comprised of 5,218 acres of marshes, grasslands, and woodlands of which about 3,800 acres (approximately 6 square miles) are terrestrial habitat. If translocations are successful, it is possible that CWTD numbers may rise to a high level prior to establishing a long-term balance with their habitat. It is feasible that deer on and adjacent to Ridgefield NWR may peak at 500 or more (approximately 100 deer per square mile in some locations over more than 6 square miles). Long-term numbers would more-likely fluctuate around 120 to 240 CWTD (approximately 20 to 40 deer per square mile).

The number of CWTD will likely change over time and future numbers are quite uncertain. However, over the long term (approximately 20 years), we believe it is reasonable to assume that deer densities may average about 20 deer per square mile and therefore have used this density in our calculation below.

Daily Movements: Another key determinant in train collisions is the amount of movement by deer along and across the tracks. We anticipate that CWTD movements in the action area will follow patterns similar to what has been observed in ungulates elsewhere and discussed in the Status of the Species section. This indicates that CWTD will be exposed to additional collision risk during mornings and evenings, even though we do not have data specific to this relationship for CWTD. We anticipate daily patterns will vary by season and surrounding topography and vegetation. However, in general, we anticipate peak movements on a daily basis will occur at and following dusk, with another period of high daily movement near dawn. In addition to these crepuscular periods, we also anticipate that nighttime movements may be more common than movements during the day.

Looking at ungulate-vehicle relationships elsewhere, we note that Allen and McCullough (1976) indicated that deer-vehicle collisions involving white-tailed deer happened more frequently during the evening and at night in southern Michigan. In northeastern Minnesota, more moose (*Alces alces*) were struck by vehicles at night than during the day (Belant 1995). In Norway, trains running at night, in the morning, or in the evening experienced a higher risk of collision with moose than did trains running during the day; and the probability of collision was also higher during nights of full moons than during nights of half or no moons (Gunderson and Andreassen1998). The risk of collision was 5 to 6.8 times higher during the night, morning, or evening than during the daytime and 1.3 times higher during periods with a full moon than during periods with a new or half-moon (Gunderson and Andreassen1998).

Huijser et al. (2008) reported peaks in wildlife-vehicle collisions at 5 a.m. to 7 a.m. and 6 p.m. to 10 p.m. For large mammals, numerous studies have shown that collisions occur more frequently in the morning (5 a.m. to 8 a.m.), the evening (4 p.m. to 12 a.m.), in the fall (October and November), and in the spring (May through June)(Joyce and Mahoney 2001, Putman 1997, and Hughes et al. 1996). Huijser et al. (2008, Figure 8) suggests 5 a.m. to 7 a.m. and 5 p.m. to 12 midnight had higher rates of collisions, with a particularly pronounced peak from 7 p.m. to 11p.m.

In Finland, the recorded times for 13,379 crashes with moose and 8191 crashes with white-tailed deer were adjusted to sunset and sunrise. The highest crash peak relative to traffic volume occurred 1 hour after sunset for both species of deer. The relative risk peaked at 30 times the seasonal daytime level of the crash rate for white-tailed deer in the fall and at over 60 times for moose in the summer (Haikonen and Summala 2001).

For vehicles, peak traffic times and driver visibility during the first hours of darkness have been cited as contributing factors. Unlike vehicles, trains trips are more constant and visibility is not a factor, so daily activity patterns of deer seem to be the primary factor contributing to daily patterns in collisions with trains.

Seasonal Movements: CWTD are not migratory, but some movements will be more common at certain times of the year. We anticipate additional dispersal movements by yearling CWTD just prior to and during the fawning season, and anticipate additional excursions and exploratory movements during the pre-rut and the rut.

In northeast Minnesota, frequency of moose-vehicle collisions was similar between sexes, as was the number of vehicle collisions involving adults or calves. There were, however, differences in collision frequency between sexes over time. Thirty-six percent of collisions involving males (primarily adults) occurred during September and October in contrast to 19 percent of females. (Belant 1995). Regarding deer-vehicle collisions, Vogel (1983 p 33) reported that 46 percent of the yearling male carcasses collected during a study in Montana were collected during a 4-week period of late May to early June. A similar trend was found by Puglisi et al. (1974).

Train Traffic: Vehicle traffic volume explained 59 percent of the monthly variation in frequency of moose train collisions in northeastern Minnesota (Belant 1995). However, lower traffic volumes do not necessarily equate with fewer roadkills (Jaarsma and Willems 2002). In fact, collisions actually decrease when traffic volume increases to a high enough level that it is, in effect, a barrier (i.e., animals do not attempt to cross)(Jaarsma and Willems 2002, Huijer et al. 2000, Trocme et al. 2003). Several researchers have hypothesized an inverse relationship between successful and unsuccessful crossings and the barrier effect with increasing traffic (Trocme et al. 2003, Seiler 2003, and Alexander et al. 2005). However, vehicles travel busy roads more than trains travel on tracks. With respect to CWTD, we anticipate additional high-speed passenger trains will contribute to additional mortality.

Train Speed: Vehicle speeds seem to contribute to collisions with deer. In Yellowstone National Park, 41 percent of ungulate (primarily elk (*Cervus canadensis*) and mule deer) accidents occurred in roadway segments with a posted speed limit of 55mph but these segments represented only some 8 percent of the roadway within Yellowstone National Park (Gunther et al. 1998 as cited in Putman et al. 2004). Average operating speeds measured along the roadway segments with a 55 mph posted speed limit were about 9 to 16 mph higher than that posted. The operating speed measured along those segments with a 35 and 45 mph posted speed limit, however, were within 1 to 3 mph of that posted. Looking at elk in Canada, researchers concluded that a decrease in the posted speed limit had a significantly negative effect on the number of vehicle collisions that occurred (Bertwistle 1999 as cited in Putman et al. 2004). Vehicle speed can also increase frequency of moose collisions (Del Frate and Spraker 1991, Lavsund and Sandegren 1991). Danks and Porter (2010) found a 35 percent increase in moose collisions for every additional 5 mile per hour from 25 to 55 miles per hour, but this relationship was most-pronounced above 45 miles per hour.

Gunderson and Andreassen(1998) found that the probability of moose-train collisions increased with increasing train speed. For instance, an increase in train speed from 50 to 100 km/hour doubled the risk of collision. The slope of the association between train speed and moose collisions was not statistically significant; although the authors believed that reduced speed could serve as a means to reduce the number of moose-train collisions in certain areas during high-risk periods. The authors stated that “although the relation between train speed and moose collision is considerably uncertain statistically, the relation should nevertheless be considered carefully in the future prior to the introduction of faster trains. High-speed trains may increase the number of moose-train collisions considerably in the future, and in particular if careful attention to the time schedule when high-speed trains pass high-risk areas is not paid” (Gunderson and Andreassen1998). In Alaska, reduced trains speeds were tested but failed to reduce the likelihood of moose strikes. Speeds were reduced from 50 to 25 mph (Becker and Grauvogel 1991). The authors noted that at some speed, strikes may decrease but these speeds were cost prohibitive and were not tested further.

The effect of speed for trains is not same as for vehicles – slower vehicles may give deer a chance to avoid the collision but also give drivers a chance to respond or stop - with trains, the response time of the engineer and the time needed to stop are too long to be factors in minimizing collisions. However, slower speeds might provide CWTD additional opportunities to avoid collision.

Effects of Collision: In most cases the animals die immediately or shortly after the collision. Even in collisions with smaller vehicles such as cars, there is frequently considerable internal damage including situations where the deer walks or runs away from the collision. In some cases, multiple animals may be struck during a single vehicle collision (Vogel 1983) and multiple, sometimes many, animals may be struck by a train during one incidence (e.g., 270 pronghorn struck by one freight train; Missoulian 2011). Gunderson and Andreassen(1998) documented 406 moose-train collisions in Norway, which killed 466 moose.

In some cases, losses from collision can include young animals that may not have been hit themselves but that were orphaned, resulting in reduced survival probability. Mule deer fawns die if orphaned prior to 6 weeks of age, but older fawns survive (Swenson 1972). Robinette (1966:345) reported that mule deer fawns orphaned in fall quickly join another doe or matriarchal group. White-tailed deer fawns are rarely seen alone in Texas following antlerless hunts (Thomas et al. 1965:317), and apparently join other social groups. Orphaned sibling fawns in Illinois commonly remain together and surviving members of family groups usually function as a family after the dominant doe is killed (Hawkins 1967:127). No adverse effects of simulated orphaning (doe removal from 20 September to 11 November) were observed on white-tailed deer fawns in Virginia (Woodson et al. 1980).

Because adult does may be struck less frequently than males and younger deer, and because the time during which fawns would be vulnerable to orphaning is relatively short (6 to 12 weeks), we do not further consider the effects of orphaning in this Opinion. Although such effects may occur, we believe that they would be relatively rare and would not add substantially to the population level effects we are already considering. Similarly, while multiple strikes during one train trip are possible, they would occur less commonly than single strikes and are already accounted for in our analysis of probability of strikes.

Mitigating factors: Reduced collisions have been documented where alternatives to actually crossing roads or tracks, such as bridges and underpasses, were present. Seiler (2003) found that the risk of collision was higher where private roads connected to a main road, but the risk decreased where tunnels or bridges separated the intersecting roads. In some cases, underpasses and overpasses have been constructed specifically for wildlife crossing, and are often associated with fencing to direct animals to the crossing points. A successful mitigation strategy requires a detailed analysis of the problem, the species and their behavior, the local situation, and often involves a combination of different types of mitigation measures. In this case, the lack of elevated tracks other than a few bridges, and the lack of a strategy to minimize or mitigate impacts of collisions lead us to adopt a reasonable worst-case scenario where, other than the bridges over major rivers and one unnamed creek, little opportunity existed for us to reduce our estimates of collision based upon alternate crossing options for CWTD.

Estimates of Injury Rates (additional Train Trips): Little information has been published regarding rates of deer collision by trains. In addition, deer struck by vehicles may be underreported by perhaps 50 percent or more (Allen and McCullough 1976; Romin and Bissonette 1996). We would anticipate that reporting rates for trains in the United States would be even lower than for vehicles. For these reasons, we examine a variety of information to help inform our estimates of future deer strikes by trains.

<u>Hokkaido Case Study</u>: Ando (2003) studied collisions of trains with sika deer (*Cervus nippon*) on Hokkaido Island, Japan. He looked at 7 km of track (about 4.3 miles) and documented 72 kills over 10 years with 23 trains per day (0.31 kills per train trip per year). Ando (2003) documented approximately 1.6 deer per mile per year. Onoyama et al. (1997) noted a lower rate for 696 kills on 331 km of tracks over 7 years (about 0.5 kills per mile per year). If we assume that Onoyama et al. (1997) reported on tracks with similar levels of traffic, then we can calculate the strike rate (number of deer struck per mile per train trip on an annual basis). The strike rate reported by Ando (2003) would be 0.07 deer struck per mile per train trip per year and by Onoyama et al. (1997) would be 0.02 deer struck per mile per train trip per year. When only examining the more-intensive 2 km section discussed by Ando, the rate would be 0.24 deer struck per mile per train trip per year.

However, it is important to consider the density of deer along the tracks. While sika deer often occur at low densities in forested environments, they may also tolerate higher population densities as their small body size would indicate. Yamamura et al. (2008) estimated the Hokkaido population of sika deer at about 550,000 in 2005, due to a significant increase in western Hokkaido. For the year 1993 which was during the time of the Ando study (1986 to 1995), Yamamura et al. (2008) estimated a total population of about 275,000.

Hokkaido Island has 32,222 square miles. However, while much of Hokkaido is covered with forests or farms, it also has significant areas of development, such as the city of Sapporo. Hokkaido is about the same size as Ireland and is slightly more populated. Using an estimate of 275,000 sika deer or an overall density of less than 10 sika deer per square mile would be misleading due to the tremendous variability of habitat and sika density across the island. Unfortunately, eastern and western Hokkaido have had different population densities, and the wintering concentrations in eastern Hokkaido cannot be accurately estimated.

Ito et al. (2014) reported sika deer density ranging from 10 and 80 sika deer per square mile with intermediate densities of 14 to 19 sika deer per square mile on a portion of mainland Japan. Tsujino and Yumoto (2004) documented densities of 130 to 170 sika deer per square mile on Yakushima Island, while Ito and Takatsuki (2005) documented over 2,000 sika deer per square mile on Kinkazan Island which is a preserve with no hunting and no predators. We assume that densities during the Ando study were likely far higher than 20 sika deer per square mile of winter range, and may have approached 200 or more sika deer per square mile.

We considered whether the densities of sika deer present during the Ando 2003 study may have been consistent with what may occur in the action area. We note that densities of CWTD in the future may vary within a wide range. However, given the migratory nature of the sika deer in Ando's study, and the likely far lower density of CWTD during the next 20 years, it is appropriate to consider that his densities may have been several times greater than would occur in the situation we are currently analyzing.

Ando (2003) reported that 97 percent of all collisions occurred along an approximately 2-km (1.2-mile) section of the track. Collisions varied with season with a large portion of the total collisions and documented crossings occurring during January through March. However, Ando's study occurred in an area where sika deer migrated seasonally to winter range near the tracks. Deer in this area also moved regularly between feeding and resting areas on opposite sides of the track. Ando (2003) also reported that collisions were most frequent in the evenings with 69 percent occurring after 17:00, with a peak between 17:00 and 19:00. This corresponded with the peak collision period reported by Onoyama et al. (1997) of 16:00 to 23:00. Ando (2003) concluded that deer-train collisions occurred in relation to the daily activity pattern of deer in the vicinity of the railway tracks.

<u>Application of strike rates from Hokkaido study</u>: The strike rate reported by Ando (2003) was 0.07 for all 7 km of his study and 0.24 for the 2 km with the most strikes. The strike rate calculated from Onoyama et al. (1997) was 0.02 deer struck per mile per train per year. If we apply these rates from Hokkaido to southwest Washington, we could develop some possible estimates of CWTD struck per year.

However, we must consider that rates developed by Ando (2003) were for a migratory population on a winter range where concentrations during portions of the year were likely quite high. On an annual basis, the increased strikes during the winter would be somewhat ameliorated by lower strikes in the summer, but not completely. In addition, sika deer have a small body size and can likely attain higher densities that white-tailed deer. Ando (2003) may have had densities over 200 sika deer per square mile while we anticipate about 20 CWTD per square mile. For these reasons, we reduced the collision rates for our estimates to one-quarter that observed by Ando (2003). Onoyama et al. (1997) looked at a larger area than Ando (2003) and may not have included as much winter range; however, due to the smaller body size of sika deer and likely higher densities, we reduced the collision rates for our estimates to one-half that observed by Onoyama et al. (1997).

For the 2.1 miles of probable crossing areas, we would apply the higher rate (0.24) observed by Ando (2003) for his concentrated 2 km section of track. Adjusting this rate by one quarter would lead us to a rate of 0.06 deer struck per mile per train per year and an estimate that about 0.13 CWTD would be struck per year per train, or about 0.5 CWTD would be struck per year as a result of the proposed project.

For the 8.5 miles of concern areas, we would apply rates of 0.02 to 0.07 from Onoyama et al. (1997) and Ando (2003) respectively. We would apply half the Onoyama rate (0.01 deer struck per mile per train per year) and only apply a quarter of the Ando (2003) rate (0.018 deer struck per mile per train per year). This would lead us to estimate that about 0.08 to 0.15 CWTD would be struck per year per train, or about 0.3 to 0.6 CWTD would be struck per year as a result of the proposed project over the 20-year analysis perioid.

Independent Estimates: Using best professional judgment, we considered the variability in the number of deer that may occupy home ranges that overlap with the tracks, or that may travel on excursions outside their normal home ranges on a periodic basis. This is difficult to predict because the track corridor is not uniformly permeable to deer and the habitats on either side of the tracks are very different. Habitats in intermixed residential areas east of the tracks provide local abundant cover and may also provide good foraging opportunities.

A “normal” density would be less than the optimum of 40 deer per square mile and may be approximately half that if the translocations are successful. CWTD densities in the range of 20 to 40 per square mile appear common. Additionally, deer most likely to cross the track would likely reside within proximity to the tracks, and likely spend much of their time within a quarter mile on either side. Therefore, we used 20 deer per square mile and a corridor of a half square mile to approximate 10 deer per mile of track with a likelihood of crossing the tracks or using areas nearby. We also looked at the availability of habitat on either side of the track and adjusted our estimate of 85 deer to 50 deer in this 8.5-mile corridor. From preliminary telemetry information, it appears that CWTD seldom cross the tracks and prefer to remain west of the tracks. However, the telemetry data also indicate that some CWTD now spend at least some of their time east of the tracks. While some deer may make daily trips between cover on one side of the track and forage on the other, we believe the majority of the deer will reside on one side or the other. However, we also recognize that excursions will become much more common during certain times of the year, such as pre- fawning, fawning, pre-rutting, and rutting periods.

Some deer may spend time on the tracks or in the right-of-way to forage on adjacent shrubs and plants or forage on spillage. While efforts have been made in some parts of the country to reduce spillage of grain and other foods to reduce strikes of ungulates and carnivores, it is unclear whether these efforts would be employed by freight trains in this area. Spillage is most likely to occur during peak transport periods for various crops. Spillage of grains such as wheat and corn may be particularly attractive to any deer and other wildlife. We also assume that salt is not used as a de-icing agent very frequently if at all due to the moderate climate.

Using the 8.5 miles of concern and a density of 20 CWTD per square mile, we estimate that up to 85 deer may reside within proximity of the tracks (10 deer per mile of track in an area that is 0.5 mile across); however, we adjusted this number to 50 based upon areas without habitat likely to contain deer on both sides of the tracks. Due to the factors discussed above, we anticipate that only a few of these will cross or occupy the tracks on a daily basis. Based on best professional judgment and careful analysis of the topography, vegetation, and other factors along the tracks, we anticipate that fewer than 5 percent will cross on a daily basis (fewer than 2.5 CWTD per day) and most of those will utilize alternative crossings (e.g., bridges). Based upon telemetry data from recent translocations, the rate of crossing for deer that crossed the tracks seemed to be about 0.03 crossing per day; however, most deer never crossed the tracks. If we apply a 0.01 crossing per day rate to 50 deer, it would result in 0.5 crossing per day. Therefore, we estimate that 0.5 crossing will be made per day within the 8.5 mile areas of concern. We anticipate that some deer will cross rapidly while others may stop to feed, or to travel parallel to the tracks. To be conservative, we estimate that each deer will spend 5 minutes on the tracks, for a total of 2.5 minutes of occupancy per day, or on a proportional basis 0.0017 of the day or year. In other words, each of the new proposed train trips would have a 0.0017 probability of passing by while a deer is within the right-of-way. We anticipate 1,460 additional passenger train trips per year. Therefore, on an annual basis, 2.5 trains would pass by a deer in the right-of-way. Passenger trains are not anticipated to have the lading or strapping that freight trains have and are therefore not likely to strike a deer unless the train itself strikes the deer. Although some deer may panic and run in front of or into the side of the moving train, we anticipate that most deer will avoid the oncoming train. We estimate that only 10 percent of the trains passing deer on the right-of-way will strike a deer. This would result in a mortality rate of 0.25 CWTD each year from the proposed project. If up to 5 percent (our initial estimates) crossed the track every day, this number could be as high as 1.25; however, the telemetry information suggest this is unlikely and the average rate of crossing per day is likely closer to 1 percent.

However, we anticipate most crossings will occur near dawn and dusk or early evening hours which is the time when the additional trains under the proposed project would be added. Therefore, deer crossings may occupy a greater portion of the time of day when these additional trains would be running. For instance, if we examine 2 hours before and after sunrise and sunset (8 hours) or at night (4 hours) and assume that the additional trains would run during this time, we might estimate that 5 trains would be passing deer on the right-of-way and that up to 0.5 CWTD would be killed per year. During years with exceedingly dense populations of CWTD (and associated additional movement), this number, based on our best professional judgment, could be as high as 2 CWTD killed per year.

If the number of deer along the action area is fewer, we would anticipate much fewer strikes. For instance, if the Ridgefield NWR subpopulation contains less than 100 CWTD and those deer make limited use of areas adjacent to the tracks; we might only anticipate fewer than 0.1 crossing per day or occupancy of less than 0.0003 of the time. If fewer than 0.5 trains pass a deer in the right-of way per year, and only strike a deer 10 percent of the time, this would result in about one strike every 20 years.

<u>Summary of Estimates</u>: Using Rates from previous studies on sika deer in Japan, we grossly estimated that 0.3 to 0.6 CWTD may be struck annually as a result of the project. Using our independent analyses, we anticipated strike rates of 0.25 to 1.25 CWTD per year. When considering the time of day these additional trains would run and the possibility of peak populations, we anticipate that, 2 or more CWTD may be struck and killed per year during peak populations. We anticipate this number will vary over time and with population density. As a reasonable worst-case, up to 2 CWTD may be struck annually from a population of about 200 CWTD and therefore we intend to use this rate of mortality (1 percent) for our assessment of population effects. However, we believe that this level is not reasonably certain to occur. It is

reasonably certain that 1 CWTD would be struck every 2 to 4 years, or that 0.25 to 0.5 CWTD would be killed per year. This range is similar to what we derived when analyzing the work on sika deer from Japan, as well as conforming to the moderate assumptions in our independent analysis.

Increased Average Speed

In this assessment, we consider that there will only be an increase in average train speed, not the maximum speeds. The most-likely change would be that trains will no longer need to slow down and stop at times. However, for some portion of the trip, the change in speed may be meaningful to the strike rate of CWTD. However, as discussed earlier, there is an uncertain relationship of train speed to strikes. Yet a doubling of speed has been observed to cause a doubling in the rate of collisions (Gunderson and Andreassen1998). This increased speed does not only apply to the newly proposed passenger train trips, but also to the existing passenger train trips. Some of the existing passenger train trips occur during the morning and evening time, while others occur midday. We anticipate a much smaller rate of strikes for passenger train trips in the midday period. However, we also consider that the change in speed applies to all of the passenger trains that would be using this corridor. Given the uncertain pattern of train speed following the proposed project in comparison to the existing pattern, it is difficult to predict the change in strike rate that may be attributable to the change in speed alone. The change in speed may be most pronounced at slow speeds and would likely be relatively small. For these reasons, we use our best professional judgment and estimate that one additional CWTD may be struck due to increases in passenger train speed attributable to this project during the 20-year analysis period.

Effects at the Population Scale

Our independent estimates of deer strikes were based upon a presumed future density of about 20 deer per square mile across much of the suitable habitat available to deer and averaged over a 20-year time period. Higher densities may result in additional mortalities, but at a similar proportion of the population.

Our estimates of mortality were up to one percent of a subpopulation (e.g., 1 CWTD per year from a subpopulation of 100, or up to 2 CWTD from a subpopulation of 200). As a reasonable worst-case analysis, we discuss the meaning of an additional one percent mortality to CWTD in the newly formed Ridgefield NWR subpopulation. Total mortality rates are anticipated to be about 20 percent annual mortality for does and about 40 percent for bucks based upon rates observed in the past in other subpopulations (Gavin 1984). Therefore, loss of one percent would be a small portion of the ongoing mortality.

Tenasillahe Island, Puget Island, JBH NWR Mainland, and Westport have averaged higher than 0.37 fawn:doe ratios for the last 5 years. On average from 1986 to 2006, the fawn:doe ratio on Puget Island was 0.44, with a range of 0.22 to 0.70. Several factors may contribute to the higher-than-average fawn recruitment and overall robust CWTD population on Puget Island, including coyote control, availability of quality forage, and a larger local range protected from flooding (USFWS 2009b). We also consider that during some years, fawn:doe ratios could be substantially lower. With a population of 100 does, recruitment of 37 fawns, and loss of 20 does per year, there would be a 17 percent annual increase without the proposed project. The mortality anticipated as an indirect result of this project could slightly reduce this increase, or may be compensated for by other forms of mortality.

Mortality in an increasing population may somewhat slow population growth, but is anticipated to be increasingly compensatory in populations that approach their carrying capacity. For instance, a deer struck on the tracks may reduce the number of deer struck on roads. As deer reach or exceed carrying capacity, the principle of inversity indicates that density-dependent mortality rates will increase and reproductive rates will decline.

We anticipate that CWTD less than a year old may comprise a slightly larger component of the deer struck on the tracks. Deer less than a year old generally have lower survival rates, and thus such mortality of young deer on tracks is more likely to be compensated by other mortality factors.

CWTD, like other white-tailed deer, have a promiscuous breeding pattern. Bucks compete for the ability to breed does in estrus. From a population standpoint, most bucks are "surplus." In addition, feedback mechanisms exist to adjust the sex ratios of newborn deer according to the density of bucks (Verme 1981). During certain times of the year, we anticipate that yearling and adult males may be struck in higher proportion compared to fawns and does. Regardless of life history stage of deer that are struck, we anticipate that these strikes will not substantially reduce the rate of increase of CWTD in the action area and will not reduce the ability of the action area to provide for the conservation needs of the species.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this Opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Within the action area, nonfederal actions that would have detrimental effects on CWTD are likely to include human population growth and associated land-use practices that further modify and decrease quality and availability of CWTD habitat. New homes, businesses, and other land-altering developments would modify CWTD habitat. The associated construction of utility transmission lines, roads, and highways, with associated increases in vehicular traffic, noise, and human presence within the action area can be expected. However, there are no specific future nonfederal activities reasonably certain to occur within the action area that would cause significantly greater impacts on CWTD than presently occur. Anticipated development would to some degree clear native vegetation, leading to further habitat fragmentation and potential decreases in the remaining native habitat. Additionally, increased traffic associated with existing and new roads and highways would increase the likelihood of CWTD collision-related mortality. This development may delay the recovery of CWTD, leading to a reduction in both the access to suitable habitat and in the security of existing suitable habitat for the species.

Within the project areas, more specific information is available. Upgrades to existing industrial facilities in the Kalama Industrial Area and the Port are expected as typical, ongoing actions within this commercialized area. Several currently issued permits, public notice review of applications, or other documentation for work by others, range from building permits, Shoreline Management review, and State Environmental Policy Act Environmental Checklist review for improvements to existing commercial facilities. Within the City of Kelso, we anticipate the expansion of the Southwest Washington Regional Airport according to its Capital Improvement Program which identifies a 5-year capital improvement plan to implement the Master Plan. This is anticipated to include runway and taxiway expansions as well as new hangers. The commercial property east of Task 6 is also in process of development or consideration of development.

Within the action area, nonfederal actions that would have beneficial effects on CWTD include native species' conservation and recovery actions that seek to restore habitats important to CWTD and other native species. Land conservation organizations are actively and effectively seeking opportunities to acquire conservation easements and fee title ownership of important lands that support CWTD habitat. Other conservation groups are planning and implementing conservation actions directly and indirectly targeted at restoring CWTD habitat.

INTEGRATION AND SYNTHESIS OF EFFECTS

Current Condition

Based upon the most-recent survey information, there are 843 or more CWTD in the Columbia River DPS, distributed among 6 subpopulations. Four of these subpopulations have well over 100 CWTD each. Since 1986, three subpopulations have had an average fawn:doe ratio of 0.36 or higher (Tenasillahe Island, Puget Island, and Westport). Tenasillahe Island, Puget Island, Westport, and JBH NWR Mainland have had fawn:doe ratios higher than 0.37 for the last 5 years. Puget Island and Westport/Wallace Island have maintained populations of three to four times the viable standard for most of the last 30 years. Initial analysis from a minimum viable population model (Skalski 2012) suggests that the probability of extinction for the Columbia River DPS with 3 subpopulations of 50 CWTD each is less than 1 percent over the next 50 years. In addition, given the population distribution at that time, the model suggests a less than 1 percent likelihood of extinction for this DPS over the next 100 years (USFWS 2013a). However, we now have all six subpopulations at or above 50, four of which are 140 or more.

Existing habitat for CWTD in the lower Columbia consists of pastures, forested tidal swamps, brushy woodlots, marshes, and sloughs along and nearby the Columbia River. There is essentially no elevational relief to the lower Columbia River bottomlands and CWTD are restricted to these flatlands. Most of the bottomlands have been diked and are crisscrossed with numerous sloughs and drainage ditches.

Summary of Ongoing Threats

Based on the most-recent data, the Columbia River DPS has approximately 850 CWTD in 6 subpopulations. The Service has expanded the range of the DPS upriver from its eastern-most range of Wallace Island in 1983 to Ridgefield, Washington. The Ridgefield NWR subpopulation is expected to grow. The Columbia River DPS population has consistently exceeded the minimum population criteria of 400 CWTD over the past two decades. Due to the lack of contiguous habitat along much of its range, CWTD have been translocated to establish new subpopulations. Although the Columbia River DPS has certainly been negatively affected by habitat loss, fragmentation, and modification in the past, it appears that many of the changes currently occurring in land use patterns within the current range are compatible with the habitat needs of CWTD.

Coyotes have consistently been identified as the main cause in fawn mortalities, and lethal control of these predators appears to have shown some success. Research indicates that greater population gains may be achieved with increases in doe survival plus fawn recruitment than with increases in fawn recruitment alone. Predator control has less of an impact on doe survival than does improving habitat quality. Continuing predator control until subpopulation abundance objectives are reached, as well as improving the quality of forage habitat, should remain primary management objectives.

Hybridization and low genetic diversity recently have been identified in the Columbia River DPS. Evidence of low-level hybridization was detected among CWTD on JBH NWR, but future genetics work could give a broader insight to the implications and occurrence of this apparently rare phenomenon. New information revealed a low genetic diversity among CWTD.

The predicted rise in sea level by climate change models could be the greatest future threat to any low-lying habitat of the Columbia River DPS not adequately protected by dikes. Maintenance of dikes and tide gates is paramount to protecting currently occupied lowland habitat on and off Refuge lands in the DPS. However, to ensure the long-term recovery of the species, priority must be placed on identifying suitable high-quality upland habitat and to develop partnerships with state wildlife agencies to facilitate the expansion and/or translocation of CWTD to these areas.

Freight trains would be anticipated to strike fewer CWTD than passenger trains when considering their potentially slower speeds, but due to their frequency and 24-hour schedules may still strike up to 2 to 4 CWTD per year. Passenger trains (Coast Starlite and Amtrack Cascades) that currently run may strike deer as well, even without the additional speed resulting from this project. Even without the additional trains added by this project, the existing passenger schedule includes morning trains and trains running beyond sunset, a time when strikes become increasingly probable. If we consider that morning and evening trains have the highest probability of striking a deer, we estimate that 0.5 to 1 CWTD may be struck each year by existing passenger trains without the additional effects of the project described below.

In total, up to 2 to 5 CWTD may be struck by trains annually in the foreseeable future regardless of whether the project occurs. This estimation is for the existing condition of traffic with the newly introduced CWTD, and what would continue into the future if the project did not happen.

Based on our review of the best available scientific information, we conclude that adequate regulatory mechanisms are in place to protect the species, now and in the foreseeable future. But protection of CWTD habitat on nonfederal lands is not required by any such regulations. From this review, it is apparent that since the publication of the Revised Recovery Plan in 1983, threats from habitat loss or degradation still remain but are less severe than previously thought. Predation can exist at a subpopulation level if predator control is not implemented but does not rise to the level of putting the entire DPS at risk of extinction. Vehicle collisions, disease and hybridization, and social resistance to expanded distribution are not likely threats to subpopulations of CWTD. The threat of sea-level rise due to climate change could potentially be a long-term threat to subpopulations that reside on low lying land that is not adequately protected by dikes.

Overall, CWTD are on an upward trajectory toward recovery in both terms of numbers and distribution. Expansion to additional subpopulations should decrease the potential for stochastic effects, such as flooding.

Summary of Future Threats

New homes, businesses, and other land-altering developments are reasonably certain to modify CWTD habitat. The associated construction of utility transmission lines, roads, and highways, with associated increases in vehicular traffic, noise, and human presence within the action area can be expected. Additionally, increased traffic associated with existing and new roads and highways would increase the likelihood of CWTD collision-related mortality. In particular, future ownership of the land supporting the Westport subpopulation is uncertain. This area has seen an interest in levee removal for fish habitat restoration. Removal of levees in this area would represent a significant loss of habitat to a critical subpopulation.

CWTD are already subject to potential low recruitment and high fawn and doe mortality. Sources of mortality include predation by coyotes as well as accidents, such as vehicle-deer collisions. It is difficult to estimate each of these factors within the newly established Ridgefield NWR subpopulation. However, we believe it is reasonable to assume that the total annual mortality rates will be approximately what have been documented elsewhere within their range (20 percent for does and 40 percent for bucks). We also anticipate that continued human development will remove potential habitat, restrict CWTD potential range, and may exacerbate many of the other threats discussed above.

Effects of the Proposed Action

Actual construction of the rail infrastructure and its maintenance are anticipated to have only insignificant effects on individual deer with no population consequences. However, the increased number of trains and increased average speeds of trains are anticipated to cause indirect effects in the form of train-deer collisions.

Our estimates of collisions were made using two separate methods. We compared rates of collisions with those observed for other deer in other parts of the world. We also used best professional judgment to estimate the number and duration of occurrences of CWTD on tracks, the probability of a passing train, and the probability of a resulting strike. We applied the latter estimates to several scenarios that included different densities of CWTD.

First, we examined observed collisions from other studies. Due to a dearth of information about train-deer collisions, we examined several studies from Hokkaido Island, Japan. These numbers were adjusted for the likely higher population density of wintering sika deer, and they provided us with estimates ranging from 0.3 to 0.6 CWTD struck per year.

Second, using best professional judgment, we examined the tracks and adjacent habitat and made some assumptions about future CWTD densities and habitat use patterns. One set of estimates was conducted for a relatively large number of future CWTD. This led us to anticipate that 0.25 to 0.5 CWTD per year may be struck as a result of the project. We also estimated that at exceedingly high densities up to 2 CWTD per year may be struck However, at lower populations of CWTD, we believed the number of CWTD struck each year could be as low as 0.05.

We also considered the general lack of elevated track or crossing structures. We found little reason to adjust our estimates to a lower number as there is a general lack of crossing structures or minimization measures.

Peaks in mortality may occur in the spring during dispersal and/or in the fall during the rut. Amounts of mortality may be greater in some years than in others and would generally increase when CWTD population densities are high. We anticipate that adults and fawns will be killed, but that fawns (less than 1 year old deer) will be killed disproportionately more frequently than adult deer. We also anticipate that yearling and adult bucks will be killed at a disproportionately high rate.

At a population level, we conducted a reasonable worst case analysis and assessed the effects of an additional 1 percent mortality rate on the newly established Ridgefield NWR subpopulation. We anticipate fawn: doe ratios at or about 0.35 and annual doe mortality of about 20 percent. In this context, we anticipate that an additional 1 percent mortality will only slow the increase of CWTD to a minor extent. Once the population reaches carrying capacity, we believe this mortality rate will be partially compensatory with other mortality causes.

We anticipate that CWTD struck as a result of this project, will not substantially slow the increase of CWTD in the action area and will not reduce the ability of this subpopulation to support the DPS. The Service believes it is reasonably certain that 0.5 individual CWTD (associated with 1,460 additional passenger train trips per year) could be struck annually as an indirect result of this proposed action. We also anticipate that the additional average speed of passenger trains may result in 1 CWTD being struck over the next 20 years. Therefore, we believe the mortality of 11 CWTD over the next 20 years is reasonably certain to occur and that this mortality will be ongoing into the future, although sporadic and difficult to predict.

After reviewing the best available scientific and commercial information available regarding the current status of CWTD, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects, the Service concludes that the proposed action is not anticipated to appreciably reduce the likelihood of survival and recovery of CWTD in the action area or in the listed range. Ridgefield NWR and surrounding areas will likely see an increase in their CWTD populations, even with a potential additional annual loss of 1 percent of the CWTD from the subpopulation and we do not anticipate that this project will affect the ability of the action area to contribute to the survival and recovery of the CWTD.

CONCLUSION

After reviewing the current status of the Columbia River DPS of the Columbian white-tailed deer, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is the Service's Biological Opinion that the action, as proposed, is not likely to jeopardize the continued existence of the species. No critical habitat has been designated for this species; therefore, none will be affected.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. *Harm* is defined by the Service as an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering (50 CFR 17.3). *Harass* is defined by the Service as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering (50 CFR 17.3). Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the (agency) so that they become binding conditions of any grant or permit issued to the (applicant), as appropriate, for the exemption in section 7(o)(2) to apply. The (agency) has a continuing duty to regulate the activity covered by this incidental take statement. If the (agency) 1) fails to assume and implement the terms and conditions or 2) fails to require the (applicant) to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the (agency or applicant) must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR 402.14(i)(3)].

AMOUNT OR EXTENT OF TAKE

The Service anticipates that 0.5 individual Columbian white-tailed deer associated with 1,460 passenger train trips per year could be killed annually as a result of this proposed action. We also anticipate that one (1) additional CWTD may be killed over the next 20 years as a result of additional speed on existing passenger trains resulting from proposed track improvements. Therefore, we anticipate that 11 CWTD will be taken over the next 20 years as a result of the proposed project. The incidental take is expected to be in the form of harm. We anticipate that this take will be ongoing, although sporadic and difficult to predict. Peaks in mortality may occur in the spring during dispersal and/or in the fall during the rut. Amounts of mortality may be greater in some years than in others and would generally increase when CWTD population densities are high. We anticipate that adults and fawns will be killed. We anticipate that fawns (less than 1 year old deer) and yearling and older bucks will be killed disproportionately more frequently than adult does.

The Service anticipates incidental take of CWTD will be difficult to detect for the following reason(s). Incidental take may occur along many miles of track and often at night. CWTD struck by trains will not often be known or discernable. Walking along the private property containing the tracks is both illegal without permission and dangerous. CWTD struck by trains or lading that are not killed may crawl into cover and later die. CWTD struck by trains will likely be scavenged quickly and remains will decay. Even with a proper sampling regime, many carcasses will not be accounted for. Without a robust sampling or survey effort, it will be impossible to get a reliable estimate of collision mortality. CWTD are wide-ranging and use cover effectively, so that it may be difficult to detect minor changes in population numbers. However, the following level of take of this species can be anticipated by the number and timing of proposed additional trains because the primary factors determining strikes are 1) the occurrence of deer on the tracks and 2) the frequency of passing trains. For these reasons, while it may be difficult to monitor the number of CWTD struck by trains, we believe it is feasible and appropriate to monitor the number of additional passenger train trips as a surrogate indicator of the level of take.

EFFECT OF THE TAKE

In the accompanying Opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

REASONABLE AND PRUDENT MEASURE

The Service believes the following reasonable and prudent measure is necessary and appropriate to minimize impacts of incidental take of CWTD:

1. Minimize the frequency of train collisions with CWTD.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the ESA, the Federal Railroad Administration must ensure compliance with the following terms and conditions, which implement the reasonable and prudent measure, described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

1. The Federal Railroad Administration (FRA) shall assess that portion of the Vancouver, B.C. to Portland, OR rail corridor that contains the action area for habitat connectivity in the Washington State Service Development Plan, to be finalized in 2017. The habitat connectivity analysis shall focus on CWTD in the range of CWTD. The FRA will request assistance from the Service in assessing habitat connectivity along the rail line in the range of the CWTD. Measures identified in the plan shall be implemented in the action area by the FRA, when reasonable to do so, as part of any subsequent rail improvement action funded by FRA.

2. The FRA shall coordinate with the Service and BNSF to develop and implement an Animal Retrieval Plan that specifies methods and contacts for retrieval of CWTD found dead or injured on the BNSF right-of-way. Such a plan shall be completed and implemented by the Federal Railroad Administration and BNSF by October 30, 2015.

3. The Federal Railroad Administration shall monitor and report the number of passenger train trips that occur each calendar year. Reports shall be submitted annually to the Service by March 1 of the following year.

The Service believes that no more than 11 CWTD will be incidentally taken as a result of the proposed action over the next 20 years.

The reasonable and prudent measure, with its implementing terms and conditions, is designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The Federal agency must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

The Service is to be notified within three working days upon locating a dead, injured or sick endangered or threatened species specimen. Initial notification must be made to the nearest U.S. Fish and Wildlife Service Law Enforcement Office. Notification must include the date, time, precise location of the injured animal or carcass, and any other pertinent information. Care should be taken in handling sick or injured specimens to preserve biological materials in the best possible state for later analysis of cause of death, if that occurs. In conjunction with the care of sick or injured endangered or threatened species or preservation of biological materials from a dead animal, the finder has the responsibility to ensure that evidence associated with the specimen is not unnecessarily disturbed. Contact the Service's Law Enforcement Office at (425) 883-8122, or the Service's Washington Fish and Wildlife Office at (360) 753-9440.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

The FRA should implement the following measures:

1. The FRA shall assess the Vancouver, BC to Portland, OR rail corridor for habitat connectivity in the Washington State Service Development Plan, to be finalized in 2017. The habitat connectivity analysis shall focus on CWTD in the range of CWTD. The FRA will request assistance from the Service in assessing habitat connectivity along the rail line in the range of the CWTD. Measures identified in the plan shall be implemented by the FRA, when reasonable to do so, as part of any subsequent rail improvement action funded by FRA.

2. Develop information flyers with pictures of distinguishing characteristics, or other approaches to facilitate identification of CWTD by WSDOT or BNSF staff who may work along the tracks or along roads within the range of the species.

3. Fund larger-scale collision reduction efforts as more-effective technologies become available in the future.

4. Improve wildlife safety and increase permeability within the existing Kelso to Vancouver Lake rail and interstate corridors.

5. In cooperation with the Service, use information from deer strikes, crossings, and other data such as telemetry to identify places of frequent crossings of highways and tracks, and identify opportunities to enhance permeability of highways and tracks to CWTD within the range of the species. Incorporate collision reduction/permeability as a consideration in all future WSDOT and Federal Railroad Administration projects south of Kelso in Washington. For instance, if existing culverts are replaced or new culverts are added, consider installing culverts that would provide CWTD passage under highways and/or tracks.

6. Provide assistance to the Service to better estimate the number of deer (CWTD and black-tailed deer) struck by trains and vehicles in Washington south of Kelso.

In order to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, we request notification of the implementation of any conservation recommendations.

REINITIATION NOTICE

This concludes formal consultation on the action(s) outlined in the (request/reinitiation request). As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: 1) the amount or extent of incidental take is exceeded; 2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; 3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or 4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

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PERSONAL COMMUNICATIONS

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United States Department of the Interior

FISH AND WILDLIFE SERVICE

Washington Fish and Wildlife Office
510 Desmond Dr. SE, Suite 102
Lacey, Washington 98503

JAN - 2 2015

In Reply Refer To:
01EWFW00-2014-F-0383
01EWFW00-2014-F-0399

Megan White, P.E.
Director, Environmental Services
Washington State Department of Transportation
310 Maple Park Avenue SE
P.O. Box 47331
Olympia, Washington 98504-7331

David Valenstein
Chief, Environmental and Systems Planning Division
Federal Railroad Administration
1200 New Jersey Avenue, SE
Washington, DC 20590

Dear Ms. White and Mr. Valenstein:

Subject: Amendment to Biological Opinion for Tasks 5 (New Siding) and 6 (Kelso to Longview Junction)

This letter transmits the U.S. Fish and Wildlife Service's (Service) Biological Opinion (Opinion) based on our review of the proposed Tasks 5 (New Siding) and 6 (Kelso to Longview Junction) of the Kelso to Martin's Bluff Improvements Project located in Cowlitz County, Washington, and their effects on the threatened streaked horned lark (*Eremophila alpestris strigata*). This formal consultation has been completed in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*).

A Biological Opinion for Columbian white-tailed deer (*Odocoileus virginianus leucurus*) was issued October 30, 2014 (Service References 01EWFW00-2014-F-0383 and 01EWFW00-2014-F-0399). An original determination for the proposed action was "may affect, not likely to adversely affect" for the streaked horned lark. Subsequent changes to the construction schedule posed potential adverse effects to streaked horned larks. The final Biological Opinion did not address adverse effects to streaked horned larks, which would result from the changed proposed action. The Service recommended the Federal Railroad Administration change their effects determination to "may affect, likely to adversely affect" for the streaked horned lark, which they did via conference call on December 4, 2014. The Service received a request to reinitiate formal consultation on effects to streaked horned larks from the Federal Railroad Administration on December 29, 2014.

This document serves as an amendment to the finalized Opinion and analyzes adverse effects to the streaked horned lark from Task 5 and 6. This amendment to the Opinion will reference the finalized Opinion whenever possible (Service References 01EWFW00-2014-F-0383 and 01EWFW00-2014-F-0399). A complete decisional record of this consultation is on file at this office.

We look forward to continued collaboration with the Federal Railroad Administration on the implementation of measures to reduce adverse effects to the streaked horned lark and Columbian white-tailed deer. If you have any questions regarding the enclosed Opinion, or our joint responsibilities under the Endangered Species Act, please contact Lindsy Wright (360) 753-6037 or Martha Jensen (360) 753-9000, of this office.

Sincerely,

Tim Romanski

Thomas L. McDowell, Acting Manager
Washington Fish and Wildlife Office

cc:
USFWS OFWO, Portland, OR (C. Brown)
WSDOT, Olympia, WA (M. Bakeman)

Endangered Species Act - Section 7 Consultation

BIOLOGICAL OPINION-AMENDMENT

U.S. Fish and Wildlife Service Reference Numbers:
01EWFW00-2014-F-0383
01EWFW00-2014-F-0399

Task 5 and 6 of the Kelso to Martin's Bluff: High-Speed Passenger Rail Improvement Project

Kalama and Kelso, Washington

Action Agency:	Federal Railroad Administration Washington DC
Consultation Conducted By:	U.S. Fish and Wildlife Service Washington Fish and Wildlife Office Lacey, Washington

Tim Romanski 1/2/15

Thomas L. McDowell, Acting Manager
Washington Fish and Wildlife Office

Date

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LIST OF ACROYNMS AND ABBREVIATIONS

Act	Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq*.)
A.T.V.	All-terrain vehicle
BA	Biological Assessment
CFR	Code of Federal Regulations
dBA	A-weighted decibels express sound loudness as perceived by the human ear
FRA	Federal Railroad Administration
ft	feet
L_{max}	Highest sound value measured by a sound level meter over a given period of time
MP	Mile Post
Opinion	Biological Opinion
RPM	Reasonable and Prudent Measures
Service	U.S. Fish and Wildlife Service
WSDOT	Washington State Department of Transportation

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INTRODUCTION

This document transmits the U.S. Fish and Wildlife Service's (Service) Biological Opinion (Opinion) based on our review of the proposed Tasks 5 and 6 of the Kelso to Martin's Bluff Improvement Project located in Kalama and Kelso, Cowlitz County, Washington, and its effects on the threatened streaked horned lark (*Eremophila alpestris strigata*). This consultation was completed in accordance with section 7(a)(2) of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq*.) (Act). Your request for formal consultation for streaked horned larks was received by the Service on December 29, 2014.

This Opinion is based on information provided in the Biological Assessments (BA's) and other information provided by the Federal Railroad Administration (FRA) and Washington State Department of Transportation (WSDOT). A complete decisional record of this consultation is on file at the Washington Fish and Wildlife Office in Lacey, Washington.

CONSULTATION HISTORY

October 30, 2014 – An Opinion was issued addressing adverse effects to the Columbian white-tailed deer (*Odocoileus virginianus leucurus*), but did not address adverse effects to the streaked horned lark.

December 4, 2014 – The Service and WSDOT had a conference call and the Service recommended that the FRA and WSDOT request formal consultation for effects to the streaked horned lark from the proposed changes to the action.

December 29, 2014 – The FRA and WSDOT requested formal consultation for the streaked horned lark on this date.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The proposed action includes creating a new third main track through two different locations (Task 5 (Figure 1) and Task 6 (Figure 2)), which will facilitate high-speed passenger rail service between Seattle, Washington and Portland, Oregon. For a full description of the proposed activities, conservation measures, and action area, refer to the finalized Opinion (Service References 01EWFW00-2014-F-0383 and 01EWFW00-2014-F-0399).

Track Structure and Rail Construction Activities

There are four major construction activities that would occur within 100 meters of occupied and/or suitable habitat for streaked horned larks:

1. Placing a rock base layer of varying thickness comprised of washed quarry spalls.
2. Placing the remainder of the embankment material over the rock from step 1 above, including granular embankment fill material (e.g., structural fill) of variable thickness, a 12-inch thick layer of sub-ballast, and a surface layer of ballast.
3. Installing approximately 10 miles of new track with specialized equipment (Track Laying Machine) and a variety of associated equipment.
4. Removing an upland berm near the south end of the streaked horned lark habitat area.

Types of construction equipment include dump trucks, track-laying equipment, bull dozer, speedswing, lag machine, tool trailer, passenger vehicles, surfacing tamper, ballast regulator, and welding trucks. These activities will occur during and outside the nesting season (the nesting season is approximately April 15 through September 1).

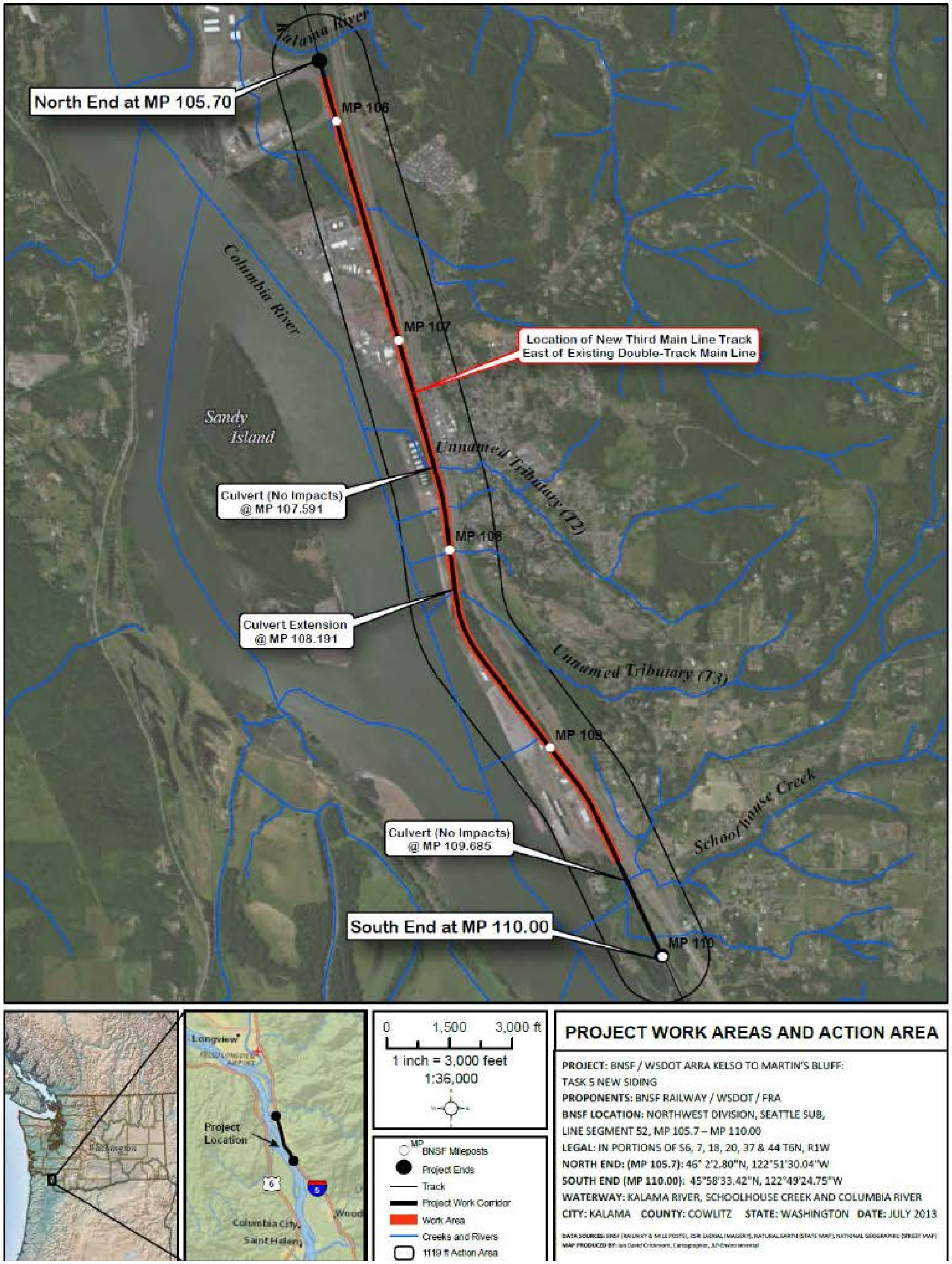

Figure 1. Task 5, Kelso to Martin's Bluff rail line addition

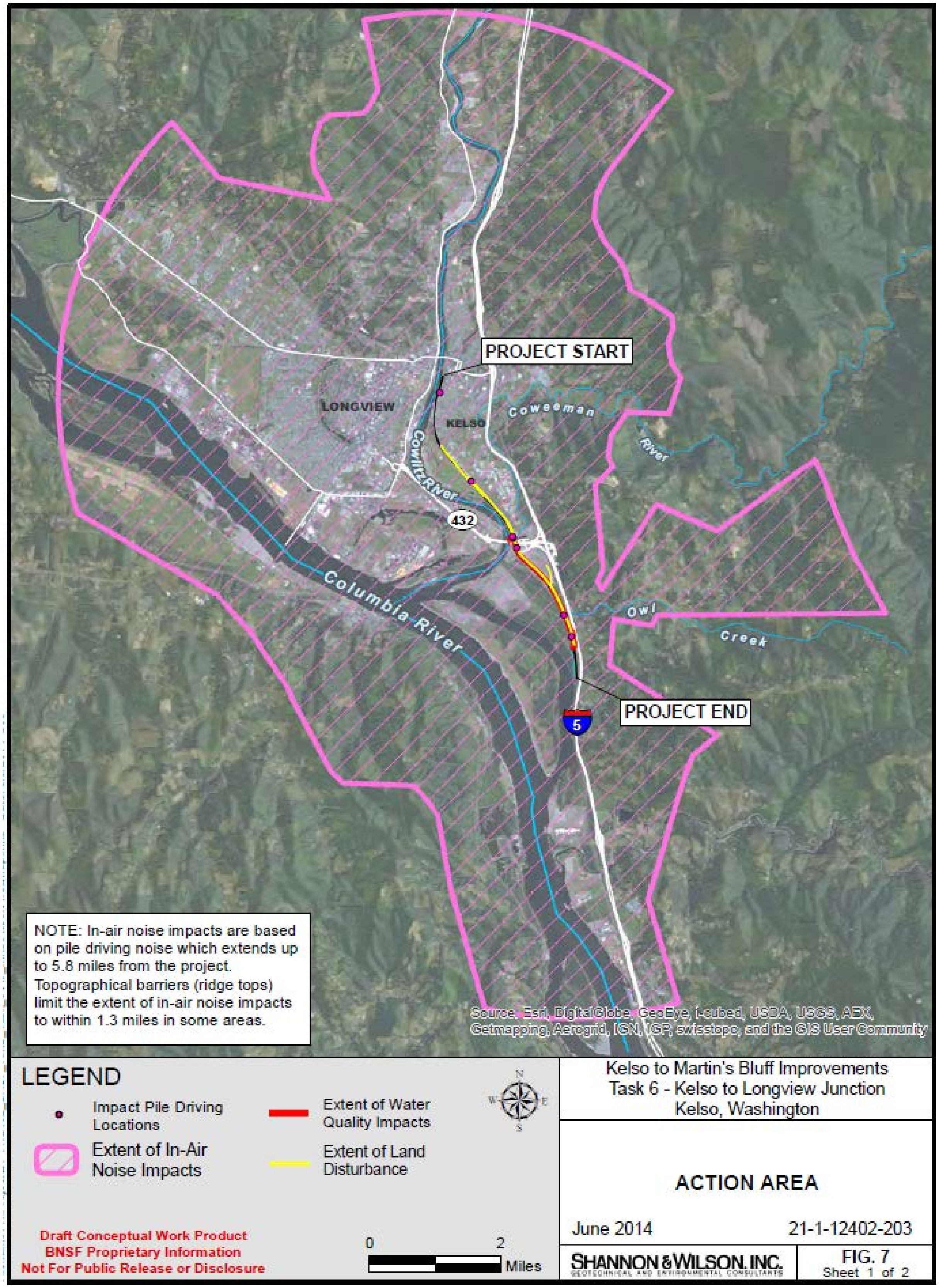

Figure 2. Task 6, Kelso to Longview Junction rail line addition

Description of the Action Area for the Streaked Horned Lark

The action area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR § 402.02). In delineating the action area, we evaluated the farthest reaching physical, chemical, and biotic effects of the action on the environment.

The proposed action will install approximately 10 miles of additional rail line, portions of which are adjacent to areas that are currently occupied by streaked horned larks or contain suitable habitat and may be occupied. The loudest construction activity will be from dumping rock, laying new track, and use of heavy equipment operation (e.g., dump trucks, graders, compactors, ballast dumping, tampers, track-laying machinery, and regulators); sound levels range from approximately 70 to 99 dBA $_{Lmax}$. All of these pieces of equipment within 43 meters of occupied/suitable streaked horned lark habitat. The Task 6 rail line installation is directly adjacent to an area that has year-round presence of streaked horned larks. The Task 5 rail line will be installed adjacent to areas that contain suitable habitat, but have not been surveyed, and have not yet had occupancy assessed (near MP 107 and 109, see Figure 2).

The farthest reaching effects to streaked horned larks are from sound and visual disturbance associated with the operation of heavy-equipment and extended human presence. The action area includes the project site along the lower Columbia River and the distance that in-air sound would extend until it reaches background levels and/or would no longer have the potential to result in effects to streaked horned larks. There are no known thresholds for how sound affects streaked horned larks; therefore, we assume that any streaked horned larks within the ensonified area may be disturbed and experience a measurable disruption to their normal behaviors from the in-air sound.

Effects to streaked horned larks include sound and visual disturbance from construction of the rail lines. In-air sound is expected to reach 99 dBA at 50 ft during operation of some types of heavy equipment and to exceed 99 dBA at 50 ft when more than one piece of equipment are being operated at the same time. The baseline ambient sound level is approximately 60 to 63 dBA at 50 ft (when trains are not passing). We assume sound will travel unobstructed because there are few trees and sound-absorbing infrastructure present adjacent to the construction. Project related in-air sound is expected to attenuate to baseline ambient sound levels within approximately 3,200 ft (976 meters/0.6 mile).

ANALYTICAL FRAMEWORK FOR THE JEOPARDY AND ADVERSE MODIFICATION DETERMINATIONS

Jeopardy Determination

In accordance with policy and regulation, the jeopardy analysis in this Opinion relies on four components: (1) the *Status of the Species*, which evaluates the streaked horned lark rangewide condition, the factors responsible for that condition, and their survival and recovery needs; (2) the *Environmental Baseline*, which evaluates the condition of the species in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of these species; (3) the *Effects of the Action*, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the species; and (4) *Cumulative Effects*, which evaluates the effects of future, non-Federal activities in the action area on the streaked horned lark.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed Federal action in the context of the species' current status, taking into account any cumulative effects, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the species in the wild.

The jeopardy analysis in this Opinion emphasizes consideration of the rangewide survival and recovery needs of the streaked horned lark and the role of the action area in the survival and recovery of these species. It is within this context that we evaluate the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

STATUS OF THE SPECIES: STREAKED HORNED LARK

The rangewide Status of the Species for the streaked horned lark is provided in Appendix A and includes a description the historic range and current range of the species.

ENVIRONMENTAL BASELINE: STREAKED HORNED LARK

Regulations implementing the Act (50 CFR 402.02) define the environmental baseline as the past and present impacts of all Federal, State, or private actions and other human activities in the action area. Also included in the environmental baseline are the anticipated impacts of all proposed Federal projects in the action area that have undergone section 7 consultation, and the impacts of State and private actions which are contemporaneous with the consultation in progress.

Existing Conditions: Setting

The new rail line will be installed in southwest Washington, through the cities of Kalama and Kelso. This portion of the lower Columbia River system is characterized by a mix of agricultural, silvicultural, and industrial development. The industrial development is concentrated within the cities.

When dams were built on the Columbia River, it was no longer able to perform its natural functions, such as sediment transport, and migration, which would create habitat similar to habitat created by upland disposal of dredged materials. Sediment is trapped behind the dams, and the river flow is lower velocity, causing sediment accumulation. Shallow water conditions create a need for dredging to maintain adequate navigable depths to support the economic system that relies on transportation in the Columbia River. Also, the Columbia Rivers ability to migrate is halted by development and hardened shorelines. Consequently the River is no longer able to create sandy islands and shoreline areas that become suitable habitat for breeding streaked horned larks.

Dredge spoil deposition gradually creates the habitat features that streaked horned larks prefer for breeding and other uses. If these dredge spoil deposition sites are left untouched long enough for vegetation to become established, they can develop the habitat characteristics that streaked horned larks select for breeding, nesting, and rearing chicks (bare ground, and low-height and low-density vegetation, and next to water, which contribute to the open-landscape context). The Columbia River has multiple dredge spoil deposit sites in shoreline areas and the uplands adjacent to the lower Columbia River, which provide breeding habitat for streaked horned larks. Streaked horned larks have likely relied on the ephemeral habitat provided by dredge spoil deposition as it is the only mechanism currently creating and providing suitable breeding habitat that remains along the lower Columbia River system except for land clearing that precludes development.

Historically, streaked horned larks were recorded on islands near Portland, Oregon, dating back to the early 1900s (Rogers 2000, p. 27) and streaked horned larks were reported as far east as Clark County, Washington, and Multnomah County, Oregon (Rogers 2000, p. 27; Stinson 2005, p. 51). Streaked horned larks evolved with habitat created by the natural habitat-forming processes such as wildfires or wind and wave-generated sandy beaches along the outer coast and islands along the lower Columbia River. Since the River no longer operates and performs natural habitat-maintaining functions, streaked horned larks currently select the upland dredge disposal sites and cleared/undeveloped lands along the shorelines because they are the only available habitat along the lower Columbia River that provide the habitat features they select.

Conservation Role of the Action Area for Streaked Horned Larks

The current range and distribution of the streaked horned lark can be divided into three regions: 1) the south Puget Sound in Washington; 2) the Washington coast and lower Columbia River islands (including airports and dredge spoil deposition and industrial sites near the Columbia River); and 3) the Willamette Valley in Oregon (Rogers 2000, p. 37; Pearson and Altman 2005, p. 23; Pearson et al. 2005, p. 2; Anderson 2009, p. 4).

Based on our current understanding of their range and distribution, we expect rail line construction to affect streaked horned larks from the Washington coast and lower Columbia River Islands. On the Washington coast and Columbia River islands, there are about 120 to 140 streaked horned larks (Altman 2011, p. 213) that breed on the outer coast in Grays Harbor, Pacific Counties, and on several dredge deposit sites and islands downstream of Portland, Oregon.

On the Columbia River, streaked horned larks breed, nest, rear young, and forage at dredge spoil deposit sites on islands downstream of Portland, Oregon and on open industrial sites adjacent to the mainstem Columbia River. Recent surveys have documented breeding streaked horned larks on Rice, Miller Sands Spit, Pillar Rock, Welch, Tenasillahe, Whites/Browns, Wallace, Crims, Northport, and Sandy Islands in Wahkiakum and Cowlitz Counties in Washington, and Columbia and Clatsop Counties in Oregon (Pearson and Altman 2005, p. 23; Anderson 2009, p. 4; Lassen 2011, in litt.). Streaked horned larks also breed at the Rivergate Industrial Complex and the Southwest Quad at Portland International Airport; both sites are owned by the Port of Portland, which are former dredge spoil deposition sites (Moore 2011, pp. 9–12). The lower Columbia River system provides a constantly shifting mosaic of breeding habitat along the lower river. If streaked horned lark populations are going to persist they need multiple options for breeding sites. These options are quickly being lost or affected by development and there is no certainty that they are being replaced in proportions sufficient to support the current or future breeding population.

Although suitable habitat does not appear to be a limiting factor for streaked horned larks breeding along the Columbia River, the population had drastically declined and continues to decline at a rapid rate. No research has been conducted to assess whether habitat is a limiting factor. It is possible that habitat is not a limiting factor because the species abundance has declined to such critically low numbers that they are experiencing reduced reproductive success and reduced genetic diversity. The Washington coast and Columbia River islands combined currently have less than 140 breeding streaked horned larks (Altman 2011, p. 213).

Studies from Washington sites (the open coast, Puget lowlands and the Columbia River islands) have found strong natal site fidelity – that is, streaked horned larks return each year to the place they nested or were born (Pearson et al. 2008, p. 11). It is not currently understood why streaked horned larks will select a particular site when there are others of similar structure/characteristics nearby that are not selected. This unknown selection criterion creates the need to be conservative when considering the impacts of the loss of occupied breeding habitat and the effects to the species.

The action area includes open areas adjacent to the river and/or dredge deposit sites. These areas of suitable habitat have not all been surveyed for streaked horned larks. Areas attractive for nesting are subject to frequent disturbance during the breeding season can become habitat sinks; areas that attract them for nesting and nests are destroyed, habitat is lost, or repeated disturbance of adults occurs during the breeding season. All of these factors can lower reproductive success and reduce the value of an area for long-term conservation and recovery of the species.

Status of the Streaked Horned Lark in the Action Area

Streaked horned larks in the lower Columbia River use a shifting mosaic of habitat created by dynamic natural and anthropogenic processes. Streaked horned larks establish their nests in areas of extensive bare ground, and nests are placed adjacent to clumps of bunchgrass (Pearson and Hopey 2004, pp. 1–2). Deposition of dredged material in an area with the proper landscape context (e.g., large, flat, open) can create suitable habitat for the streaked horned lark; following dredged material deposition, there is a natural progression from bare sand to vegetation too dense to provide habitat for streaked horned larks. The amount of time needed for vegetation succession varies throughout the lower Columbia River but can be as little as one growing season (USFWS 2014, p. 24). Some sites maintain suitability for several years, depending on what activities occur on them (e.g., unauthorized A.T.V. use maintains low vegetation height and density).

Rail line construction will occur adjacent to occupied nesting habitat or areas that contain suitable habitat but have not been surveyed for occupancy. Not all suitable habitat areas have been surveyed for occupancy and absent surveys, we assume that if it contains suitable habitat, the birds may be using it any time of year. Throughout the remainder of this document these areas that are occupied or contain suitable habitat and could be occupied are referred to as "occupied/suitable habitat". The property adjacent to the Task 6 rail line extension has documented observations of streaked horned larks during the nesting season (April 15 through Sept. 1) (Figure 3). Task 5 also has areas adjacent to it that may provide suitable habitat for streaked horned larks (near MP 107 and 109, see Figure 2).

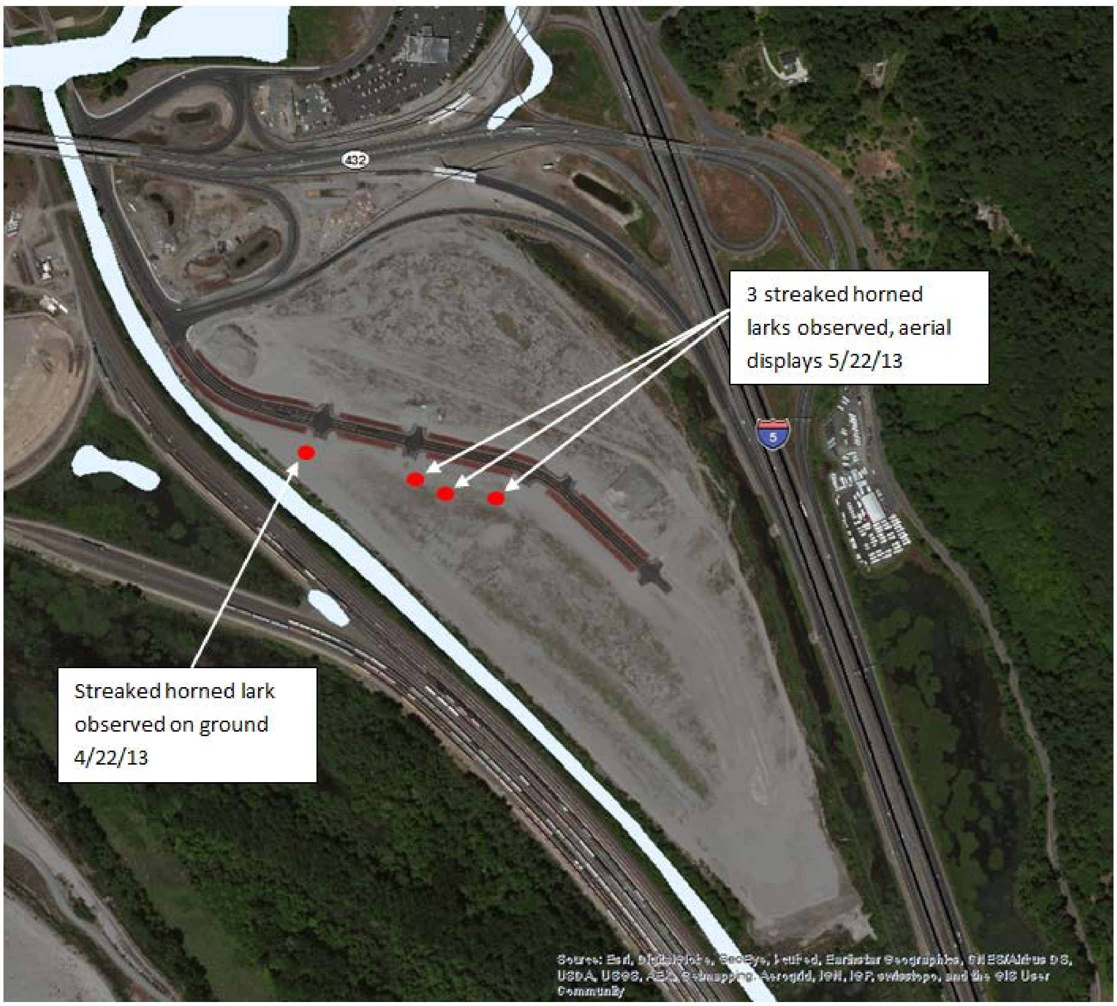

Figure 3. Streaked horned lark observations adjacent to the Task 6 rail line extension

Streaked horned lark nests are extremely difficult to see and locate (Figure 4) because they rely on cryptic behavior as a means of survival and breeding success. Even the most experienced streaked horned lark nest surveyors have difficulty locating nests. Adult streaked horned larks present and exhibiting breeding behaviors in suitable habitat conditions during the breeding season are assumed to be breeding there (e.g., aerial displays, aggressive pursuits, singing, calling, carrying food away instead of consuming it, etc.). Given their high natal site fidelity, we expect streaked horned larks will continue to be present in the action area and likely will nest and/or forage within the action area.

Figure 4. Streaked horned lark nest in an agricultural field at Finley National Wildlife Refuge, Corvallis, Oregon
(Moore and Kotiach 2010, p. 53).

Threats to the Survival and Recovery of Streaked Horned Larks

The streaked horned lark has disappeared from all formerly documented locations in the northern portion of its range, the Oregon coast, and the southern edge of its range. There are currently estimated to be fewer than 1,600 streaked horned larks rangewide, and population numbers are declining. Their range and distribution are continuing to contract; the south Puget Sound breeding population is estimated to be fewer than 170 individuals; the Washington coast and Columbia River islands breeding population is less than 140 individuals. Recent research estimates the number of streaked horned larks in Washington and on the Columbia River islands is still declining and there is evidence of inbreeding depression in the south Puget Sound, indicating that the streaked horned larks range may continue to contract further.

The primary long-term threats to the streaked horned lark are the loss, conversion, and degradation of habitat, particularly to agricultural and urban development, successional changes to grassland habitat, and the spread of invasive plants. Their habitat is threatened and declining throughout their entire range. Natural disturbance regimes are no longer present, unsuitable vegetation is invading suitable habitat and making it unsuitable, and land management practices are incompatible with long-term presence of suitable habitat. Winter congregations are limited to the Washington coast, in the lower Columbia River at dredge deposit sites, and agricultural fields in Oregon's Willamette Valley, putting them at risk from stochastic weather events. Today, most sites used by streaked horned larks require some level of disturbance or management to maintain the habitat structure they need; natural mechanisms that formerly maintained the habitat in suitability no longer exist.

We expect adverse effects will occur to streaked horned larks from the proposed action, including disturbance and flushing of breeding and non-breeding adults and fledglings, increased depredation of nests and young, and displacement from nesting habitat, resulting in reduced reproductive success and fitness of individuals.

Climate Change

Current climate change predictions for terrestrial areas in the Northern Hemisphere indicate warmer air temperatures, more intense precipitation events, and increased summer continental drying (Field et al. 1999, pp. 1-3; Hayhoe et al. 2004, p. 12422; IPCC 2007, p. 1181). Climate change may lead to increased frequency and duration of severe storms and droughts (Golladay et al. 2004, p. 504; McLaughlin et al. 2002, p. 6074; Cook et al. 2004, p. 1015), as well as sea level rise.

During the breeding season, small populations of streaked horned larks are distributed across the range; in the winter, however, streaked horned larks concentrate mainly on the lower Columbia River sites and in the Willamette Valley. The small, isolated nature of the remaining populations of the streaked horned lark increases their vulnerability to stochastic (random) natural events. There are estimated to be fewer than 1,600 streaked horned larks rangewide (Altman 2011, p. 213). Concentrating the rangewide population in this manner exposes the entire population to stochastic events such as heavy snow, ice storms or flooding that could kill individuals or destroy limited habitat; “a severe weather event could wipe out a substantial percentage of the entire subspecies” (Pearson and Altman 2005, p. 13).

Surveys conducted at the Corvallis Airport since 2007 have consistently found 80 to 100 pairs during the breeding season (Moore 2008, Moore and Kotaich 2010, Moore 2013). However, heavy snow in the Willamette Valley during the winter of 2013/2014 appears to have reduced the resident breeding population of streaked horned larks at the Corvallis Airport; only 23 breeding pairs and 21 unmated singing males were counted in June at the airport (Randy Moore, pers. comm., 2014). This indicates that the small and declining population of streaked horned larks is certainly at risk of random environmental events that could have catastrophic consequences to their abundance.

EFFECTS OF THE PROPOSED ACTION: STREAKED HORNED LARK

The regulations implementing section 7 of the Act define “effects of the action” as “the direct and indirect effects of an action on the species or habitat together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline” (50 CFR 402.02).

There are four major construction activities within 100 meters of occupied and/or suitable habitat for streaked horned larks:

1. Placing a rock base layer (large-diameter quarry spalls).
2. Placing fill over the base layer (12-inch thick layer of sub-ballast, and a surface layer of ballast rock).
3. Laying the new track.
4. Removing an upland berm near the south end of occupied habitat.

Types of construction equipment include dump trucks, track-laying equipment, bull dozer, speedswing, lag machine, tool trailer, passenger vehicles, surfacing tamper, ballast regulator, and welding trucks. These activities will occur during and outside the nesting season (the nesting season is approximately April 15 through September 1). Construction will occur in or adjacent to areas known to be occupied year round or potentially occupied (suitable habitat). Effects to the species include disturbance, displacement, and increased depredation of nests and/or young, resulting in reduced reproductive success and fitness.

Streaked Horned Lark

The primary conservation need for streaked horned lark is to protect nesting populations from disturbance and direct mortality due to human activities [71 FR 61938: 61998 (October 11, 2012)]. As proposed, the construction activities will measurably disturb streaked horned larks. The life stages affected are nesting and/or non-nesting adults, fledglings, and eggs/chicks in the nest.

Increased Human Presence

Streaked horned larks using the areas adjacent to construction will be exposed to increased human presence for the duration of construction. Streaked horned larks perceive humans on foot as a threat and are expected to flush, abandon and/or be kept from nests, and/or neglect fledglings, resulting in the loss of vulnerable young and reduced reproductive success. Laying large-diameter rock, gravel, and installing new rail lines will occur as close as 43 meters to suitable and/or occupied nesting and foraging areas. Streaked horned larks that use the areas adjacent to construction are expected to be acclimated to the routine activities that occur. Streaked horned larks using these areas are not accustomed to activities associated with the proposed activities, which vary from normal activities. Construction will result in higher levels of sound, intensity, and increased duration of human presence; additionally the proposed activities are less predictable than normal operations. We expect streaked horned larks foraging, nesting, or otherwise using areas adjacent and within 100 meters of the work will be measurably disrupted by the increased sound and human presence during the duration of the work. These disruptions are expected to result in reduced reproductive success from nest abandonment, depredation of eggs, chicks, or fledglings, interrupted foraging attempts, and reduced fitness of individuals.

Heavy Equipment Use/Construction

Construction will increase the frequency and duration of heavy equipment operation within 100 meters of occupied/suitable streaked horned lark habitat, resulting in increased sound and visual disturbance. Sound from heavy equipment operation is expected to reach 99 dBA (at 50 feet) and to exceed these levels when more than one piece of machinery is being used; however, it is impossible to predict which pieces of equipment will operate concurrently and the maximum sound levels associated with this. We estimate that project related in-air sound would attenuate to baseline ambient sound levels within approximately 3,200 ft (976 meters/0.6 mile); therefore, we expect construction-related sound would extend throughout occupied/suitable habitat areas for streaked horned larks within the action area.

Female streaked horned larks have been observed leaving nests as a result of disturbance sources (i.e., pedestrians, vehicles, and aircraft) up to 100 meters away (CNLM 2012, p. 21). If a predator is detected by a streaked horned lark at some distance (23 to 91 meters) the birds may flush directly and silently, flying near the ground (Stinson 2005, p. 58). To protect nests containing vulnerable young, streaked horned lark females will "causally abandon" nests, flying silently and near the ground when an intruder is 25 to 100 meters away (Beason 1970, p. 99). The "behavior of females on the nest is different because she will fly from the nest when a human was 100 meters or more away, if she could see him" (Beason 1970, p. 41). Therefore, based on research in areas with regular human presence, we expect that some nesting streaked horned larks are reasonably certain to flush when construction activities are within a 100-meter radius of active nests.

Activities that "prevent females from returning to their nests for extended periods of time (more than an hour) may cause them to abandon their nest" (Pearson and Hopey 2005, p. 17; Pearson and Altman 2005, p. 10). Human activities may be responsible for some of the observed nest abandonment (Pearson and Hopey 2005, p. 16). The sound levels range from 70 to over 99 dBA, depending on which piece of equipment is being used and whether more than one piece of equipment is in use at the same time; equipment may be in operation for up to 8 to 10 hours per day in areas where streaked horned larks are expected to be nesting. When streaked horned larks are nesting or foraging within 100 meters of the equipment and the birds are exposed to stationary disturbances lasting longer than 1 hour, we expect some of these birds will experience a measurable disruption of normal behavior (especially the closer they are to the construction site).

Depending on the stage of nesting (early incubation or chicks) and distance from the disturbance, we expect some nesting adults may abandon their nests, flush repeatedly, experience interrupted foraging, or neglect vulnerable young, leaving nests at increased risk of depredation. Flushing adults from active nests repeatedly may result in nest abandonment and failure. Nests can fail when the eggs and nestlings are left unprotected from predators, young have missed feedings, or young become overheated or too cold. Investing so much energy into failed nesting attempts reduces the reproductive fitness of adults by causing them to re-nest, increasing their energy demand and straining the adult's fitness during the time of year when they are already stressed. Therefore, we expect disturbance from construction will result in measurable effects to individual reproductive fitness from temporary visual and sound disturbance to streaked horned larks.

Streaked horned larks may shift their nesting locations in response to the visual and sound disturbance from construction activities. Shifting nesting locations could result in the birds being forced into less desirable areas where their reproductive success could be diminished. Displacing the birds from nesting areas may also cause the displaced birds to abandon their nesting attempt. Streaked horned larks have high breeding site fidelity (Anderson et al. 2013, p. 3), and are expected to return to the same territories each year to breed. The birds may nest elsewhere in response to being displaced. Research has shown that reinitiating nests does not make nests, nestlings, and fledglings less vulnerable (Wolf and Anderson 2013, p. 60). Therefore, we expect that displacement is likely to result in reduced reproductive success, particularly for subsequent nesting attempts.

The effect of temporarily displacing nesting streaked horned larks from the areas that they may prefer, forage in, and/or have previously successfully fledged young is expected to vary depending on timing within the nesting season. If such displacement occurs late in the nesting season, streaked horned larks may not re-nest that year. This would result in reduced reproductive success for those individuals. If displacement occurs earlier, streaked horned larks are expected to attempt re-nesting, which is an increased energetic cost that is a disruption of normal behaviors significant enough that it creates a likelihood of injury to adults from reduced reproductive fitness and success. All streaked horned larks temporarily displaced from occupied/suitable habitat will experience a measurable disruption to their normal breeding and foraging behaviors during construction.

Construction, in general, has been associated with observed nest abandonment (Pearson and Hopey 2005, p. 17). Human-caused disturbance may have effects at every stage of streaked horned larks lives (Anderson et al. 2013, p. 5), but birds are most sensitive and more likely to abandon nests during early incubation than when they are tending chicks. The birds disturbed by construction may re-nest again, which does not mean they are less vulnerable in terms of reproductive fitness. There is no instance where nests, nestlings, and fledglings were less vulnerable because subsequent nests were reinitiated (Wolf and Anderson 2013, p. 60).

Depredation of streaked horned lark young is expected to increase when construction occurs within 100 meters of active nests. Construction crews will remain onsite for several hours each day over the duration of construction and may inadvertently generate food waste and other trash that attracts crows (*Corvus* spp.) and other predators. Crows are most likely the primary predators of streaked horned larks along rail line systems. If streaked horned larks are kept from returning to the nest for extended periods of time, we expect this will result in an increased risk of predation of eggs, nestlings, and/or flightless young (Pearson and Hopey 2004, p. 21); we expect that any adults precluded from tending nests/young for longer than one hour are at a higher risk of nest failure. Based on this information, we expect depredation of nests and young will be measurably increased when construction occurs within 100 meters of active nests.

CUMULATIVE EFFECTS: STREAKED HORNED LARK

Cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this Opinion. There are no non-Federal actions reasonably certain to occur in the action area. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

INTEGRATION AND SYNTHESIS: STREAKED HORNED LARK

In the Environmental Baseline and Status of the Species sections of the Opinion, we established that past, present, and future effects of the action would result in temporary adverse effects to the streaked horned lark.

Summary of the Effects of the Action

Streaked horned larks have experienced significant population declines in Washington over the past 10 years, resulting in a genetic bottleneck (Drovetski et al. 2005, p. 881). Primary long-term threats to the streaked horned larks along the lower Columbia River include the loss and conversion of habitat associated with development. There are no mechanisms in place to ensure that enough suitable nesting habitat is consistently available to sustain the local population along the lower Columbia River. The dredge spoil deposition areas and undeveloped areas along lower Columbia River are critical to conserving the streaked horned lark because these areas are the only suitable breeding areas available, besides airports. These ephemeral habitats provide demographic support to other populations throughout the range of the subspecies.

We expect streaked horned larks nesting within 100 meters of construction will experience a measureable disruption to their normal behaviors. Construction will increase sound and visual disturbance to nesting, foraging, and overwintering birds within approximately 0.5 mile of construction. Streaked horned larks are expected to respond to increased sound and visual disturbance by flushing, shifting nest placement locations, abandoning nest-building attempts, abandoning nests with eggs, abandoning foraging attempts, and/or neglecting vulnerable young. Construction activities are also expected to cause an increased risk of depredation. All nesting adults disturbed by construction work lasting longer than 1 hour within 100 meters of active nests and/or foraging areas are expected to experience a measurable disruption to their normal behavior. We expect these responses will reduce the reproductive success and fitness of adult streaked horned larks.

The proposed action is expected to cause temporary disturbance that could result in a short-term reduction in young produced. However, we do not expect the proposed action to result in a measurable reduction in the population abundance of streaked horned larks along the lower Columbia River or to measurably affect the population at the scale of the State of Washington, or the range of the subspecies.

Likelihood of Persistence at the Rangewide Scale

The proposed action is not expected to result in the loss of adult streaked horned larks or a measurable reduction in the population of breeding birds along the lower Columbia River or the range of the subspecies. The effects of the action, taken together with cumulative effects, are not expected to result in a measurable reduction of numbers, reproduction, or distribution of streaked horned lark at the range-wide scale and will not result in an appreciable reduction in their likelihood of persistence. The areas of occupied/suitable habitat adjacent to the new rail line are essential for the conservation of the streaked horned lark. The proposed action will not alter the habitat features in these areas in any way; therefore, the proposed action is not expected to appreciably reduce the likelihood of survival and recovery of the streaked horned lark.

CONCLUSION: STREAKED HORNED LARK

After reviewing the status of the streaked horned lark, the environmental baseline for the action area, the effects of the action, and the cumulative effects, it is the Service's Biological Opinion that the action, as proposed, is not likely to jeopardize the continued existence of the streaked horned lark.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. *Harm* is defined by the Service as an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering (50 CFR 17.3). *Harass* is defined by the Service as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering (50 CFR 17.3). Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the Federal Railroad Administration (FRA) and Washington State Department of Transportation (WSDOT) so that they become binding conditions of any grant or permit issued to them as appropriate, for the exemption in section 7(o)(2) to apply. The FRA and WSDOT have a continuing duty to regulate the activity covered by this incidental take statement. If the FRA and WSDOT fails to assume and implement the terms and conditions or 2) fails to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the FRA and WSDOT must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR 402.14(i)(3)].

AMOUNT OR EXTENT OF TAKE

The Service expects incidental take in the form of harm and harassment of streaked horned larks from the proposed action. Take of individuals will be from mortality, disturbance, displacement, and/or depredation. Although we have estimated the numbers of individuals taken, it will not be possible to accurately determine the exact numbers of individuals taken for the following reasons: low likelihood of finding dead or injured individuals due to their small size, life habits (living under ground or camouflage coloration), scavenging, and rapid rate of decomposition. Therefore, the Service is relying on the activity levels to determine the extent, frequency, and/or duration of impacts to individuals. Therefore, the duration, frequency, and intensity of temporary exposures are used for quantifying take. These surrogates represent an amount and extent of take that can be more readily monitored. Using these surrogates, the Service expects the following forms and extent of take will result from the action:

1. Take of juvenile streaked horned larks (eggs, nestlings, or flightless fledglings) in the form of ***harm*** between April and mid-September from:
    a. Increased depredation of eggs/nestlings and flightless fledglings within 100 meters of construction that are left unattended or unprotected for longer than 1 hour.
    b. Increased mortality of eggs/nestlings and flightless fledglings within 100 meters of construction that are left unattended or unprotected for longer than 1 hour.
2. Take of streaked horned larks in the form of ***harassment*** year round from:
    a. Temporary disturbance of some individuals from construction activities lasting longer than 1 hour within 100 meters of active nests and/or foraging areas.

b. Temporary disturbance and displacement of streaked horned lark breeding pairs during construction lasting longer than 1 hour within 100 meters of occupied/suitable nesting habitat.

EFFECT OF THE TAKE

In the accompanying Opinion, the Service determined that this level of expected take is not likely to result in jeopardy to the species.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures (RPMs) are necessary and appropriate to minimize impacts of incidental take of streaked horned larks:

RPM 1: Minimize sources of harm to streaked horned larks resulting from mortality associated with increased depredation.

RPM 2: Monitor sources of harm and harassment of streaked horned larks from disturbance that results in missed foraging/provisioning opportunities, neglect of nest/young, and interrupted pairing of breeding pairs.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the FRA and WSDOT must comply with the following terms and conditions, which implement the reasonable and prudent measures, described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary. The following terms and conditions apply to all of the construction projects discussed in this Opinion, unless indicated otherwise below.

<u>The following terms and conditions are required for the implementation of RPM 1:</u>

1. Construction personnel shall dispose of food waste in a manner that does not attract corvids or other predators.

<u>The following terms and conditions are required for the implementation of RPM 2:</u>

1. Monitor and log construction activities (type and duration) adjacent to occupied/suitable habitat for streaked horned larks.
    a. Submit a final report describing the type of equipment used, duration of use, and estimated sound levels of construction work to the Services within 6 months of completion of the project work.

2. A qualified biologist shall survey occupied/suitable habitat areas during construction for streaked horned lark occupancy and use in and adjacent to the work sites.
    a. A qualified biologist shall monitor as much of the occupied/suitable habitat within 100 meters of the construction as possible for a minimum of 4 days during the construction.
        i. Observers will document streaked horned lark presence and behavior (e.g., aerial displays, flying, chasing, singing, or any other behavior).
        ii. The four days shall be evenly spaced throughout the duration of construction adjacent to these areas (e.g., construction takes 30 days, space four surveys days evenly over the 30 day period).
        iii. Surveys will be done according to a survey methodology coordinated with the Service.
        iv. If the occupied/suitable habitat is not directly accessible, an attempt to monitor from the nearest accessible location shall occur.
    b. Any streaked horned larks detected in and near the construction areas will be noted and their location mapped.
    c. The bird surveyor will provide a monitoring report that includes maps of these use areas and data sheets of the documented behaviors.
    d. The final report shall be submitted to the Service within 6 months upon completion of construction.

The Service expects the amount or extent of incidental take described above will not be exceeded as a result of the proposed action. The RPMs and their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The Federal action agency must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

The Service is to be notified within three working days upon locating a dead, injured or sick endangered or threatened species specimen. Initial notification must be made to the nearest U.S. Fish and Wildlife Service Law Enforcement Office. Notification must include the date, time, precise location of the injured animal or carcass, and any other pertinent information. Care should be taken in handling sick or injured specimens to preserve biological materials in the best possible state for later analysis of cause of death, if that occurs. In conjunction with the care of sick or injured endangered or threatened species or preservation of biological materials from a dead animal, the finder has the responsibility to ensure that evidence associated with the specimen is not unnecessarily disturbed. Contact the U.S. Fish and Wildlife Service Law Enforcement Office at (425) 883-8122, or the Service's Washington Fish and Wildlife Office at (360) 753-9440.

REINITIATION NOTICE

This concludes formal consultation on the action(s) outlined in the request. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: 1) the amount or extent of incidental take is exceeded, 2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this Opinion, 3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this Opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

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APPENDIX A: STATUS OF THE SPECIES – STREAKED HORNED LARK

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Appendix A: Status of the Streaked Horned Lark

Legal Status

The streaked horned lark was listed as a threatened species on October 3, 2013 (78 FR 61452), under the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq*.)   The final rule designating critical habitat for the subspecies was published on the same date (78 FR 61506 [October 3, 2013]).

Life History

Taxonomy

The horned lark is found throughout the northern hemisphere (Beason 1995, p. 1); it is the only true lark native to North America (Beason 1995, p. 1). Subspecies of horned larks are based primarily on differences in color, body size, and wing length. Western populations of horned larks are generally paler and smaller than eastern and northern populations (Beason 1995, p. 3). The streaked horned lark was first described as *Otocorys alpestris strigata* by Henshaw (1884, pp. 261–264, 267–268). In addition to the streaked horned lark, there are four other subspecies of horned larks that occur in Washington and Oregon: pallid horned lark (*E. a. alpina*), dusky horned lark (*E. a. merrilli*), Warner horned lark (*E. a. lamprochroma*), and arctic horned lark (*E. a. articola*) (Marshall et al. 2003, p. 426; Wahl et al. 2005, p. 268). None of these other subspecies breed within the range of the streaked horned lark, but all four subspecies frequently overwinter in mixed species flocks in the Willamette Valley (Marshall et al. 2003, pp. 425–427). Genetic analyses indicate that the streaked horned lark population is well-differentiated and isolated from all other sampled localities, including coastal California, and has "remarkably low genetic diversity" (Drovetski et al. 2005, p. 875).

The lack of mitochondrial DNA (mtDNA) diversity exhibited by streaked horned larks is consistent with a population bottleneck (Drovetski et al. 2005, p. 881). The streaked horned lark is differentiated and isolated from all other sampled localities, and although it was "…historically a part of a larger Pacific Coast lineage of horned larks, it has been evolving independently for some time and can be considered a distinct evolutionary unit" (Drovetski et al. 2005, p. 880). The streaked horned lark is recognized as a valid subspecies by the Integrated Taxonomic Information System (ITIS 2012).

Physical Description

The streaked horned lark is endemic to the Pacific Northwest (British Columbia, Washington, and Oregon) (Altman 2011, p. 196) and is a subspecies of the wide-ranging horned lark (*Eremophila alpestris* sp.). Horned larks are small, ground-dwelling birds, approximately 16 to 20 centimeters (6−8 inches) in length (Beason 1995, p. 2). Adults are pale brown, but shades of brown vary geographically among the subspecies. The male's face has a yellow wash in most subspecies. Adults have a black bib, black whisker marks, black "horns" (feather tufts that can be raised or lowered), and black tail feathers with white margins (Beason 1995, p. 2). Juveniles lack the black face pattern and are varying shades of gray, from almost white to almost black with a silver-speckled back (Beason 1995, p. 2).

The streaked horned lark have unique characteristics that differentiate them from other horned larks including a dark brown back, yellowish underparts, a walnut brown nape and yellow eyebrow stripe and throat (Beason 1995, p. 4). The streaked horned lark subspecies is conspicuously more yellow beneath and darker on the back than almost all other subspecies of horned lark. The combination of small size, dark brown back, and yellow underparts distinguishes this subspecies from other horned larks.

Current and Historical Range

The current range and distribution of the streaked horned lark can be divided into three regions: 1) The south Puget Sound in Washington; 2) the Washington coast and lower Columbia River islands (including dredge spoil deposition and industrial sites near the Columbia River in Portland, Oregon); and 3) the Willamette Valley in Oregon (Figure 1).

The streaked horned lark's breeding range historically extended from southern British Columbia, Canada, south through the Puget lowlands and outer coast of Washington, along the lower Columbia River, through the Willamette Valley, the Oregon coast and into the Umpqua and Rogue River Valleys of southwestern Oregon (Altman 2011, pp. 200-202). The subspecies has been extirpated as a breeding species throughout much of its range, including all of its former range in British Columbia, the San Juan Islands, the northern Puget Trough, the Washington coast north of Grays Harbor County, the Oregon coast, and the Rogue and Umpqua Valleys in southwestern Oregon (Pearson & Altman 2005, pp. 4–5).

Current Breeding Range

Streaked horned larks currently breed on seven sites in the south Puget Sound. Four of these sites are on Joint Base Lewis McChord: 13th Division Prairie, Gray Army Airfield, McChord Field, and 91st Division Prairie. The largest population of streaked horned larks currently breeds at the Olympia Regional Airport and a small population nests at the Port of Shelton's Sanderson Field (airport) (Pearson and Altman 2005, p. 23; Pearson et al. 2008, p. 3). One additional breeding population has recently been documented at the Tacoma Narrows Airport (Tirhi, in litt. 2014); however, there is very limited population abundance information available.

On the Washington coast, there are four known breeding sites in Grays Harbor and Pacific Counties: Damon Point; Midway Beach; Graveyard Spit; and Leadbetter Point. On the lower Columbia River, streaked horned larks breed on several of the sandy islands downstream of Portland, Oregon. Recent surveys have documented breeding streaked horned larks on Rice, Miller Sands Spit, Pillar Rock, Welch, Tenasillahe, Coffeepot, Whites/Browns, Wallace, Crims, and Sandy Islands in Wahkiakum and Cowlitz Counties in Washington, and Columbia and Clatsop Counties in Oregon (Pearson and Altman 2005, p. 23; Anderson 2009, p. 4; Lassen, in litt. 2011). Streaked horned larks also breed at the Rivergate Industrial Complex and the Southwest Quad at Portland International Airport; both sites are owned by the Port of Portland, and are former dredge spoil deposition fields (Moore 2011a, pp. 9–12).

In the Willamette Valley, streaked horned larks breed in Benton, Clackamas, Lane, Linn, Marion, Polk, Washington, and Yamhill Counties. Streaked horned larks are most abundant in the southern part of the Willamette Valley. The largest known breeding population of streaked horned larks rangewide are resident at Corvallis Municipal Airport in Benton County, with 75 to 102 pairs annually (Moore 2008, p. 15); other resident populations occur at the Baskett Slough, William L. Finley, and Ankeny units of the Service's Willamette Valley National Wildlife Refuge Complex (Moore 2008, pp. 8–9). Breeding populations also occur at municipal airports in the valley (including McMinnville, Salem, and Eugene) (Moore 2008, pp. 14–17). In 2008, a large population of streaked horned larks colonized a wetland and prairie restoration site on M-DAC Farms, a privately-owned parcel in Linn County; as the vegetation at the site matured in the following 2 years, the site became less suitable for larks, and the population declined (Moore and Kotaich 2010, pp. 11–13). This is likely a common pattern, as breeding streaked horned larks shift sites as habitat becomes available among private agricultural lands in the Willamette Valley (Moore 2008, pp. 9–11).

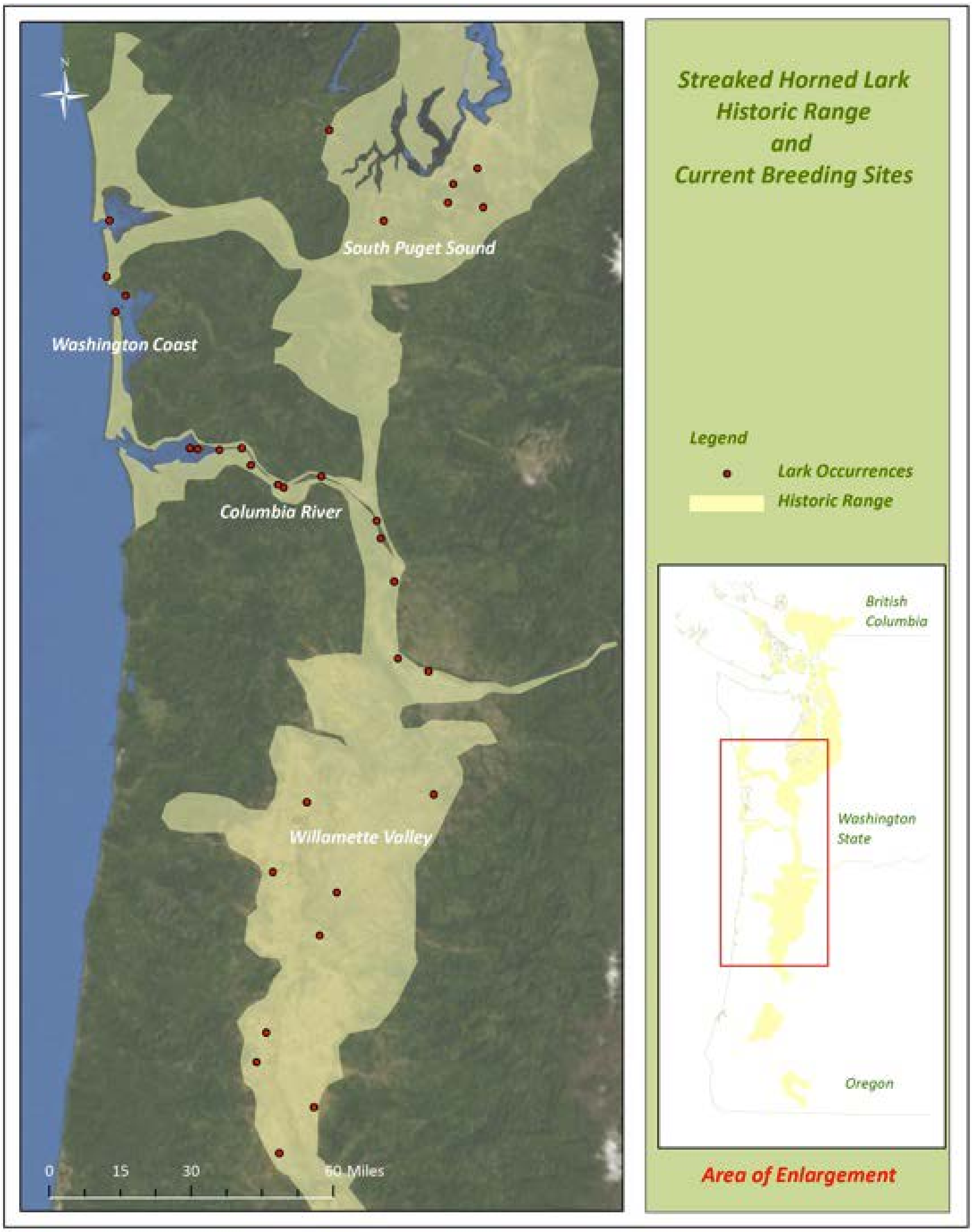

Figure 1. Historic and current range of streaked horned larks (rangewide) (Anderson, in litt. 2014a).

Wintering Range

Pearson *et al*. (2005b, p. 2) found that most streaked horned larks winter in the Willamette Valley (72 percent) and on the islands in the lower Columbia River (20 percent); the rest of the winter is spent on the Washington coast (8 percent) or in the south Puget Sound (1 percent). In the winter, most of the streaked horned larks that breed in the south Puget Sound migrate south to the Willamette Valley or west to the Washington coast; streaked horned larks that breed on the Washington coast either remain on the coast or migrate south to the Willamette Valley; birds that breed on the lower Columbia River islands remain on the islands or migrate to the Washington coast; and birds that breed in the Willamette Valley remain there over the winter (Pearson *et al*. 2005b, pp. 5–6). Streaked horned larks spend the winter in large groups of mixed subspecies of horned larks in the Willamette Valley, and in smaller flocks along the lower Columbia River and Washington Coast (Pearson et al. 2005b, p. 7; Pearson and Altman 2005, p. 7). During the winter of 2008, a mixed flock of over 300 horned larks was detected at the Corvallis Municipal Airport (Moore, pers. comm. 2011b).

Range Contraction

Streaked horned lark has experienced a substantial contraction of its range; it has been extirpated from all formerly documented locations at the northern end of its range (British Columbia, and the San Juan Islands and northern Puget Trough of Washington), the Oregon coast, and the southern edge of its range (Rogue and Umpqua Valleys of Oregon). The streaked horned lark's current range appears to have been reduced to less than half the size of its historical range in the last 100 years. The pattern of range contractions for other Pacific Northwest species (e.g., western meadowlark (*Sturnella neglecta*) shows a loss of populations in the northern part of the range, with healthier populations persisting in the southern part of the range (Altman 2011, p. 214). The streaked horned lark is an exception to this pattern—its range has contracted from both the north and the south simultaneously (Altman 2011, p. 215).

Habitat and Biology

Habitat Selection

Habitat used by streaked horned larks is generally flat with substantial areas of bare ground and sparse low-stature vegetation primarily comprised of grasses and forbs (Pearson and Hopey 2005, p. 27). Suitable habitat is generally 16–17 percent bare ground, and may be even more open at sites selected for nesting (Altman 1999, p.18; Pearson and Hopey 2005, p. 27). Vegetation height is generally less than 13 in (33 cm) (Altman 1999, p.18; Pearson and Hopey 2005, p. 27). A key attribute of habitat used by larks is open landscape context. Our data indicate that sites used by streaked horned larks are generally found in open (i.e., flat, treeless) landscapes of 300 acres (120 ha) or more (Converse et al. 2010, p. 21).

Some patches with the appropriate characteristics (i.e., bare ground, low stature vegetation) may be smaller in size if the adjacent areas provide the required open landscape context; this situation is common in agricultural habitats and on sites next to water. For example, many of the sites used by streaked horned larks on the islands in the Columbia River are small (less than 100 ac (40 ha)), but are adjacent to open water, which provides the open landscape context needed. Streaked horned lark populations are found at nearly every airport within the range of the subspecies, because airport maintenance requirements provide the desired open landscape context and short vegetation structure.

Although streaked horned larks use a wide variety of habitats, populations are vulnerable because the habitats used are often ephemeral or subject to frequent human disturbance. Ephemeral habitats include bare ground in agricultural fields and wetland mudflats; habitats subject to frequent human disturbance include mowed fields at airports, managed road margins, agricultural crop fields, and disposal sites for dredge material (Altman 1999, p. 19).

Foraging

Horned larks forage on the ground in low vegetation or on bare ground (Beason 1995, p. 6); adults feed on a wide variety of grass and weed seeds, but feed insects to their young (Beason 1995, p. 6). Larks eat a wide variety of seeds and insects (Beason 1995, p. 6), and appear to select habitats based on the structure of the vegetation rather than the presence of any specific food plants (Moore 2008, p. 19).

Breeding and Nesting

The majority of streaked horned larks that breed in Washington are migratory, with birds spending the winter in the Willamette Valley, Columbia River or along the Washington coast. In the south Puget Sound geographic area, the first males begin to arrive mid-to-late February (Wolf, in litt. 2013). The first females begin arriving in early March (Anderson, in litt. 2014b) but don't start arriving in numbers until late March and April (Pearson 2003, p.11).

Horned larks form pairs in the spring (Beason 1995, p. 11) and establish territories approximately 1.9 acres (0.77 ha) in size (range 1.5 to 2.5 acres) (Altman, 1999, p. 11). Some areas used by streaked horned larks at study sites in Washington can be 9 acres or more in size (CNLM 2012, p. 20; CNLM, in litt. 2013). Horned larks create nests in shallow depressions in the ground and line them with soft vegetation (Beason 1995, p. 12). Female horned larks select the nest site and construct the nest without help from the male (Beason 1995, p. 12). Streaked horned larks establish their nests in areas of extensive bare ground with little or no woody vegetation, and nests are placed adjacent to clumps of bunchgrass, most often on the north side of the plant (Pearson and Hopey 2004, pp. 1–2; Anderson 2006, p.18; Moore 2013, p. 18). Studies from Washington sites (the open coast, Puget lowlands and the Columbia River islands) have found strong natal fidelity to nesting sites – that is, streaked horned larks return each year to the place they were born and will nest in the same territories every year (Pearson et al. 2008, p. 11; Anderson et al. 2013, pp. 3, 7).

Historically, nesting habitat was found on grasslands, estuaries, and sandy beaches in British Columbia, in dune habitats along the coast of Washington, in western Washington and western Oregon prairies, and on the sandy beaches and spits along the Columbia and Willamette Rivers.

Today, the streaked horned lark nests in a broad range of habitats, including native prairies, coastal dunes, fallow and active agricultural fields, wetland mudflats, sparsely-vegetated edges of grass fields, recently planted Christmas tree farms with extensive bare ground, moderately- to heavily-grazed pastures, gravel roads or gravel shoulders of lightly-traveled roads, airports, and dredge deposition sites in the lower Columbia River (Altman 1999, p. 18; Pearson and Altman 2005, p. 5; Pearson and Hopey 2005, p. 15; Moore 2008, pp. 9–10, 12–14, 16; Anderson et al.

2013, p. 4). The areas adjacent to road ways, airport runways and other vehicle rights-of ways are some of the most consistently (annually) available habitat for the streaked horned larks to breed (Moore 2013, p. 14) and the subspecies likely would not have persisted if not for the regular activities and disturbance that maintains habitat in the surrogate landscapes currently used for nesting. Wintering streaked horned larks use habitats that are very similar to breeding habitats (Pearson et al. 2005, p. 8).

Nesting Phenology in the South Puget Sound Geographic Area

The nesting season for streaked horned larks begins in early April and ends mid- to late August (Figure 2 and 3) (Pearson and Hopey 2004, p. 11; Anderson 2007, p. 6; Moore 2011a, p. 32). Clutches range from 1 to 5 eggs, with a mean of 3 eggs (Pearson and Hopey 2004, p. 12). After the first nesting attempt in April, streaked horned larks will often re-nest in late June or early July (Pearson and Hopey 2004, p. 11). In some situations, they can renest up to 6 times per season (R. Moore, pers. comm. *in* CNLM 2012, p. 24) and can produce two or three successful broods per season. Young streaked horned larks leave the nest by the end of the first week after hatching, and are cared for by the parents until they are about 4 weeks old when they become independent (Beason 1995, p. 15).

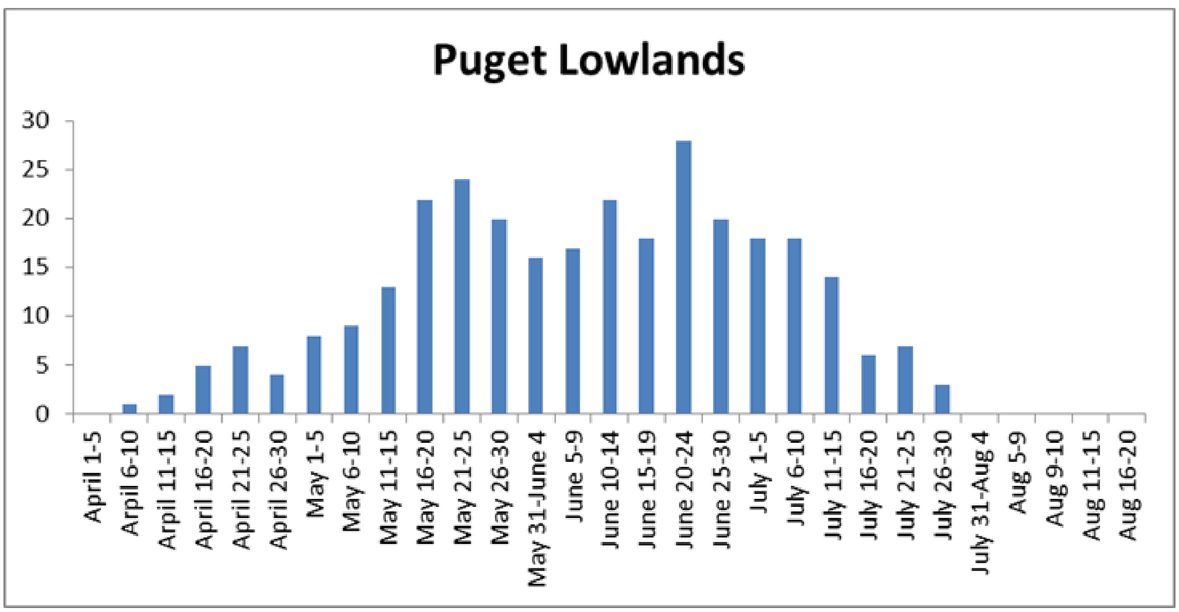

Figure 2. Clutch initiation dates for the Puget Lowlands (draft, WDFW).

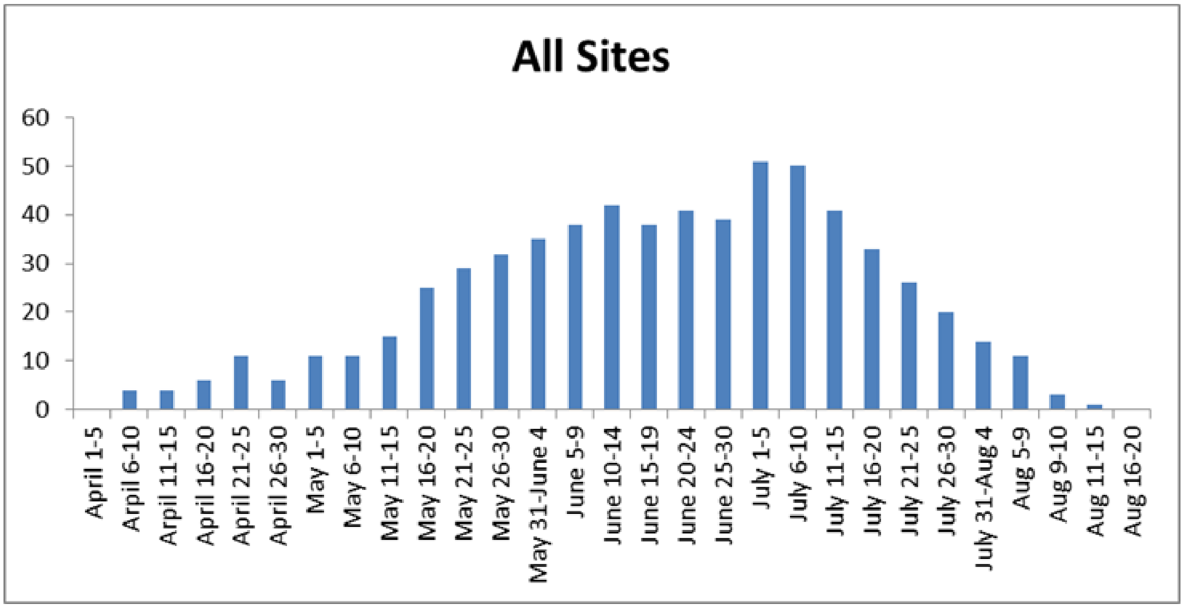

Figure 3: Clutch initiation dates for all nesting sites in Washington and Oregon.

Nest success studies (i.e., the proportion of nests that result in at least one fledged chick) in streaked horned larks report highly variable results. Nest success on the Puget lowlands of Washington is low, with only 28 percent of nests successfully fledging young (Pearson and Hopey 2004, p. 14; Pearson and Hopey 2005, p. 16). According to reports from sites in the Willamette Valley, Oregon, nest success has varied from 23 to 60 percent depending on the site (Altman 1999, p. 1; Moore and Kotaich 2010, p. 23). At one site in Portland, Oregon, Moore (2011a, p. 11) found 100 percent nest success.

Nestlings leave the nest about 8 to 10 days after hatching (once they leave the nest, they are fledglings). Fledgling grassland songbirds leave the nest much earlier than most other passerines and therefore have a lower percentage of muscle mass upon fledging (Moore 2013, p. 8). Immediately after leaving the nest, fledglings are quite ungainly and hop and flutter around following their parents. The young can fly poorly at 4 to 5 days old (Wolf, in litt. 2014). Young flightless birds generally avoid areas without much cover and rely on camouflage for concealment (Wolf, in litt. 2014). About 17 days after they leave the nest, they can walk and fly well. Young streaked horned larks are not able to efficiently flee danger (i.e., walk and fly *well*) until they are approximately 17 days out of the nest (approximately 27 days after hatching (Beason 1970, p. 134).

Population Estimates and Current Status of the Streaked Horned Lark

Data from the North American Breeding Bird Survey (BBS) indicate that most grassland-associated birds, including the horned lark, have declined across their ranges in the past three decades (Sauer et al. 2011, pp. 3–5). The BBS can provide population trend data only for those species with sufficient sample sizes for analyses, but the data are insufficient for the streaked horned lark for a rangewide population trend analysis (Altman 2011, p. 214). An analysis of recent data from a variety of sources concludes that the streaked horned lark has been extirpated from British Columbia, Canada, the Oregon coast, and the Rogue and Umpqua Valleys (Altman 2011, p. 213); this analysis estimates the current rangewide population of streaked horned larks to be about 1,170 to 1,610 individuals (Altman 2011, p. 213).

In the south Puget Sound, approximately 150 to 170 streaked horned larks breed at six sites (Altman 2011, p. 213), and breeding has been recently documented at the Tacoma Narrows Airport (WDFW, in litt 2014). Recent studies have found that larks have very low nest success in Washington (Pearson et al. 2008, p. 8); comparisons with other ground-nesting birds in the same prairie habitats in the south Puget Sound showed that streaked horned larks had significantly lower values in all measures of reproductive success (Anderson 2010a, p. 16). Estimates of population growth rate (λ, lambda) that include vital rates from nesting areas in the south Puget Sound, Washington coast, and Whites Island in the lower Columbia River indicate that the Washington population is declining precipitously. One study estimated that the population of streaked horned larks was declining by 40 percent per year ($\lambda = 0.61 \pm 0.10$ SD), apparently due to a combination of low survival and fecundity rates (Pearson et al., 2008, p. 12). More recent analyses of territory mapping at four sites in the south Puget Sound found that the total number of breeding streaked horned lark territories decreased from 77 territories in 2004 to 42 territories in 2007– a decline of over 45 percent in three years (Camfield et al. 2011, p. 8). Pearson et al. (2008, p. 14) concluded that there is a high probability that populations may be lost in Puget Sound in the future given the low estimates of fecundity and adult survival along with high emigration out of Puget Sound.

On the Washington coast and Columbia River islands there are about 120 to 140 breeding streaked horned larks (Altman 2011, p. 213). Data from the Washington coast and Whites Island were included in the population growth rate study discussed above; populations at these sites appear to be declining by 40 percent per year (Pearson et al. 2008, p. 12). Although nest success is high at the Portland industrial sites, fewer streaked horned larks are nesting at the Rivergate industrial site because the size of the site is decreasing with development.

There are about 900 to 1,300 breeding streaked horned larks in the Willamette Valley (Altman 2011, p. 213). The largest known population of streaked horned larks breeds at the Corvallis Municipal Airport and the population have been as high as 100 breeding pairs in years when the adjacent grass fields are suitable (Moore and Kotaich 2010, pp. 13–15). The population at the Corvallis Airport was 60 to 70 percent lower in 2014, with only 23 confirmed breeding pairs (Moore, in litt. 2014). In 2007, a large (580-acre (235-ha)) wetland and native prairie restoration project was initiated on a former rye grass field in Linn County (Cascade Pacific RC&D 2012, p. 1). Large semi-permanent wetlands were created at the site, and the prairie portions were burned and treated with herbicides (Moore and Kotaich 2010, pp. 11–13). These conditions created excellent quality ephemeral habitat for streaked horned larks and the site was used by about 75 breeding pairs in 2008 (Moore and Kotaich 2010, p. 12). The site had high use again in 2009, but the number of breeding streaked horned larks has steadily declined as the vegetation matured and most of the pairs have moved to other agricultural habitats (Moore and Kotaich 2010, p. 13).

There are no population trend data in Oregon that are comparable to the study in Washington by Pearson et al. (2008, entire); however, research on breeding streaked horned larks indicates that nest success in the southern Willamette Valley is higher than in Washington (Moore, pers.

comm. 2011b). The best information on trends in the Willamette Valley comes from surveys conducted by the Oregon Department of Fish and Wildlife (ODFW); the agency conducted surveys for grassland-associated birds, including the streaked horned lark, in 1996 and again in 2008 (Altman 1999, p. 2; Myers and Kreager 2010, p. 2). Point count surveys were conducted at 544 stations in the Willamette Valley (Myers and Kreager 2010, p. 2). Over the 12-year period between the surveys, measures of relative abundance of streaked horned larks increased slightly from 1996 to 2008 (Myers and Kreager 2010, p. 11). Population numbers decreased slightly in the northern Willamette Valley and increased slightly in the middle and southern portions of the valley (Myers and Kreager 2010, p. 11).

Although there are no conclusive data on population trends throughout the streaked horned lark's range, the rapidly declining population in Puget Sound, along the coast and the Columbia River islands suggests that the range of the streaked horned lark may still be contracting.

Table 1**.** High counts of streaked horned larks during May to July surveys at breeding sites in Washington, 2010-2013 (Linders, in litt. 2014; WDFW 2013, p. 70[1]).

South Sound Sites	**2010**	**2011**	**2012**	**2013[1]**	**Columbia River and coastal sites**	**2010**	**2011**	**2012**	**2013[1]**
Gray Army Airfield	29	25	18	18	**Whites/ Brown Island**	32	24	30	40
13th Division Prairie	3	6	18	14	**Rice Island**	14	24	24	34
91st Division Prairie, Range 74	12	9	4	5	**Kalama and Johns River***	-	-	4 (2 at each site)	-
McChord	26	18	17	23	**Leadbetter**	-	20	13	10
Olympia Airport	47	41	46	45	**Midway**	-	-	2	2
Shelton Airport	15	11	16	16	**Damon Point**	-	6	4	4
Total #	132	110	119	94	**Total #**	46	74	77	90

* Newly documented (2014) breeding areas include Johns River (2 pairs), the Tacoma Narrows Airport (3 pairs) and Range 50 in the Artillery Impact Area (7 or 8 pairs).

Threats

Reasons for listing

The streaked horned lark was listed as threatened species because of the following:

- The streaked horned lark has disappeared from all formerly documented locations in the northern portion of its range, the Oregon coast, and the southern edge of its range.
- There are currently estimated to be fewer than 1,600 streaked horned larks rangewide, and population numbers are declining.
- Their range is small may be continuing to contract;
    - The south Puget Sound breeding population is estimated to be less than 170 individuals.
    - The Washington coast and Columbia River islands breeding population is less than 140 individuals.
    - Recent research estimates the number of streaked horned larks in Washington and on the Columbia River islands is declining.
        - This decline considered with evidence of inbreeding depression on the south Puget Sound indicated the larks range may contract further in the future.
- Their habitat is threatened throughout their entire range from loss of natural disturbance regimes, invasion of unsuitable vegetation that alter habitat structure, and incompatible land management practices.
- Winter congregations are limited to one location, in Oregon's Willamette Valley, putting it at risk from stochastic weather events.
- Most sites currently used by larks require some level of disturbance or management to maintain the habitat structure they need and natural mechanisms that used to provide this function no longer exist.

Land Conversion and Development

The prairies of south Puget Sound and western Oregon are considered one of the rarest ecosystems in the United States (Noss *et al.* 1995, p. I-2; Dunn and Ewing 1997, p. v). Dramatic changes have occurred on the landscape over the last 150 years, including a 90 to 95 percent reduction in the prairie ecosystem. In the south Puget Sound region, where most of western Washington's prairies historically occurred, less than ten percent of the original prairie persists, and only three percent remains dominated by native vegetation (Crawford and Hall 1997, pp. 13–14). In the remaining prairies, many of the native bunchgrass communities have been replaced by nonnative pasture grasses (Rogers 2000, p. 41), which streaked horned larks avoid using for territories and nest sites (Pearson and Hopey 2005, p. 27). In Oregon's Willamette Valley native grassland has been reduced from being the most common vegetation type to scattered parcels intermingled with rural residential development and farmland; it is estimated that less than one percent of the native grassland and savanna remains in Oregon (Altman et al. 2001, p. 261).

Land Use Practices

Horned larks, including the streaked horned lark subspecies, need expansive areas of flat, open ground to establish breeding territories. As native prairies and scoured river banks in the Pacific Northwest have declined, the large, flat, treeless areas, which airports necessarily require, have become attractive breeding sites for streaked horned larks. Six of the seven streaked horned lark nesting sites remaining in the Puget lowlands are located on or adjacent to airports and military airfields (Rogers 2000, p. 37; Pearson and Hopey 2005, p. 15; Linders, in litt. 2014). At least four breeding sites are found at airports in the Willamette Valley, including the largest known population (historically) at Corvallis Municipal Airport (Moore 2008, pp. 14–17). Stinson (2005, p. 70) concluded that if large areas of grass had not been maintained at airports the streaked horned lark might already have been extirpated from the south Puget Sound area. Although routine mowing to meet flight path regulations helps to maintain grassland habitat in suitable condition for nesting larks, the timing of mowing is critical to avoid effects to nesting larks.

Mowing during the active breeding season (mid-April to late July) can destroy nests or flush adults, which may result in nest failure (Pearson and Hopey 2005, p. 17; Stinson 2005, p. 72). Some of the airports in the range of the streaked horned lark have adjusted the frequency and timing of mowing in recent years to minimize impacts to larks (Pearson and Altman 2005, p. 10). In 2011, McChord Air Field at Joint Base Lewis-McChord (JBLM) agreed to a mowing regime that would protect the lark during their nesting period. Unfortunately, recent unseasonably wet weather doesn’t allow this strategy to be implemented. WDFW coordinates mowing schedules at the Olympia Airport to reduce impacts to larks.

In 2008, the Port of Olympia prepared an Interlocal Agreement with the WDFW that outlines management recommendations and mitigation for impacts to state-listed species from development at the airport. In December, 2010, a white paper and supplemental planning memorandum was developed as part of the Airport Master Plan Update (Port of Olympia 2010). This document, which is outlined in Appendix 2 of the Master Plan Update, describes management recommendations for the protection of critical areas and priority species, including the streaked horned lark. The recommendations include minimizing development, retaining open or bare ground, and avoiding mowing during the nesting season (April 15 through August 15) in known or potential lark nesting areas. Although the Port of Olympia does not anticipate any development to occur in the streaked horned lark nesting areas within the next 20 years, the agreement is not a regulatory document and would not preclude future development, which is a primary source of revenue for the Port of Olympia.

Airport expansions could result in further losses of some populations. At the Olympia Airport, hangars were built in 2005 on habitat used by streaked horned larks for foraging, resulting in a loss of grass and forb-dominated habitat. This could have resulted in a smaller local population due to reduced habitat availability for breeding and wintering larks (Pearson and Altman 2005, p. 12). Based on discussions with staff at Sanderson Field in Shelton, future development plans do not include impacts to streaked horned lark habitat at this time. Most of the proposed development at Sanderson Field will occur in areas already impacted (between existing buildings). The West Ramp at Gray Army Air Field on JBLM was expanded in 2005 into areas previously used by breeding larks, resulting in a loss of available breeding habitat (Stinson 2005, p. 72).

At the Portland International Airport, streaked horned larks nest in an area called the Southwest Quad. This is an old dredge material deposition site in a currently unused part of the airport. The Port of Portland, which owns the airport, may propose to develop the Southwest Quad to accommodate future expansion; however, there is currently no plan in place (Green, in litt. 2012). Future development of the Southwest Quad would result in the loss of at least 33 ac (13 ha) of habitat and three breeding territories (Moore 2011a, p. 12).

Industrial development has also reduced habitat available to breeding and wintering larks. The Rivergate Industrial Park, owned by the Port of Portland, is a large industrial site in north Portland near the Columbia River; the site is developed on a dredge spoil field, and still has some large areas of open space between the industrial buildings. Rivergate has been an important breeding site for streaked horned larks, and a wintering site for mixed flocks of up to five horned lark subspecies (including the streaked horned lark). In 1990, the field used by larks at Rivergate measured more than 650 acres (260 ha) of open sandy habitat (Dillon, pers. comm. 2012). In the years since, new industrial buildings have been constructed on the site; now only one patch of 79 acres (32 ha) of open dredge spoil field remains and the breeding population has dropped from 20 pairs to 5 pairs in this time (Moore 2011a, pp. 9-10).

The 13th Division Prairie at JBLM is used for helicopter operations (paratrooper practices, touch-and-go landings, and load drop and retrievals) and troop training activities. Foot traffic and training maneuvers that are conducted during the streaked horned lark breeding season are likely contributing factors to nest failure and low nest success at 13th Division Prairie. Recently, a streaked horned lark nest was destroyed at 13th Division Prairie by a porta-potty service vehicle (Linders, in litt. 2012). Artillery training, off-road vehicle use, and troop maneuvers at the 91st Division Prairie are also conducted in areas used by larks during the nesting season. Because access into this training area is limited and streaked horned lark surveys are only conducted opportunistically, we do not know the degree to which streaked horned lark nests are lost due to military activities at 91st Division Prairie.

Streaked horned lark populations on JBLM are exposed to differing levels of training activities. The Department of Defense's (DOD) proposed actions under 'Grow the Army' (GTA) include stationing 5,700 new soldiers, new combat service support units, a combat aviation brigade, facility demolition and construction to support the increased troop levels, additional aviation, maneuver, and live fire training (75 FR 55313, September 10, 2010). The increased training activities will affect nearly all training areas at JBLM resulting in an increased risk of accidental fires, and habitat destruction and degradation through vehicle travel, dismounted training, bivouac activities, and digging. Although training areas on the base have degraded habitat for the species, with implementation of conservation measures, these areas still provide habitat for the streaked horned lark. Military training, including bombardment with explosive ordnance and hot downdraft from aircraft, has been documented to cause nest failure and abandonment for streaked horned larks at Gray Army Airfield and McChord Field at JBLM (Stinson 2005, pp. 71–72). These activities harass and may kill some streaked horned larks, but the frequent disturbance also helps to maintain sparse vegetation and open ground needed for streaked horned lark nesting.

In odd-numbered years since 2005, McChord Field has hosted a military training event known as the Air Mobility Rodeo. This international military training exercise is held at the end of July, during lark breeding season. This event includes aircraft, vehicles, and tents staged on or near lark nesting areas, although the majority of these activities take place on concrete hardstand areas (Geil, in litt. 2010). In even-numbered years, McChord Field hosts a public air show known as Air Expo, which is scheduled in mid-July. At the Air Expo, aerial events incorporate simulated bombing and fire-bombing, including explosives and pyrotechnics launched from an area adjacent to the most densely populated streaked horned lark nesting site at this location; these disturbances likely have adverse effects to fledglings of late nests (Stinson 2005, p. 72).

Surveys in 2004 detected 31 pairs of streaked horned larks at McChord Field (Anderson 2011, p. 14). In 2006, the number of lark pairs at McChord Field had dropped by more than half to 14 pairs, and the number of lark pairs has remained low, with just 11 pairs detected in 2011 (Anderson 2011, p. 14). The Rodeo and Air Expo events are scheduled to take advantage of the good weather that typically occurs in the summer on the south Puget Sound; this timeframe also coincides with the streaked horned lark nesting season, and the disturbance may continue to cause nest failure and abandonment (Pearson et al. 2005a, p. 18). During the airshows, tents, vehicles and concession stands are set up in the grassy areas along the runways used by streaked horned larks for nesting and thousands of visitors a day line the runways for viewing the shows.

Airports routinely implement a variety of approaches to minimize the presence of hazardous wildlife on or adjacent to airfields and to prevent wildlife strikes by aircraft. McChord Field uses falcons to scare geese and gulls off the airfield, and also uses two dogs for this purpose; the falcons and dogs are part of McChord Field's Integrated Bird/Wildlife Aircraft Strike Hazard program and are designed to minimize aircraft and crew exposure to potentially hazardous bird and wildlife strikes (Geil, in litt. 2010). The falcons and dogs cause streaked horned larks to become alert and fly (Pearson and Altman 2005, p. 12), which imposes an energetic cost to adults and could expose nests to depredation. Portland International Airport uses a variety of hazing and habitat management tools to minimize wildlife hazards. Raptors and waterfowl pose the greatest danger to aircraft operations, but the airport's Wildlife Hazard Management Plan aims to reduce the potential for any bird strikes (Port of Portland 2009, pp. 5–6). Streaked horned larks are not known to nest near the runways at Portland International Airport, but foraging individuals from the nearby Southwest Quad could be harassed by the hazing program, which could impose resulting energetic costs.

JBLM has committed to restrictions both seasonally and operationally on military training areas, in order to avoid and minimize potential effects to the streaked horned lark. These restrictions include identified non-training areas, seasonally restricted areas during breeding, and the adjustment of mowing schedules to protect the species. These conservation management practices are outlined in an operational plan that the Service has assisted the DOD in developing for JBLM (Thomas, pers. comm. 2012).

Habitat features are not the only influence on where streaked horned larks nest, although it is usually attributed as the major influential component of nest site selection. More recent research has demonstrated that social information and behavioral cues can be as or more important than environmental cues in habitat selection (Ahlering et al. 2010). A recent conspecific attraction study by the CNLM used social cues (decoys and calls) to try luring birds to newly created habitats. Two years of observations resulted in 23 detections of streaked horned larks at the habitat restoration sites, but no birds established territories or bred on them (Anderson et al. 2013, p. 3).

Loss of Ecological Disturbance Regimes

Habitat has been rendered unusable for the streaked horned lark due to invasion of nonnative grasses and woody vegetation. These invasive species have established themselves across vast portions of the landscape because ecological disturbance regimes that prevented them, such as fire and flooding, have been suppressed or entirely ceased. The basic ecological processes that maintain prairies, meadows, and scoured river banks have disappeared from, or have been altered on, all but a few protected and managed sites.

Historically, the prairies and meadows of the south Puget Sound region of Washington and western Oregon are thought to have been actively maintained by the native peoples of the region, who lived here for at least 10,000 years before the arrival of Euro-American settlers (Christy and Alverson 2011, p. 93). Frequent burning reduced the encroachment and spread of shrubs and trees (Chappell and Kagan 2001, p. 42), favoring open grasslands with a rich variety of native plants and animals. Following Euro-American settlement of the region in the mid-19th century, fire was actively suppressed on grasslands, allowing encroachment by woody vegetation into the remaining prairie habitat and oak woodlands (Franklin and Dyrness 1973 p. 122; Kruckeberg 1991, p. 287; Agee 1993, p. 360; Altman et al. 2001, p. 262).

The result of fire suppression has been the invasion of the prairies and oak woodlands by native and nonnative plant species (Dunn and Ewing 1997, p. v; Tveten and Fonda 1999, p. 146), notably woody plants such as the native Douglas-fir (*Psuedotsuga menziesii*) and the nonnative Scot's broom, and nonnative grasses such as *Arrhenatherum elatus* (tall oatgrass) in Washington and *Brachypodium sylvaticum* (false brome) in the Willamette Valley of Oregon. This increase in woody vegetation and nonnative plant species has resulted in less available prairie habitat overall and habitat that streaked horned larks avoid (Pearson and Hopey 2005, pp. 2, 27).

On tallgrass prairies in midwestern North America, fire suppression has led to degradation and the loss of native grasslands (Curtis 1959, pp. 296, 298; Panzer 2002, p. 1297). On northwestern prairies, fire suppression has allowed Douglas fir to encroach on and out-compete native prairie vegetation for light, water, and nutrients (Stinson 2005, p. 7). On JBLM alone, over 16,000 acres (6,477 ha) of prairie has converted to Douglas-fir forest since the mid-19th century (Foster and Shaff 2003, p. 284). Where controlled burns or direct tree removal are not used as a management tool, this encroachment will continue to cause the loss of open grassland habitats for the streaked horned lark.

Restoration in some of Washington's south Puget Sound native grasslands has resulted in temporary control of Scot's broom and other invasive plants through the careful and judicious use of herbicides, mowing, grazing, and fire. Fire has been used as a management tool to maintain native prairie composition and structure. Use of fire for these purposes is acknowledged to improve the health and composition of grassland habitat by providing a short-term nitrogen addition, which results in a fertilizer effect to vegetation, thus aiding grasses and forbs as they re-sprout.

Unintentional fires ignited by military training burns patches of prairie grasses and forbs on JBLM on an annual basis. These "low-intensity" ground fires create a mosaic of conditions within the grassland, maintaining a low vegetative structure of native and nonnative plant composition, and patches of bare soil. Because of the topography of the landscape, these fires create patches that burn completely, some areas that do not burn, and areas where consumption of the vegetation is mixed in its effects to the habitat. One of the benefits to fire in grasslands is that it tends to kill regenerating conifers, and reduces the cover of nonnative shrubs such as Scot's broom; however, Scot's broom seeds that are stored in the soil can be stimulated by fire (Agee 1993, p. 367). On sites where regular fires occur, such as on JBLM, there is a high complement of native plants and fewer invasive species. Management practices such as intentional burning and mowing require expertise in timing and technique to achieve desired results. If applied at the wrong season, frequency, or scale, fire and mowing can be detrimental to the restoration of native prairie species.

Prior to the construction of dams on the Columbia River, annual flooding and scouring likely created nesting and wintering habitat for streaked horned larks on sandy islands and beaches along the river's edge (Stinson 2005, p. 67). Once the dams were in place, willows (*Salix* spp.), black cottonwood (*Populus trichocarpa*), and other vegetation established broadly on the sandbars and banks (Rogers 2000, pp. 41–42), resulting in unsuitable habitat for larks. Loss of these habitats may have been partially ameliorated by the formation of dredge spoil islands that have been established as part of the U.S. Army Corps of Engineers' (Corps) shipping channel maintenance (Stinson 2005, p. 67).

Streaked horned larks currently use sand islands in the lower Columbia River for both breeding and wintering habitat. These islands are a mosaic of Federal, State, and private lands, but there are no management or conservation plans in place to protect larks or these important habitats. The Corps has a dredging program to maintain the navigation channel in the Columbia River. In 2002, the Corps established a deeper navigation channel in the river, a regular maintenance dredging program, and a plan for disposing dredge material on the islands in the lower Columbia River (USFWS 2002, pp. 1–14). In this plan, the Corps addressed the disposition of dredge material in the lower Columbia River, which has the potential to both benefit and harm streaked horned larks, depending on the location and timing of deposition. Recent studies by Anderson (2010a, p. 29) on the islands in the lower Columbia River have shown that fresh dredge material stabilizes and develops sparse vegetation suitable for lark nesting approximately three years after deposition, and can be expected to remain suitable for approximately two years before vegetation becomes too dense. Thus, deposition of dredge material can be both a tool for habitat creation and a threat, as deposition of dredge material at the wrong time (e.g., during the nesting season) can destroy nests and young or degrade suitable habitat.

Destruction of occupied lark habitat through the deposition of dredge materials has been documented several times on the lower Columbia River islands (Stinson 2005, p. 67; Pearson and Altman 2005, p. 11; Pearson et al. 2008, p. 14). In 2006, dredge spoils were deposited on Whites Island while larks were actively nesting. All nests at this site were apparently destroyed (Pearson, pers. comm. 2012). This site had at least 21 nests and 13 territories during the 2005 nesting season (Pearson et al. 2008, p. 21). In a similar situation, singing males were observed on Rice Island in June 2000, but dredge spoil was placed on the site in July 2000, which destroyed nesting habitat during the breeding season (MacLaren 2000, p. 3). In 2004 on Miller Sands Spit, the Corps deposited dredge material on lark breeding habitat, which likely resulted in nest failure (Pearson and Altman 2005, p. 10). The Corps has recently begun working with the Center for Natural Lands Management to coordinate dredge spoil depositions with timing of lark breeding season (Anderson, in litt. 2011).

Dredge spoil deposition also creates habitat for Caspian terns (*Sterna caspia*), a native bird species that nests in very large numbers in the lower Columbia River. These large terns have been shown to eat substantial numbers of salmon smolts, and for the past decade, an interagency effort has focused on reducing tern depredation on young salmon (Lyons et al. 2011, p. 2). One aspect of the effort to reduce the numbers of terns in the lower Columbia River has been a program to discourage tern nesting on Rice Island by planting vegetation and placing barrier fencing on open sandy habitats; these measures have also reduced habitat available to larks on the island and are ongoing (Stinson 2005, p. 73; Roby et al. 2011, p. 14).

Larks appear to respond positively to habitat management that simulates natural processes. From 2001 through 2004, JBLM mowed and controlled burns to control Scot’s broom during the nonbreeding season (Pearson and Hopey 2005, p. 30). The September 2004 burns resulted in increased lark abundance and a dramatic vegetative response on 13th Division Prairie. Relative to the control sites, larks increased their use of burned areas immediately after a late summer fire in 2006, and in the breeding season following the fires (Pearson and Hopey 2005, p. 30).

Throughout the year, streaked horned larks use areas of bare ground or sparse vegetative cover in grasslands. These grasslands may be native prairies in the Puget lowlands, perennial or annual grass seed fields in the Willamette Valley, or the margins of airport runways throughout the range of the species. All of these habitats receive management to maintain desired structure: prairies require frequent burning or mowing to prevent succession to woodlands; agricultural fields are mowed during harvest or burned to reduce weed infestations; airports mow to maintain low-stature grasses around airfields to minimize attracting hazardous wildlife. Burning and mowing are beneficial to larks because these activities maintain the habitat structure required by the lark, but these activities can also harm larks if the activities occur during the breeding season when nests and young are present (Pearson and Hopey 2005, p. 29). In the nesting seasons from 2002 to 2004, monitoring at the Puget lowlands sites (Gray Army Airfield, McChord Field, and Olympia Airport) documented nest failure of 8 percent of nests caused by mowing over the nests, young, and adults (Pearson and Hopey 2005, p. 18). Habitat management to maintain low-stature vegetation is essential to maintaining suitable habitat for streaked horned larks, but the timing of the management is important, as improperly-timed actions can destroy nests and young.

Restoration Activities

Management for invasive species and encroachment of conifers requires control through equipment, herbicides, and other activities. While restoration has conservation value for the species, management activities to implement restoration may also have direct impacts to the species that are the target of habitat restoration. The introduction of Eurasian beachgrass (*Ammophila arenaria*) and American beachgrass (*A. breviligulata*), currently found in high and increasing densities in most of coastal Washington and Oregon, has dramatically altered the structure of dunes on the outer coast (Wiedemann and Pickart 1996, p. 289). The tall leaf canopy of beachgrass creates areas of dense vegetation, which is unsuitable habitat for streaked horned lark nesting (MacLaren 2000, p. 5).

Streaked horned larks require sparse, low-stature vegetation with at least 16–17 percent bare ground; areas invaded by beachgrass are too dense for streaked horned larks. The area suitable for streaked horned lark breeding on the Washington coast has decreased as a result of the spread of beachgrasses (Stinson 2005, p. 65; USFWS 2011, p. 4-2). In a 10-year period (from 1977 to 1987) at Leadbetter Point on the Willapa National Wildlife Refuge, spreading beachgrass reduced the available nesting habitat for streaked horned larks by narrowing the distance from vegetation to water by 112 feet (34 meters) (WDFW 1995, p. 19). Since 1985, encroaching beachgrasses have spread to cover over two-thirds of Damon Point at Grays Harbor, another lark breeding site on the Washington coast (WDFW 1995, p. 19). At Damon Point, Scot's broom is also encroaching on lark habitat, reducing the area available for nesting (Pearson, in litt. 2011). On the Oregon coast, the disappearance of the streaked horned lark has been attributed to the invasion of exotic beachgrasses and the resultant dune stabilization (Gilligan et al. 1994, p. 205).

Some efforts have been successful in reducing the cover of encroaching beachgrasses. The Service's Willapa National Wildlife Refuge has restored habitat on Leadbetter Point. In 2007, the area of open habitat measured 84 acres (34 ha); after mechanical and chemical treatment to clear beachgrass (mostly American beachgrass) and spreading oyster shell across 45 acres (18 ha), 121 acres (50 ha) of sparsely vegetated open habitat suitable for lark nesting was created (Pearson et al. 2009, p. 23). The main target of the Leadbetter Point restoration project was the threatened western snowy plover (*Charadrius alexandrinus nivosus*), but the restoration actions also benefited the streaked horned lark. Before the restoration project, this area had just 2 streaked horned lark territories (Pearson et al. 2005a, p. 7); after the project, an estimated 8 to 10 territories were located in and adjacent to the restoration area (Pearson, pers. comm. 2012).

Transient Agricultural Habitat

Roughly half of all the agricultural land in the Willamette Valley is devoted to grass seed production fields (Oregon Seed Council 2012, p. 1). Grasslands–both rare native prairies and grass seed fields–are important habitats for streaked horned larks in the Willamette Valley; open areas within the grasslands are used for both breeding and wintering habitat (Altman 1999, p. 18; Moore and Kotaich 2010, p. 11; Myers and Kreager 2010, p. 9). About 420,000 acres (170,000 ha) in the Willamette Valley are currently planted in grass seed production fields. Demand for grass seed is declining in the current economic climate (Oregon Department of Agriculture 2011, p. 1); this decreased demand for grass seed has resulted in farmers switching to other agricultural commodities, such as wheat or nurseries and greenhouses (Oregon Department of Agriculture 2011, p. 1). The continued decline of the grass seed industry in the Willamette Valley will likely result in conversion from grass seed fields to other agricultural types; this will result in fewer acres of suitable breeding and wintering habitat for streaked horned larks.

Another potential threat related to agricultural lands is the streaked horned lark's use of ephemeral habitats. In the breeding season, streaked horned larks will move into open habitats as they become available, and as the vegetation grows taller over the course of the season, will abandon the site to look for other open habitats later in the season (Beason 1995, p. 6). This ability to shift locations in response to habitat changes is a natural feature of the streaked horned lark's life history strategies, as breeding in recently disturbed habitats is part of their evolutionary history. In the Willamette Valley, patches of suitable habitat in the agricultural fields shift from place to place as fields are burned, mowed, or harvested. Other suitable sites appear when portions of grass fields perform poorly, inadvertently creating optimal habitat for larks. The shifting nature of suitable habitat is not in itself a threat; the potential threat is in the overall reduction of compatible agriculture, which would reduce the area within which streaked horned lark habitat could occur.

Depredation and Pest Control

Depredation on adult streaked horned larks has not been identified as a threat, but it is the most frequently documented source of mortality for eggs and young larks. In most studies of streaked horned lark nesting ecology, depredation has been the primary documented source of nest failure (Altman 1999, p. 18; Pearson and Hopey 2004, p. 15; Pearson and Hopey 2005, p. 16; Pearson and Hopey 2008, p. 1; Moore and Kotaich 2010, p. 32). Sixty-nine percent of nest failures were caused by depredation at four south Puget Sound study sites (Gray Army Airfield, 13th Division Prairie, Olympia Airport, McChord Field) in 2002–2004 (Pearson and Hopey 2005, p. 18). Anderson (2006, p. 19) concluded that the primary predators of streaked horned lark eggs and young were avian, most likely American crows (*Corvus brachyrhynchos*), although garter snakes (*Thamnophis* spp.) and western meadowlarks have also been documented preying on eggs and young in the region (Pearson and Hopey 2005, p. 16; Pearson and Hopey 2008, p. 4). On the Washington coast and lower Columbia River islands, 46 percent of nest failures were caused by predation at three study sites (Midway Beach, Damon Point, and Puget Island) in 2004 (Pearson and Hopey 2005, p. 18). A study of five sites in the Willamette Valley (Corvallis Airport, M-DAC Farms, William L. Finley, Baskett Slough, and Ankeny National Wildlife Refuges) determined that 23 to 58 percent of all streaked horned lark nests were lost to predation (Moore and Kotaich 2010, p. 32).

Video cameras were used to identify predators in the Willamette Valley study; documented predators include: red-tailed hawk (*Buteo jamaicensis*), northern harrier (*Circus cyaneus*), American kestrel (*Falco sparverius*), great-horned owl (*Bubo virginianus*), and rats and mice (Family Cricetidae) (Moore and Kotaich 2010, p. 36). Streaked horned larks are ground-nesting birds and are vulnerable to a many other potential predators, including domestic cats and dogs, coyotes (*Canis latrans*), raccoons (*Procyon lotor*), striped skunks (*Mephitis mephitis*), red foxes

(*Vulpes vulpes*), long-tailed weasels (*Mustela frenata*), opossums (*Didelphis virginiana*), meadow voles (*Microtus pennsylvanicus*), deer mice (*Peromyscus maniculatus*), and shrews (*Sorex* spp.) (Pearson and Hopey 2005, p. 17; Stinson 2005, p. 59).

Depredation is a natural part of the streaked horned lark's life history, and in stable populations, the effect of predation would not be considered a threat to the species. However, in the case of the streaked horned lark, the effect of depredation may be magnified when populations are small, and the disproportionate effect of depredation on declining populations has been shown to drive rare species even further towards extinction (Woodworth 1999, pp. 74–75). We consider the effect of depredation on streaked horned lark populations, particularly in the south Puget Sound, to be a threat to the subspecies.

The one area where depredation does not appear to be a threat to nesting streaked horned larks is in Portland at Rivergate Industrial Complex and the Southwest Quad at Portland International Airport. In 2009 and 2010, nesting success was very high, and only a single depredation event was documented at these sites (Moore 2011a, p. 11). The reason for the unusually low depredation pressure may be that the two industrial sites have few predators since both sites are isolated from other nearby natural habitats.

Depredation may have contributed to the extirpation of streaked horned larks on the San Juan Islands. The subspecies was last documented on the islands in 1962 (Lewis and Sharpe 1987, p. 204). The introduction of several exotic animal species to the island roughly coincides with the disappearance of the streaked horned lark, including feral ferrets (*Mustela outorius*) and red foxes. These introduced predators may have significantly affected ground nesting birds and played a role in the eventual extirpation of streaked horned larks (Rogers 2000, p. 42).

Disease and Genetics

Genetic analysis has shown that streaked horned larks have suffered a loss of genetic diversity due to a population bottleneck (Drovetski *et al.* 2005, p. 881), the effect of which may be exacerbated by continued small total population size. In general, decreased genetic diversity has been linked to increased chances of inbreeding depression, reduced disease resistance, and reduced adaptability to environmental change, leading to reduced reproductive success (Keller and Waller 2002, p. 235).

Recent studies in Washington have found that streaked horned larks have lower fecundity and nest success than other Northwestern horned lark subspecies (Camfield et al. 2010, p. 277). In a study on the south Puget Sound, all measures of reproductive success were lower for streaked horned larks than for other ground-nesting birds at the same prairie sites (Anderson 2010a, p. 15). The streaked horned lark's egg hatching rate at these sites is extremely low (i.e., 44 percent at 13th Division Prairie) (Anderson 2010a, p. 18). Comparisons with savannah sparrows (*Passerculus sandwichensis*), a bird with similar habitat requirements that nests on the same prairies, found that streaked horned lark fecundity was 70 percent lower (Anderson 2010b, p. 18).

If the streaked horned lark's very low reproductive success was caused by poor habitat quality, other ground-nesting birds at the study sites would be expected to show similarly low nest success rates. Other bird species have much higher nest success in the same habitat, suggesting that inbreeding depression may be playing a role in the decline of streaked horned larks in the south Puget Sound (Anderson 2010a, p. 27). Other factors consistent with hypothesized inbreeding depression in the south Puget Sound population include two cases of observed mother-son pairings (Pearson and Stinson 2011, p. 1), and no observations of immigration from other sites into the Puget lowland breeding sites (Pearson *et al.* 2008, p. 15).

Estimates of population growth rate (λ) that include vital rates from all of the nesting areas in Washington (south Puget Sound, Washington Coast, and one lower Columbia River island) indicate that streaked horned larks in Washington are declining by 40 percent per year, apparently due to a combination of low survival and fecundity rates (Pearson et al. 2008, pp. 10, 13; Camfield et al. 2011, p. 7). Territory mapping at 4 sites on the south Puget Sound found that the total number of breeding streaked horned lark territories decreased from 77 territories in 2004 to 42 territories in 2007—a decline of over 45 percent in 3 years (Camfield et al. 2011, p. 8). The combination of low genetic variability, small and rapidly declining nesting populations, high breeding site fidelity, and no observed migration into the Puget lowlands populations suggests that the south Puget Sound population could become extirpated in the near future (Pearson et al. 2008, pp. 1, 14, 15).

In 2011, a project was initiated to increase genetic diversity in the south Puget Sound streaked horned lark population. Twelve eggs (four three-egg clutches) were collected from streaked horned lark nests in the southern Willamette Valley and were placed in nests at the 13th Division Prairie site at JBLM (Wolf 2011, p. 9). At least five young successfully fledged at the receiving site; if even one of these birds return to breed in future years, it will likely increase genetic diversity in the receiving population, resulting in improved fitness and reduced extinction risk for the south Puget Sound larks (Wolf 2011, p. 9). For 2014, these genetic rescue efforts were abandoned due to a 60 to 70 percent decline in the streaked horned lark population at the Corvallis Airport, the source of the transplanted eggs. Based on our consideration of these factors, we conclude that the loss of genetic diversity, the current number of small and isolated populations (particularly in Washington State), and the species' low reproductive success are likely to combine to result in continued population declines for the streaked horned lark.

Summary of Threats

The streaked horned lark population decline in the south Puget Sound of Washington indicates that the observed range contraction for this subspecies may be continuing, and the subspecies may disappear from that region in the near future. There are many other ongoing threats to the streaked horned lark's habitat throughout its range, including: (1) converting land use to agriculture and industry; (2) loss of natural disturbance processes such as fire and flooding; (3) encroachment of woody vegetation; (4) invasion of coastal areas by nonnative beachgrasses; and (5) incompatible management practices. The continued loss and degradation of streaked horned lark habitat may result in smaller, more isolated habitats available to the subspecies, which could further depress the rangewide population or reduce the geographic distribution of the streaked horned lark.

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U.S. Department of Transportation
Federal Railroad Administration
1200 New Jersey Avenue, SE
Washington, DC 20590

November 18, 2014

M r. Mark Wilson, Executive Director
Port of Kalama
390 West Marine Drive
Kalama, WA 98625

Subject: Request for Concurrence the Federal Railroad Administrations De Minimis Impacts Finding on Louis Rasmussen Day Use Park from the Kelso Martin's Bluff Improvement Projects

Dear Mr. Wilson:

The purpose of this letter is to request the concurrence of the Port of Kalama, as the entity with jurisdiction, with the Federal Railroad Administration (FRA) de minimis impact finding to Louis Rasmussen Day Use Park (Park). The effects will result from the construction/replacement of the Unnamed Tributary 3 (UT3) culvert within the Park. In the existing condition, the UT3 culvert extends from east of, and under, the existing BNSF Railway tracks, under the Port of Kalama (Port) managed Hendrickson Drive, and under the Port's day use parking lot and beach recreation area of Louis Rasmussen Day Use Park, where it daylights and flows into the Columbia River. Implementation of the Project, with proposed minimization measures, will not adversely affect the recreational activities or other features that qualify the property for protection under Section 4(f). Consequently, the FRA finds that the Project will have a *de minimis* impact to Louis Rasmussen Day Use Park, a Section 4(f) property. FRA respectfully requests your consideration of the potential effects of the Project on the Park. This letter summarizes the proposed culvert replacement, the recreational activities in the Park, the potential impacts, and the measures to minimize harm to the Park. If you concur with our description of the potential impacts and de minimis impact finding to Louis Rasmussen Day Use Park, please sign below documenting your written concurrence as the agency with jurisdiction over this resource.

The Washington State Department of Transportation (WSDOT) and FRA are completing an Environmental Assessment (EA) in order to evaluate potential impacts of the proposed Kelso Martin's Bluff Improvement projects (Project). The analysis includes determining the potential impacts of the Project on public lands, parks, and recreational facilities. Section 4(f) of the U.S. Department of Transportation Act (49 U.S.C. 303) applies to transportation projects and protects publicly owned public parks, recreation areas, wildlife and waterfowl refuges and any land from a historic site of national, state, or local significance. Section 4(f) applies to this Project because WSDOT is receiving grant funding through FRA's High-Speed Intercity Passenger Rail Program for construction of the Project, including the proposed replacement of the UT3 culvert.

Under Section 4(f), an operating administration of the U.S. Department of Transportation, in this case FRA, may not approve a project that uses protected properties unless there are no prudent or feasible alternatives and the project includes all possible planning to minimize harm to such properties. "Use" of a property can be permanent, temporary or constructive. FRA can also find the impacts are *de minimis*. In the case of a park or ecological reserve, FRA may find that the impacts are *de minimis* if, after opportunity for public review and comment, FRA finds that a transportation project will not adversely affect the activities, features, and attributes qualifying the property for protection under Section 4(f) after mitigation. FRA must also obtain written concurrence in this finding from the officials with jurisdiction over the park or ecological reserve.

We understand that BNSF and WSDOT have discussed replacing this culvert within the Park with the Port's recreation managers and that the Port is engaged in conversations with BNSF and WSDOT to ensure the design is consistent with your future improvement plans for the Park. Reports from WSDOT indicate the Port believes the Project could provide an opportunity to improve fish passage as well as improve passive recreational opportunities at the southern end of the park without creating a hazard for park visitors.

Louis Rasmussen Day Use Park:

The Park is approximately 6 acres in size and is located along the east bank of the Columbia River in Cowlitz County, adjacent to the City of Kalama. The Park is bordered to the south by industrial Port land and to the north by the Port-managed Marine Park, a 222-slip marina. BNSF Railway tracks extend the length of the park to the east, across from the Port-managed Hendrickson Drive.

Unusual Characteristics Reducing or Enhancing Park Value

The current UT3 culvert is a 36-inch diameter, approximately 200-foot long metal culvert, reinforced with rip rap at its outfall on the beach within Louis Rasmussen Day Use Park. The UT3 culvert was identified by the Washington Department of Fish and Wildlife as a fish passage barrier as it currently blocks 1.6 miles of habitat (east of) the culvert. This section of UT3 has been identified as critical habitat for coho salmon and steelhead in accordance with the Endangered Species Act. The culvert is located in an area of the beach used by pedestrians but closed to on-beach vehicular traffic. A parking area immediately east provides easy access for passive use of the beach.

We understand that Port plans for the future development of the upland areas in the vicinity of UT3 include additional walking/biking trails but that the recreational emphasis in this area will continue to be passive beach use (Figure 1).

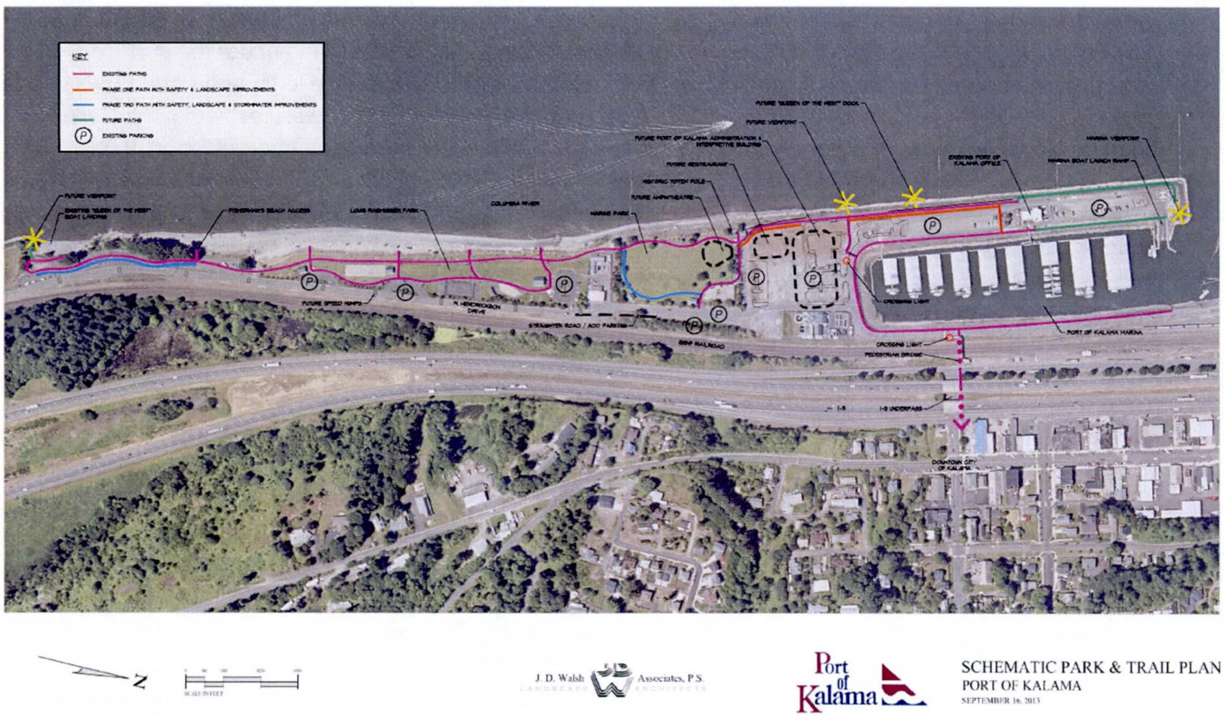

Figure 1. Site plan view of future trails identified in the Louis Rasmussen Day Use Park Master Plan.

Access:

The Park is accessible via vehicle, bicycle, or foot from the Port-managed Hendrickson Drive and via boat from the Columbia River.

Louis Rasmussen Day Use Park Use Assessment:

The Louis Rasmussen Day Use Park provides the following recreational opportunities: a playground; basketball, volleyball, tennis courts, horseshoe pits and picnic areas. A two-mile pedestrian/bike pathway connects the Park with Marine Park and the marina. The Park also provides vehicle and pedestrian access to the Columbia River for swimming, windsurfing, fishing, and passive enjoyment. Use of the Park project area is open to pedestrian use only. Future plans for the Park are consistent with its current use and include enhancing the upland areas with more pedestrian-only beach access points, additional picnic areas with river views, and improvement of pedestrian paths and parking areas. Following construction of the UT3 culvert replacement, the recreational emphasis in this area will continue to be passive beach use, and the culvert will continue in its present function. However, the Project will improve the culvert by replacing the current corrugated steel and rip rap outfall with a gated box culvert and natural stream (see Figure 2 below). Once replaced, the culvert will allow for pedestrian access above the culvert. In addition, the new culvert and outfall will give beach visitors an opportunity to view salmon returning to spawn in UT3.

The UT3 culvert will require the temporary closure (approximately 3-4 weeks) of Hendrickson Drive and the Port's north parking area. Emergency access will be maintained during this time but non-emergency access will utilize existing roads to the east and west of the construction area. The new fish-passable culvert structure would consist of two, 60-inch culverts that would extend approximately 200 feet west of BNSF right-of-way (ROW) to the outfall at the Columbia River. The limits of construction for this culvert include pit excavation for a jack and bore machine west of the railroad structure on BNSF ROW and in Hendrickson Drive. The 20- by 40-foot bore pit would be excavated to a depth of 20 to 25 feet below the surface. Pumps would be used to dewater during construction and use of the bore pit. Approximately 90 feet of the new culvert would be installed under the railroad structure by this method (see 10 percent engineering in Attachment A).

The remainder of the culvert would be installed under Port-owned land. West of the bore pit, an approximately 5-foot-high by 15-foot-wide three-sided (bottomless) box culvert would be installed via an open cut across Hendrickson Drive and the Port of Kalama's parking lot. It would convey water to an open stream channel that would flow across the beach use area of the Port of Kalama's Louis Rasmussen Day Use Park. The open cut would be approximately 10 to 20 feet deep and 30 feet wide. After installation, the open cut would be closed and the area restored to pre-construction conditions; there would be no visible change to the Park after the open cut is closed. In addition, the culvert outfall would include a gate (i.e. traditional culvert gate, angled culvert gate, or equivalent) to prevent pedestrian access for safety reasons (Figure 2). The gate will be designed so as to not inhibit fish passage.

Figure 2. Examples of a traditional culvert gate (left) and angled culvert gate (right)

As currently proposed, the stream would be an approximately 70-foot-long, open, more natural stream channel to the Columbia River than the current culvert outfall. The stream is expected to be roughly 20 feet across with gradual embankments and a rock and gravel stream bottom. Water levels in the stream would range from 3 to 4 inches at low tide and 14 to 18 inches at high tide. Winter river flows may reach as high as 3 to 4 feet. Figure 3 is based on the June 2014 10% engineering drawings attached and ongoing coordination with WDFW Habitat Biologists and Engineers, and Port staff. The renderings depict a representation of what the stream would look like during high flow periods. The outfall of the existing culvert will be removed once construction of the new culvert is completed.

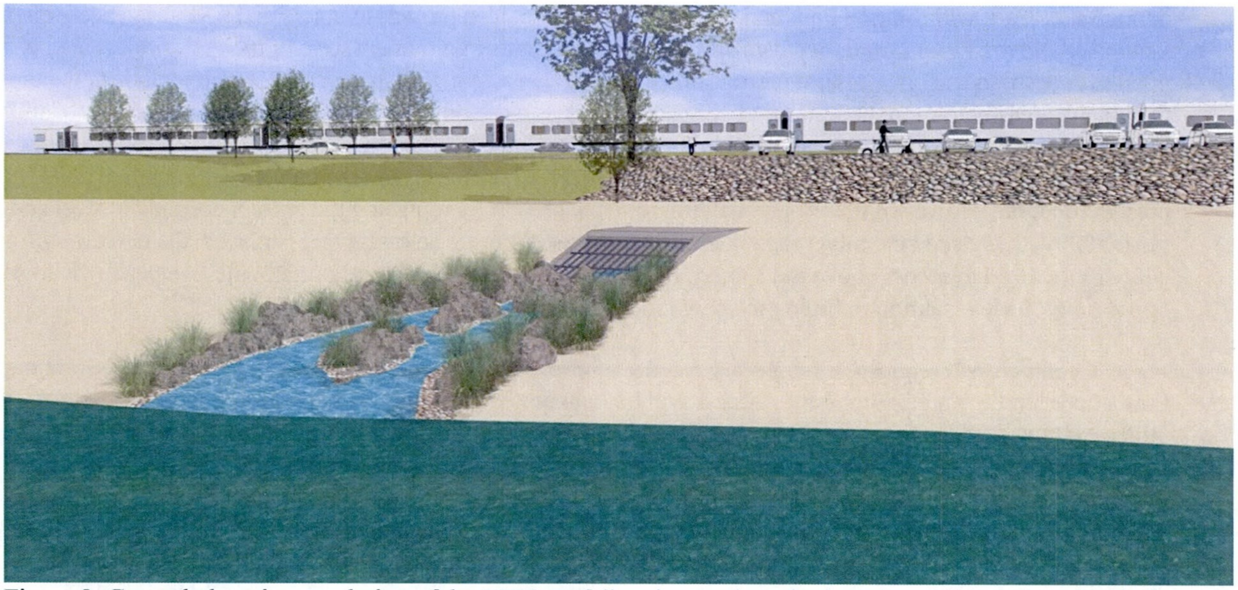

Figure 3. Ground plan view rendering of the UT-3 outfall and natural stream based on 10% engineering design.

The Project would have a footprint of approximately 1,300 square feet, or approximately 0.03 acres of the Park from the replacement of the UT3 culvert. This area represents approximately 0.005% of the total Park area. No acquisition of real property interest would occur.

The area to be used for the Project is a section of sandy beach near the southern boundary of the Park. None of the upland recreational features (described above) or their use would be affected by the Project. Recreational activity on the beach is not expected to change, as the culvert outfall would be designed to provide a continuous sandy beach for pedestrians for free travel north and south along the Columbia River (Figure 3). Vehicular access to the beach would not be affected, as motorized vehicles are not currently permitted south of the culvert location, and this is not contemplated by the Port's future planning for this portion of the Park. The physical attributes of the culvert and the stream it conveys will be affected; however the new culvert and outfall will allow for free passage of fish and would provide an enhanced feature for the Park which could be considered a beneficial overall effect to the Park.

Access to the Park would remain largely unaffected during construction, although the construction zone area would be cordoned off. Construction activities at the Park are expected to last for about 3 to 4 weeks .The construction zone includes a temporary construction area (TCA) of about 13,000 square feet (0.30 acres) that includes a section of the beach, a portion of a paved parking area, and a section of Hendrickson Drive. The TCA will serve as a buffer between the construction activities and users of the Park. Once construction activities are completed, the area used for the TCA would be restored to its original condition. Restoration would include pavement restoration, grading, seeding, and planting of native herbaceous species at the outlet. Alternative access routes to the Park as well as vehicle parking is available both north and south of the construction zone. The temporary impacts and closures will be addressed through a separate agreement between the Port, BNSF Railway, and WSDOT prior to construction.

Minimization

To minimize disruption and to protect park visitors, the Port has proposed specific conditions with BNSF and WSDOT:

- Access – A route on Hendrickson Drive capable of supporting emergency services will be maintained at all times during construction. This condition will imposed for all construction related activities, and included in all appropriate contracting documents.
- Timing – WSDOT and BNSF Railway will coordinate construction timing with the Port to avoid impacts to recreation use. A tentative schedule has been discussed with the Port and will be refined prior

to construction.

- Maintenance – A future maintenance agreement between BNSF Railway and the Port will be secured prior to constructing the UT3 culvert.
- Design – Prior to proceeding with final design, WSDOT and BNSF Railway will provide the design and review with the Port to ensure park resources and visitor safety are addressed with the culvert design. In general, the culvert will be constructed, and following construction the area will be restored, in a manner that conforms to the Port's Louis Rasmussen Day Use Park Master Plan.
- Construction – The culvert outfall and natural stream conveyance will be constructed to ensure the safety of park visitors.
- Construction – WSDOT will oversee the construction and use WSDOT's construction best management practices (BMPs) to control dust, noise, etc.

Conclusion:
WSDOT will ensure that these measures to minimize harm to the Park are implemented before and during project construction. Consequently, the FRA finds that the Project will have a de minimis impact to Louis Rasmussen Day Use Park, a Section 4(f) property. FRA respectfully requests your consideration of the potential effects of the Project on the Park. If you concur with our description of the potential impacts to Louis Rasmussen Day Use Park, please sign below documenting your written concurrence as the agency with jurisdiction over this resource.

The Port of Kalama, as owner of Louis Rasmussen Day Use Park, concurs w it h FRA's description of the potential impacts of the Project as described herein to Louis Rasmussen Day Use Park, a Section 4(f) resource, as defined in 49 U.S.C. 303(d).

Signature: [signature] Date: 9-Dec-14

Mark Wilson, Executive Director
Port of Kalama

If you would like additional information or would like to meet in person to discuss the Project and the Section 4(f) findings, please contact Frank Green, WSDOT KMB Project Manager, at frank.green@wsdot.wa.gov or by phone at (360) 905- 1547, or contact Laura Schick with the Federal Railroad Administration via email at Laura.Shick@dot.gov, or by calling (202) 366-0340.

Sincerely,

[signature] FOR

David Valenstein
Chief, Environment and Systems Planning Division

Enclosure(s): 10% Design Documents for replacement of the UT3 culvert

cc: Frank Green, KMB Project Manager, WSDOT
Chris Regan, KMB Environmental Manager, WSDOT
Jennifer Papazian, Environmental Protection Specialist, Volpe – FRA
Michael Johnsen, Environmental Team Lead, FRA