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, WA 98115

NMFS Tracking No.:
WCR-2015-3817

February 19, 2016

Daniel M. Mathis
Federal Highway Administration
Suite 501, Evergreen Plaza
711 South Capitol Way
Olympia, Washington 98501-1284

Re: Reinitiation of the Endangered Species Act Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the State Route 520 Bridge Replacement Project, King County, Washington (HUC 171100120302, Lake Washington)

Dear Mr. Mathis:

The National Marine Fisheries Service (NMFS) recently reviewed your December 8, 2015 request to reinitiate our Endangered Species Act (ESA) consultation for the State Route (SR) 520 Bridge Replacement Project in King County, Washington. On May 20, 2011, NMFS completed formal consultation on this project and issued a biological opinion (NMFS Tracking Number NWR-2010-5723) (original opinion). The original opinion concluded that the proposed action would not jeopardize the continued existence of the Puget Sound (PS) Chinook salmon (*Oncorhynchus tshawytscha*) Evolutionarily Significant Unit (ESU) and the PS Distinct Population Segment (DPS) of steelhead (*O. mykiss*) and is not likely to destroy or adversely modify PS Chinook critical habitat. This action is funded in part by the Federal Highway Administration (FHWA), and is being carried out by the Washington State Department of Transportation (WSDOT).

Since 2011, NMFS completed three subsequent consultations for this project, the east approach and the floating bridge portions of the project (NWR-2011-5917), the west connection bridge (WCB) and the west staging area (NWR-2012-9537), and the west approach bridge north (WABN) phase (NWR-2013-10358) (reinitiated opinions). A fourth reinitiation opinion (WCR-2014-1665), completed on May 7, 2015, superseded the original opinion and subsequent reinitiation opinions, which are no longer in effect.

In its December 8, 2015 submittal, the FHWA requested an additional reinitiation of the original consultation to update the following project elements:

1. Bridge demolition activities associated with the FB&L construction phase, which includes a request to conduct in-water work outside current timing restrictions.
2. Schedule and duration of existing and temporary structures associated with the FB&L and WABN construction phases because of construction delays.
3. The WABN construction phase underwater noise monitoring results from impact pile driving and exceedance of predicted underwater sound level thresholds.
4. The Union Bay Natural Area (UBNA) wetland mitigation site shoreline herbicide application and planting.
5. A correction of previous reporting errors.

The enclosed opinion replaces the original opinion and reinitiated opinions, and so the original opinion and reinitiated opinions, including their incidental take statements, are no longer in effect. A complete record of this consultation is on file at the Oregon and Washington Coastal Office in Lacey, Washington.

This concludes the reinitiation of consultation for the project. Should you have questions regarding this consultation, please contact Michael Grady of the Oregon-Washington Coastal Office at (206) 526-4645 or by email at Michael.Grady@noaa.gov.

Sincerely,

for William W. Stelle, Jr.
Regional Administrator

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

for the

State Route 520 Bridge Replacement Project
King County, Washington (HUC 171100120302, Lake Washington)

NMFS Tracking Number: WCR-2015-3817

Action Agency: Federal Highway 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?
Puget Sound steelhead (*Oncorhynchus mykiss*)	Threatened	Yes	No	N/A
Puget Sound Chinook salmon (*O. tshawytscha*)	Threatened	Yes	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 19, 2016

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1. INTRODUCTION

This 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 this supplemental biological opinion and incidental take statement 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 C.F.R. 402. The opinion and incidental take statement comply with the Data Quality Act (44 U.S.C. 3504(d)(1) *et seq.*) and underwent pre-dissemination review.

This opinion incorporates by reference, and is intended to be attached to and read in conjunction with, the May 20, 2011 biological opinion for the SR 520 Bridge Replacement Project over Lake Washington (Lake), NMFS Consultation Number NWR-2010-5723 (original opinion), as supplemented by three previous reinitiations of this consultation: NMFS Consultation Numbers NWR-2011-5917, NWR-2012-9537, and NWR NWR-2013-10358. A fourth reinitiation opinion, WCR-2014-1665, completed on May 7, 2015, superseded the original opinion and subsequent reinitiation opinions, which are no longer in effect. However, NMFS has determined that portions of text from the original opinion remain valid and are incorporated by reference here rather than reproduced.

1.2 Consultation History

On May 20, 2011, we completed formal consultation on this project and issued the original opinion, which concluded that the proposed action would not jeopardize the continued existence of the Puget Sound (PS) Chinook salmon (*Oncorhynchus tshawytscha*) Evolutionarily Significant Unit (ESU) or the PS Distinct Population Segment (DPS) of steelhead (*O. mykiss*) and is not likely to destroy or adversely modify PS Chinook critical habitat. The proposed action is funded in part by the Federal Highway Administration (FHWA), and is being carried out by the Washington State Department of Transportation (WSDOT).

Subsequent to the original opinion, we completed four reinitiations for this project, the east approach and the floating bridge and landings (FB&L) portions of the project (NWR-2011-5917), the west connection bridge (WCB) and the west staging area (NWR-2012-9537), and the west approach bridge north (WABN) phase (NWR-2013-10358). A fourth reinitiation (WCR-2014-1665) superseded the original opinion and the three subsequent reinitiation opinions.

On December 8, 2015, the FHWA requested an additional reinitiation of the consultation to update the following project elements:

6. Bridge demolition activities associated with the FB&L construction phase, which includes a request to conduct in-water work outside current timing restrictions.
7. Schedule and duration of existing and temporary structures associated with the FB&L and WABN construction phases because of construction delays.

8. The WABN construction phase underwater noise monitoring results from impact pile driving and exceedance of predicted underwater sound level thresholds.
9. The Union Bay Natural Area (UBNA) wetland mitigation site shoreline herbicide application and planting.
10. A correction of previous reporting errors.

This opinion analyzes the effects of these changes. A complete record of this consultation is on file at the Oregon and Washington Coastal Office in Lacey, Washington.

1.3 Changes to the Proposed Action

1.3.1 Bridge Demolition

Bridge demolition methods were not described in any of the previous consultations. To demolish the existing bridge, 54 columns will be removed from the west approach and 12 columns from the east approach (Figure 1). A crane with a clamshell bucket will be used to remove sediment from the base of the columns. A concrete shear will then cut the columns two feet below the mudline. Sediment will be replaced to its original position once the columns are removed. Columns will be hauled offsite by barge for disposal.

Column demolition was originally proposed for 2015, but will now occur in August and September 2016. To avoid the potential for adverse weather and safety risks associated with this activity, WSDOT proposes to begin column demolition in the west approach area on August 16, 2016. This change will represent a two-week deviation from the original NMFS opinion restriction on turbidity-generating activities in the west approach between April 15 and September 1.

Two transition piers and footings will also be demolished, one at the west approach and one at the east approach (Figure 1). Approximately 24 feet of column and eight feet of footing (totaling roughly 525 cubic yards) will be removed using a hoe ram. The hoe ram is an excavator with a hammer attachment that uses rapid impacts to break the concrete into rubble. Pier demolition will proceed in a top-down progression to two feet below the lakebed. A crane with a clamshell bucket will remove the concrete rubble from the lakebed as it accumulates.

Each pier is expected to take a little over a month to remove. The hoe ram will operate for approximately 20 days, with the hammer impacting concrete under water for approximately four hours per day. The remainder of that time the hammer either will be repositioning or will be inactive as debris is being removed and divers are checking clearances.

Transition pier demolition is scheduled to begin in early July 2016 in the east approach and on August 16 in the west approach. This work will also be a two-week deviation from the original opinion restricting turbidity-generating activities in the west approach between April 15 and September 1.

1.3.2 Schedule Revisions

Project construction, including construction of temporary work bridges, demolition of existing structures, and removal of temporary structures, will extend into the fall of 2016, prolonging the duration of some previously reported effects. Structural elements of the FB&L that will remain in place beyond the previously reported end dates include the existing bridge and foundations, the temporary work trestle and loading ramp, the east side staging areas, and the west side staging area. The east and west side staging areas will facilitate the demolition of the existing bridge and will remain in place until demolition is complete in the fall of 2016. The temporary work trestle and loading ramp were removed in May 2015.

Temporary work bridges proposed for the WABN construction were originally scheduled to be constructed during the in-water work window spanning September 2014 through April 2015. These “finger piers” (piers extending perpendicular to the main trestle) must now be completed in March and April of 2016. The 13 piers will be supported by 110 steel piles, which will be driven to refusal with a vibratory hammer and then proofed with an impact hammer to validate their bearing capacity. The proposed work bridge construction methods and number of piles is consistent with previous descriptions in the original opinion and subsequent reinitiations; only the schedule has changed.

1.3.3 WABN Pile-Driving Underwater Noise

WSDOT has completed underwater noise monitoring for impact pile-driving associated with the WABN phase of construction. During the in-water work period between November 2014 and April 2015, WSDOT monitored underwater noise levels during the installation of 40 piles associated with work trestle construction. Monitoring results indicated that six of the monitored piles on the east side of Foster Island exceeded the predicted 188dB$_{peak}$ threshold at 10 meters. The measured sound levels of those piles varied from 191 – 200dB$_{peak}$ (see Table1, below).

Table 1. Summary of Sound Levels Exceeding Thresholds Recorded for 30-inch Steel Piles Driven East of Foster Island

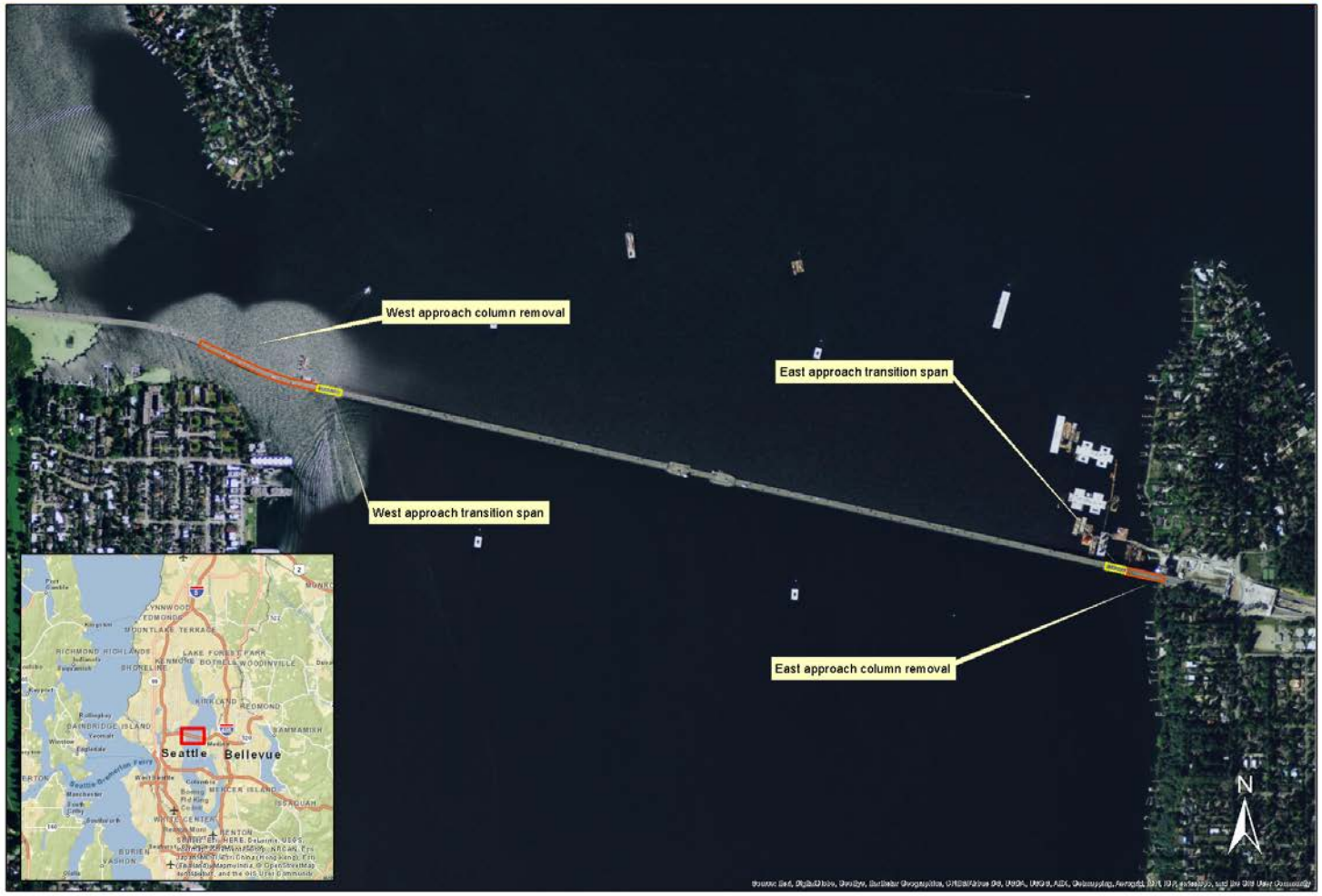
Pile #	Date	Peak at 10 meters (dB)	RMS (dB)	Single strike SEL	Cumulative SEL
1	1/28/15	191	172	156	175
17	4/11/15	193	177	165	186
18	4/12/15	200	187	171	191
19	4/12/15	196	179	167	188
20	4/12/15	198	178	168	189
21	4/12/15	194	176	165	185

1.3.4 Union Bay Natural Area

Project activities at the UBNA wetland mitigation site remain unchanged from the description in the original Biological Assessment (BA) and will occur largely within the upland areas of the site. WSDOT has identified two activities not identified in the BA: herbicide application along the shoreline to control noxious weeds and planting shoreline wetland vegetation below the ordinary high water mark (OHWM). To ensure protection of aquatic life and habitat from herbicide application, WSDOT has implemented an integrated vegetation and pest management plan. This plan specifies that herbicide application cannot be done in the open waters of the lake; herbicides can only be applied in the late summer/early fall when Lake levels are dropping; use of pre-emergent or residual herbicides are prohibited; and the applicator must have coverage under the State of Washington Aquatic Noxious Weed Management NPDES General Permit.

Proposed enhancement of vegetated emergent wetland along the UBNA shoreline extends waterward of the OHWM. Mowing, herbicide application, plant material removal, and installation of plants will all occur below the OHWM. These activities will occur during the fall and winter months when Lake levels are lowest, and will not occur within the wetted perimeter.

Figure 1. Column and Transition Pier Demolition Locations for the SR520 I-5 to Medina: Bridge Replacement and HOV Project.



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 sections of the original opinion and reinitiation opinions are incorporated by reference here. The proposed changes described in this opinion do not affect the extent of the action area defined in the original opinion and subsequent reinitiation opinions.

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

2.1 Approach to the Analysis

The Approach to the Analysis section of the original opinion (NMFS Consultation Number NWR-2010-5723) is incorporated by reference here.

2.2 Range-wide Status of the Species and Critical Habitat

The range-wide status of the species and critical habitat section of the original opinion is incorporated by reference here.

2.3 Environmental Baseline

The Environmental Baseline section of the original opinion and subsequent reinitiation opinions is incorporated by reference here.

2.4 Changes to the Effects of the Proposed Action

The Effects of the Action sections of the original opinion and reinitiation opinions are incorporated by reference here, except to the extent that they are inconsistent with the changes described below, in which case the description of the changes prevail.

2.4 1 Effects on Species

Suspended Sediment

The original opinion quantified the area that will be subjected to elevated suspended sediment from the proposed action. Table 2 below, compares the impacts from suspended sediment from the original proposal to the current design. Episodic, localized turbidity plumes will increase in 2016 in the west approach under the current design by a cumulative total of 19.5 acres in 2016. In total, the new design will only increase by 2.0 acres over all construction years at the west approach. Turbidity at the east approach will increase by 3.2 acres in 2016, but will be reduced by 5.6 acres over all construction years. In total, the new design will decrease the area of elevated suspended sediment by 3.6 acres, a nominal one percent reduction compared to the original design. This change is likely to be of immeasurable significance to the species relative to the effects of this component action previously considered.

Table 2. Changes in Areas (Acres) Exposed to Suspended Sediment per Construction Year

West Approach	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**Total**
Previous Design	---	9.3	44.7	19.5	35.4	25.8	25.8	**160.5**
Current Design	---	9.3	5.6	41.1	54.9	25.8	25.8	**162.5**
Net change	**N/A**	**0**	**-39.1**	**+21.6**	**+19.5**	**0**	**0**	**+2.0**
East Approach								
Previous Design	8.6	1.9	5.3[1]	7.1	N/A	---	---	**22.9**
Current Design	8.6	N/A	N/A	5.5	3.2	---	---	**17.3**
Net Change	**0**	**-1.9**	**-5.3**	**-1.6**	**+3.2**	**---**	**---**	**-5.6**
Total net change	**0**	**-1.9**	**-44.4**	**+20**	**+22.7**	**0**	**0**	**-3.6**

[1] Corrects previous reporting errors

Based on the location and timing of pier removal, only residual rearing and adult Chinook are likely to be exposed to elevated suspended sediments. The effects of turbidity will be episodic during demolition activities, coinciding with the lakebed material movements for each pier bent and transition pier demolition. Adults and larger juvenile salmonids will be expected to avoid localized turbidity plumes (Robertson et al. 2007, Servisi and Martens 2011). This response may lead to altered migration routes, but adults and larger fish can tolerate short-term increases in suspended sediment and are not likely to be harmed by brief exposure. Smaller juveniles may experience sublethal effects such as displacement and physiological stress (see page 37 from the original opinion).

Sediment-generating activities in the west approach will begin August 16, two weeks before the previously established in-water work window. Temperatures in Lake Washington are highest at this time of year, resulting in low dissolved oxygen (DO) levels. Elevated suspended sediment could exacerbate physiological stress caused by exposure to low DO.

Underwater Noise
Transition Pier Demolition
Underwater noise will be generated during the demolition of the east and west approach transition piers, which will be performed using a hoe ram. Deployment of the hoe ram is expected to last approximately 20 days, with impact hammering taking place for four hours per day.

There is limited data on noise generated during hoe ram operation. WSDOT recently monitored underwater sound produced by hoe rams during the demolition of two piers on the Manette Bridge on the Kitsap Peninsula near Bremerton, WA. Waveforms were similar to impact type waveforms, with peak underwater sound levels ranging between 189 and 205 dB_{peak} (WSDOT 2012; see Table 3 below).

Table 3. Summary of Underwater Sound Levels for the SR303 Manette Bridge Pier Demolition Project (source: WSDOT 2012).

Pier #	Date	Peak at 10 meters (dB)[1]	RMS (dB)	Single strike SEL	Cumulative SEL
5A	7/3/2012	189	173	160	195
6	7/10/2012	205	186	171	196

These data are not necessarily applicable to the SR520 project due to unique circumstances for the transition pier demolition, which had different equipment, structures, and substrate conditions. In addition, data was recorded when the hoe ram was operating above the water surface, not underwater. However, they do indicate that the operation of the hoe ram could produce sound levels high enough to injure fish. Given the values in Table 4, sounds levels above 187dB could extend up to 100 meters from the hoe ram. WSDOT applied the Manette Bridge data as a surrogate for in-situ data and estimated that the total area exposed to cumulative sound exposure levels greater than 187 dB during transition pier demolition will be approximately 28 acres (14 acres on the west approach, and 14 acres on the east approach).

Residual and adult Chinook salmon and adult steelhead could be in the ensonified area during demolition and exposed to injurious levels of underwater sound. Residual Chinook could be injured and perhaps killed, whereas adult Chinook would more likely experience sublethal effects such as temporary threshold shifts. Moving the in-water work window ahead by two weeks extends the amount of time when migrating adult Chinook will be exposed to elevated underwater sound when Lake temperatures are high and DO levels are low, potentially exacerbating their stress response and increasing the likelihood of injury. Due to low numbers of steelhead in Lake Washington, steelhead are unlikely to be present near the transition piers during demolition and any steelhead nearby would likely avoid the affected area.

WABN Work Bridges

The WABN work bridges near Foster Island were originally scheduled for completion during the 2014 in-water work window, but will need to be completed during the 2016 in-water work window due to space conflicts with existing bridge ramps. The original opinion stated that no pile-driving will take place in that location at that time. Table 4 compares the area within which sound levels in that zone would exceed 187dB SEL in different construction years under the current and previous designs.

Table 4. Total Area (Acres) Exposed to Cumulative Sound Exposure Levels Greater than 187dB per Construction Year.

Arboretum/Foster Island Area	2013	2014	2015	2016	2017	2018	Total
Previous Design	0	30.7	0	0	28.0	0	**58.7**
Current Design	0	28.0	0	29	28.0	0	**85.0**
Net change	**0**	**-2.7**	**0**	**+29.0**	**0**	**0**	**+26.3**

The in-water work window (September 1 to April 30) for impact pile-driving for this area will avoid out-migrating juvenile Chinook salmon and steelhead. Migrating adult Chinook and steelhead may occasionally move through this area, but due to unfavorable habitat conditions they are unlikely to reside for any length of time. NMFS estimates that the maximum sound levels for a single strike in this area will not be enough to injure adult fish. Residual Chinook salmon could spend a greater amount of time in this area, particularly in the winter months when water temperatures are lower and predators are less active. NMFS expects any residual Chinook salmon in the project site during pile-driving to be injured or killed.

WABN Underwater Noise Results

As described above, six of the piles monitored for underwater noise during WABN work trestle construction exceeded the predicted sound level threshold of $188dB_{peak}$ for impact pile-driving in the west approach area. Piles that exceeded the sound level thresholds were all in areas with relatively shallow deposits of organic material compared with much of the work trestle area; sound levels from other monitored piles were generally well below the $188dB_{peak}$ threshold. Using the average strike counts and measured peak, SEL, and RMS levels from the monitored piles, threshold distances to $183dB_{SEL}$ and $150dB_{RMS}$ are calculated to be seven meters and 74 meters, respectively. These values are well below the predicted threshold distances of 117 meters to $183dB_{SEL}$ and 631 meters to $150\ dB_{RMS}$ and fall well within the previously authorized take for that period.

Overwater and In-Water Structures

Table 5 below, shows the changes in the area of existing, new, and temporary structures for each construction year. The new design will slightly increase overwater cover at both the east and west approaches in 2016, but the total area of overwater cover decreases by 0.4 acres overall, reducing the effects of shading on juvenile Chinook migration from those considered in the original opinion.

On page 48 (Section 2.4.1.4) of the original opinion, NMFS established that juvenile Chinook salmon within five feet of in-water piles or columns could be subjected to higher rates of predation by smallmouth bass. Due to construction delays, the numbers of vertical structures per year has changed since the original consultation, decreasing in some years and increasing in others. Final pile numbers remain unchanged in the west and east approach areas, but will decrease slightly in Union Bay (Table 6). However, because some of the drilled shafts are larger than originally proposed, the overall amount of predator habitat will increase by 0.15 acres in that area (Table 7). This increase was addressed in the May 7, 2015 reinitiation.

Table 5. Changes in Overwater Cover (Acres) per Construction Year

Union Bay	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**Final**
Previous Design	N/A	9.2	12.3	16.6	16.0	12.7	12.7	**8.4**
Current Design	N/A	5.9	5.5	5.5	11.2	11.9	11.9	**8.0**
Net change	**N/A**	**-3.3**	**-6.8**	**-11.1**	**-4.8**	**-0.8**	**-0.8**	**-0.4**
West Approach								
Previous Design	N/A	6.2	9.2	14.8	12.9[1]	16.3	13.4	**10.1**
Current Design	N/A	6.2	9.2	14.8	14.8	16.3	13.4	**10.1**
Net Change	**N/A**	**0**	**0**	**0**	**+1.9**	**0**	**0**	**0**
East Approach								
Previous Design	2.3	2.3	2.3	2.0	1.3	N/A	N/A	**1.3**
Current Design	2.3	2.3	2.3	2.3	2.0	N/A	N/A	**1.3**
Net Change	**0**	**0**	**0**	**+0.3**	**+0.7**	**N/A**	**N/A**	**0**
Total net change	**0**	**-3.3**	**-6.8**	**-10.8**	**-2.2**	**-2.7**	**-0.8**	**-0.4**

[1] Corrects previous reporting errors

Table 6. Changes in the Number of Vertical Structures per Construction Year

Union Bay	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**Final**
Previous Design	N/A	746	649	1,293	704	704	704	**104**
Current Design	N/A	193	448	448	510	789	683	**83**
Net change	**N/A**	**-553**	**-201**	**-845**	**-194**	**+85**	**-21**	**-21**
West Approach								
Previous Design	N/A	554[1]	719[1]	719[1]	663	783	783	**109**
Current Design	N/A	554	279	717	719	783	783	**109**
Net Change	**N/A**	**0**	**-440**	**-2**	**+56**	**0**	**0**	**0**
East Approach								
Previous Design	56	65	49	11	11	N/A	N/A	**11**
Current Design	57[1]	57[1]	57[1]	57	25	N/A	N/A	**11**
Net Change	**+1**	**-8**	**+8**	**+46**	**+14**	**N/A**	**N/A**	**0**
Total net change	**+1**	**-561**	**-663**	**-801**	**-124**	**+85**	**-21**	**-21**

[1] Corrects previous reporting errors

Table 7. Changes in Area of Predator Habitat (Acres) by Construction Year

Union Bay	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**Final**
Previous Design	N/A	2.16	1.97	3.81	2.01	2.01	2.01	**0.27**
Current Design	N/A	0.71	1.41	1.41	1.69	2.49	2.05	**0.42**
Net change	**N/A**	**-1.45**	**-0.56**	**-2.4**	**-0.32**	**+0.48**	**+0.04**	**+0.15**
West Approach								
Previous Design	N/A	0.98	2.46	2.46	1.76	2.23	2.23[1]	**0.57**
Current Design	N/A	0.98	1.07	2.45	2.46	2.23	2.23	**0.57**
Net Change	**N/A**	**-1.39**	**-0.01**	**+0.7**	**0**	**0**	**0**	**0**
East Approach								
Previous Design	0.17	0.19	0.17	0.03	0.03	N/A	N/A	**0.03**
Current Design	0.16[1]	0.16[1]	0.16[1]	0.16	0.09	N/A	N/A	**0.03**
Net Change	**-0.01**	**-0.03**	**-0.01**	**+0.13**	**+0.06**	**N/A**	**N/A**	**0**
Total net change	**-0.01**	**-2.87**	**-0.58**	**-1.57**	**-1.83**	**+0.48**	**+0.04**	**+0.15**

[1] Corrects previous reporting errors

2.4.2 Changes to the Effects on Critical Habitat

Freshwater Spawning Sites (PCE 1)
The only spawning habitat in the action area of the project is at the Cedar River habitat restoration site (RM 5.3). The project changes described in this supplemental opinion will not affect this PCE in any way.

Freshwater Rearing Sites and Freshwater Migration Corridors (PCE 2 and PCE 3)
Project changes will cause additional temporary effects to rearing and migration habitat compared to the original opinion. The new design will slightly increase overwater cover at both the east and west approaches in 2016, but the total area of overwater cover decreases by 0.4 acres overall, reducing the effects of shading on juvenile Chinook migration from those considered in the original opinion and reducing the effects of shading on PCEs 2 and 3 of Chinook critical habitat.

In addition, the new design will decrease the area of elevated suspended sediment by 3.6 acres, a nominal one percent reduction compared to the original design. Because this area contains primary constituent elements (PCEs) 2 and 3 (freshwater rearing and migration) of PS Chinook salmon critical habitat, temporary increases of suspended sediment also increase the magnitude of the temporary effects to these PCEs. Moving the in-water work window by two weeks will result in additional exposure of residual Chinook salmon and migrating adult Chinook during the summer when Lake temperatures are highest and DO are low. However, impacts are short-term and temporary and will not reduce the conservation function of these two PCEs in the action area.

2.5 Cumulative Effects

The Cumulative Effects section of the original opinion is incorporated by reference here.

2.6 Revised Integration and Synthesis

2.6.1 Puget Sound Chinook Salmon ESU

Changes in the project design will generate turbidity and elevated underwater sound levels outside the previously established in-water work window. Project changes will also expand the area of increased suspended sediment in 2016, though the total area over all years will decrease overall compared to the original opinion. Extending the in-water work window increases the likelihood of injury to residual juvenile and adult Chinook salmon by exposing them to turbidity and noise levels when they may be already stressed from low DO. However, residual juvenile Chinook are unlikely to return to spawn near the project site during this period, and most adult fish will be able to avoid the affected areas. The changes to the levels of effects to the species and small changes in habitat impacts will not have an observable effect on the spatial structure, productivity, long-term abundance, or diversity of the Lake Washington populations or the PS ESU as a whole.

2.6.2 Puget Sound Steelhead DPS

Lake Washington Basin steelhead are virtually extirpated (see Section 2.6.2 from the original opinion). The small changes in the levels of the sublethal impacts to small numbers of individuals described above will not affect the abundance, productivity, spatial structure, or diversity of the Lake Washington Basin steelhead population or the PS DPS as a whole because the low chance of exposure from the proposed stressors to any one individual.

2.6.3 Puget Sound Chinook Salmon Critical Habitat

The proposed design changes will cause minor increases to the effects of the proposed action on critical habitat but will also decrease some permanent effects compared to the original opinion, such as the area of overwater cover in the primary migratory corridor for juvenile Chinook salmon. These small changes do not alter NMFS' determination from the original opinion that critical habitat will remain functional and retain the current ability for PCEs to serve the intended conservation role for the species. Therefore, the proposed action will not significantly reduce the conservation value of critical habitat at the ESU scale.

2.7 Conclusion

Extending the in-water work window increases the likelihood of injury to residual juvenile Chinook salmon, and adult Chinook salmon and steelhead by exposing them to turbidity and noise levels when they are already oxygen-stressed. The updated design will also increase the area temporarily exposed to elevated suspended sediment at the west approach 2.0 acres, but decrease the area at the east approach by 5.6 acres. The area of habitat temporarily exposed to injurious levels of underwater sound will also be increased at both the east and west approaches.

Although the changes to the proposed design increase temporary impacts from those evaluated in the original opinion, they do not alter NMFS' opinion that the proposed action is not likely to jeopardize the continued existence of PS Chinook salmon or PS steelhead or destroy or adversely modify PS Chinook salmon designated critical habitat.

2.8 Changes to the Incidental Take Statement

2.8.1 Amount or Extent of Take

Section 2.8.1 of the May 7, 2015 opinion describes the amount and extent of take exempted for the proposed action. The following are changes based on the project design updates described above:

- Take from elevated suspended sediment, measured as five or more NTUs over background turbidity levels, is exempted for areas shown in Table 2.
- Take from elevated sound levels generated during transition pier demolition using a hoe ram (cumulative SEL greater than 187dB) is exempted for 14 acres at the west approach and 14 acres at the east approach; and for the areas shown in Table 4.
- Take from increased shading from over-water structures is exempted for the areas shown in Table 6.
- Take from increased predatory fish habitat from over-water structures is exempted for the areas shown in Table 7.

2.8.2 Effect of the Take

The effect of the take on PS Chinook salmon and PS steelhead is described in the original (May 20, 2011) opinion.

2.8.3 Changes to Terms and Conditions

The NMFS is changing term and condition 1(b) from the May 7, 2015 opinion as follows:

1. To implement Reasonable and Prudent Measure (RPM) 1, FHWA shall:
   b. With the exception of vibratory driving of temporary piles and drilled shaft casings, preclude any turbidity generating in-water work at the west approach east of Foster Island between April 15 and August 15, 2016; and April 15 and September 1 in all other construction years.

The NMFS is adding one more term and condition to meet RPM 2:

2. To implement RPM 2, FHWA shall:
   g. Monitor underwater sound levels generated during demolition of the transition piers using a hoe ram and submit any monitoring reports to NMFS.

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 Conservation Recommendations Effects section of the original opinion is incorporated by reference here.

2.10 Reinitiation of Consultation

This concludes formal consultation for the State Route 520 Bridge Replacement Project. As stated 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 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.

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

Section 3 of the original opinion is incorporated by reference here, with the following changes:

- The amount of EFH that will be adversely affected by elevated suspended for the action area is detailed in Table 2.
- The amount of EFH that will be adversely affected by shading from over-water structures is shown in Table 6.

EFH Conservation Recommendation 3 has been modified as follows:

3. Preclude any turbidity generating in-water work at the west approach east of Foster Island between April 15 and August 15 in 2016; and April 15 and September 1 in all other construction years.

4. REFERENCES

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WSDOT. 2012. Concrete Pier Demolition Underwater Sound Levels: SR303 Manette Bridge Project. Washington State Department of Transportation, November 2012. 29 pp. http://www.wsdot.wa.gov/NR/rdonlyres/D789C840-AD5C-4CD9-B610-C2C0E254F2C3/0/MannetteBrdgPierDemolition.pdf.