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

Effects of the Pacific Coast Salmon Plan on the Lower Columbia River Coho Evolutionarily Significant Unit Listed Under the Endangered Species Act.

NMFS Consultation Number: 2015-2026

Action Agency: National Marine Fisheries Service (NMFS)

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 Coho Salmon (*Oncorhynchus kisutch*)	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	No	No
Pacific Fishery Management Council's Coastal Pelagic Species	No	No
Pacific Coast Groundfish	No	No
U.S. West Coast Fisheries for Highly Migratory Species	No	No

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

Issued By: ______________________________

William W. Stelle, Jr.
Regional Administrator

Date: April 9, 2015

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Acronyms and Abbreviations

CFR	Code of Federal Regulations
	Columbia River
CRITFC	Columbia River Inter-Tribal Fisheries Commission
CTC	Chinook Technical Committee
CWT	coded-wire tag (or tagged)
DIP	demographically independent population
DPS	distinct population segment
EEZ	exclusive economic zone
EFH	essential fish habitat
ER	exploitation rate
ESA	Endangered Species Act
ESU	evolutionarily significant unit
FR	Federal Register
FRAM	Fisheries Regulation Assessment Model
LCR	Lower Columbia River
MMPA	Marine Mammal Protection Act
MPG	major population group
MSA	Magnuson-Stevens Fishery Conservation Act
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPFMC	North Pacific Fisheries Management Council
NWIFC	Northwest Indian Fisheries Commission
OC	Oregon Coast
ODFW	Oregon Department of Fish and Wildlife
PFMC	Pacific Fisheries Management Council
PSC	Pacific Salmon Commission
PST	Pacific Salmon Treaty
RER	recovery exploitation rate
RMP	resource management plan
SFA	Sustainable Fisheries Act
TAC	Technical Advisory Committee
TRT	Technical Recovery Team
UCR	Upper Columbia River
USFWS	U.S. Fish and Wildlife Service
UWR	Upper Willamette River
VSP	viable salmonid population
VRAP	Viability Risk Assessment Procedure
WDFW	Washington Department of Fish and Wildlife

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) (NMFS) prepared the biological opinion (opinion) and incidental take statement portions of this document 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. The opinion documents consultation on the action proposed by NMFS, Sustainable Fisheries Division, West Coast Region.

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). The document will be available through NMFS's Public Consultation Tracking System: https://pcts.nmfs.noaa.gov/pcts-web/homepage.pcts. A complete record of this consultation is on file at the Sustainable Fisheries Division of the West Coast Region of NMFS.

1.2 Consultation History

NMFS promulgates ocean fishing regulations within the Exclusive Economic Zone (EEZ) of the Pacific Ocean. The following summary describes the consultation history for NMFS's consideration of the effects of its implementation of the Pacific Fisheries Management Council's (PFMC) Pacific Coast Salmon Fishery Management Plan (Salmon FMP) on all ESA listed salmon and steelhead species and other non-salmonid species. The summary provides additional detail regarding the sequence of biological opinions that considered the effects of PFMC fisheries on ESA-listed lower Columbia River (LCR) coho salmon.

Since 1991, 27 salmon ESUs and steelhead Distinct Population Segments (DPSs) have been listed under the ESA on the West Coast of the U.S. (Table 1). The incidental take of these species associated with the proposed action has been addressed in existing biological opinions (Table 2).

Beginning in 1991, NMFS considered the effects on salmon species listed under the ESA resulting from PFMC fisheries and issued biological opinions based on the regulations implemented each year rather than on the Salmon FMP itself. In a biological opinion dated March 8, 1996, NMFS considered the impacts on all listed salmon species resulting from implementation of the Salmon FMP, including Snake River spring/summer-run Chinook, Snake River fall-run Chinook, Snake River sockeye, and Sacramento River winter-run Chinook (NMFS 1996b). Subsequent biological opinions beginning in 1997 considered the effects of PFMC fisheries on the growing catalogue of listed species (e.g., NMFS 1998; NMFS 1999; NMFS 2000b; NMFS 2000a).

Table 1. Status and critical habitat designations for ESA listed species (Listing status: 'T' means listed as threatened under the ESA; 'E' means listed as endangered).

Species	Listing Status, Federal Register Notice		Critical Habitat Designated	
Chinook salmon (*Oncorhynchus tshawytscha*)				
Sacramento River winter-run	E: 70 FR 37160	6/28/05	58 FR 33212	06/16/93
Snake River fall-run	T: 70 FR 37160	6/28/05	58 FR 68543	12/28/93
Snake River spring/summer-run	T: 70 FR 37160	6/28/05	64 FR 57399	10/25/99
Puget Sound	T: 70 FR 37160	6/28/05	70 FR 52630	09/02/05
Lower Columbia River	T: 70 FR 37160	6/28/05	70 FR 52630	09/02/05
Upper Willamette River	T: 70 FR 37160	6/28/05	70 FR 52630	09/02/05
Upper Columbia River spring-run	E: 70 FR 37160	6/28/05	70 FR 52630	09/02/05
Central Valley spring-run	T: 70 FR 37160	6/28/05	70 FR 52630	09/02/05
California Coastal	T: 70 FR 37160	6/28/05	70 FR 52630	09/02/05
Chum salmon (*O. keta*)				
Hood Canal Summer-run	T: 70 FR 37160	6/28/05	70 FR 52630	09/02/05
Columbia River	T: 70 FR 37160	6/28/05	70 FR 52630	09/02/05
Coho Salmon (*O. kisutch*)				
Central California Coast	E: 70 FR 37160	6/28/05	64 FR 24049	05/05/99
S. Oregon/N. California Coasts	T: 70 FR 37160	6/28/05	64 FR 24049	05/05/99
Lower Columbia River	T: 70 FR 37160	6/28/05	78 FR 2726	01/14/13[1]
Oregon Coast	T: 76 FR 35755	6/20/11	73 FR 7816	02/11/08
Sockeye Salmon (*O. nerka*)				
Snake River	E: 70 FR 37160	6/28/05	58 FR 68543	12/28/93
Ozette Lake	T: 70 FR 37160	6/28/05	70 FR 52630	09/02/05
Steelhead (*O. mykiss*)				
Southern California	E: 71 FR 834	1/05/06	70 FR 52630	09/02/05
South-Central California Coast	T: 71 FR 834	1/05/06	70 FR 52630	09/02/05
Central California Coast	T: 71 FR 834	1/05/06	70 FR 52630	09/02/05
Northern California	T: 71 FR 834	1/05/06	70 FR 52630	09/02/05
Upper Columbia River	T: 71 FR 834	1/05/06	70 FR 52630	09/02/05
Snake River Basin	T: 71 FR 834	1/05/06	70 FR 52630	09/02/05
Lower Columbia River	T: 71 FR 834	1/05/06	70 FR 52630	09/02/05
California Central Valley	T: 71 FR 834	1/05/06	70 FR 52630	09/02/05
Upper Willamette River	T: 71 FR 834	1/05/06	70 FR 52630	09/02/05
Middle Columbia River	T: 71 FR 834	1/05/06	70 FR 52630	09/02/05
Puget Sound Steelhead	T: 72 FR 26722	5/11/07	78 FR 2726	01/14/13[1]
North American Green Sturgeon (*Acipenser medirostris*)				
Southern DPS of Green Sturgeon	T: 71 FR 17757	4/07/06	74 FR 52300	10/09/09
Killer Whales (*Orcinus orca*)				
Southern Resident DPS Killer Whales	E: 70 FR 69903	11/18/05	71 FR 69054	11/29/06
Steller Sea Lion (*Eumetopias jubatus*)				
Western DPS	E: 62 FR 24345	5/05/97	58 FR 45269	08/27/93
Eulachon (*Thaleichthys pacificus*)				
Columbia River Eulachon (Smelt)	T: 75 FR 13012	3/18/10	76 FR 65324	10/20/11
Puget Sound/Georgia Basin Rockfish (*Sebastes spp.*)				
Bocaccio, Yelloweye, Canary	E: Boccacio		79 FR 68041	11/13/14
	T: Yelloweye, Canary		75 FR 22276	04/28/10

[1] proposed rule

Table 2. NMFS ESA determinations regarding ESUs and DPS affected by PFMC Fisheries and the duration of the 4(d) Limit determination or biological opinion (BO). (Only those decisions currently in effect are included).

Date (Decision type)	**Duration**	**Citation**	**Species Considered**
Salmonid Species			
March 8, 1996 (BO)	until reinitiated	(NMFS 1996b)	Snake River spring/summer and fall Chinook, and sockeye
April 28, 1999 (BO)	until reinitiated	(NMFS 1999)	S. Oregon/N. California Coasts coho Central California Coast coho Oregon Coast coho
April 28, 2000 (BO)	until reinitiated	(NMFS 2000b)	Central Valley Spring-run Chinook California Coastal Chinook
September 14, 2001 (BO, 4(d) Limit)	until withdrawn	(NMFS 2001b)	Hood Canal summer-run chum
April 30, 2001 (BO)	until reinitiated	(NMFS 2001a)	Upper Willamette River Chinook Columbia River chum Ozette Lake sockeye Upper Columbia River spring-run Chinook Ten listed steelhead DPSs
June 13, 2005 (BO)	until reinitiated	(NMFS 2005c)	California Coastal Chinook
May 1, 2014 (BO)	until April 2015[1]	(NMFS 2014)	Puget Sound Chinook Puget Sound steelhead
April 27, 2012 (BO)	until reinitiated	(NMFS 2012a)	Lower Columbia River Chinook
April 2012 (BO)	until reinitiated	(NMFS 2012b)	Sacramento River winter-run Chinook
Non Salmonid species			
April 30, 2007 (BO)	until reinitiated	(NMFS 2007)	North American Green Sturgeon
December 22, 2008 (BO)	until December 2018	(NMFS 2008b)	Western DPS Steller Sea Lion
May 5, 2009 (BO)	until reinitiated	(NMFS 2009)	Southern Resident Killer Whales
April 30, 2011 (BO)	until reinitiated	(NMFS 2010a)	Puget Sound/Georgia Basin Rockfish
April 30, 2011 (BO)	until reinitiated	(NMFS 2010a)	Pacific Eulachon

[1]*NMFS is currently working on a biological opinion considering the effects of proposed fisheries on these species expected to be issued in 2015.*

NMFS has issued new biological opinions as new ESUs/DPSs were listed or reinitiated consultation when appropriate.

Table 2 lists the biological opinions and 4(d) limit determinations currently in effect that consider effects of PFMC fisheries on each of the listed salmonid species along the West Coast of the United States. The effects of PFMC fisheries on LCR coho salmon were last considered by NMFS in 2008 (NMFS 2008a).

Other non-salmonid species have also been listed under the ESA in recent years, including Southern Resident killer whales (*Orcinis orca*), the southern DPS of North American green sturgeon (*Acipenser medirostris*), three Puget Sound/Georgia Basin rockfish species (*Sebastes spp.*), Stellar sea lions (*Eumetopias jubatus*), and Pacific eulachon (*Thaleichthys pacificus*) (Table 1). NMFS has also previously considered the effects of PFMC fisheries on these species and determined either that the fisheries would have no effect, were not likely to adversely effect, or were not likely to jeopardize the species, and made necessary determinations related to designated critical habitat. The related biological opinions are listed in Table 2.

NMFS is both the action agency and consulting agency for this consultation. The current Salmon FMP requires that the PFMC manage fisheries consistent with NMFS' ESAconsultations or recovery plans to meet the immediate needs for conservation and long-term recovery of the species. Consistent with the requirements of the Salmon FMP, NMFS provides guidance to the PFMC regarding ESA-related management constraints derived from existing opinions through an annual guidance letter (see for example Stelle 2015). The Salmon FMP requires that the PFMC manage its fisheries consistent with NMFS' guidance.

In 1997, the PFMC adopted a management plan (Amendment 13 to the Pacific Coast Ocean Plan) that constrained overall allowable fishery impacts on Oregon Coast Natural coho. The management plan was built around a harvest matrix that allowed harvest impacts to vary depending on brood year escapement and marine survival. In 2000, after a review of Amendment 13, the PFMC adopted changes to the management plan recommended by an ad hoc workgroup as expert advice, including a lower range of harvest impacts when parental spawner abundance and marine survival were very low. NMFS reviewed the management plan through Section 7 consultation and concluded that it was not likely to jeopardize Oregon Coast coho (NMFS 1999).

LCR coho salmon were listed under Oregon's ESA in July 1999 (ODFW 2006). A related fishery management plan, which was modeled after the one for Oregon Coast Natural coho salmon, was approved by the Oregon Fish and Wildlife Commission in July 2001. The plan was similar to that for Oregon Coast coho, but defined the allowable harvest rate for both ocean and inriver fisheries depending on brood year escapement and marine survival indicators (Melcher 2005). The resulting matrix was used by the states of Oregon and Washington for managing ocean and Columbia River fisheries for LCR coho from 2002-2005.

In 2005, NMFS concluded in a conference opinion that the exploitation rates anticipated in the 2005 PFMC fisheries, based on the ocean component of the Oregon matrix, were not likely to jeopardize the continued existence of the LCR coho salmon ESU, which was then proposed for listing under the ESA as threatened (NMFS 2005b). LCR coho salmon were subsequently listed as threatened under the ESA, effective August 29, 2005 (Table 1). Once the federal listing of the LCR coho salmon ESU became effective, the conference opinion was confirmed as the biological opinion (NMFS 2005a).

NMFS consulted on the effects of PFMC fisheries on LCR coho in biological opinions in 2006 and 2007. In 2006, NMFS concluded in a biological opinion that a 15% total combined (ocean and inriver) exploitation rate was not likely to jeopardize the continued existence of the LCR coho salmon ESU. The exploitation rate was significantly lower than what the Oregon matrix would have prescribed for total impacts (ocean and inriver), and equivalent to the ocean portion of the Oregon Matrix given the expected marine survival and parental spawner abundance in 2006. Since the federal listing of LCR coho under the ESA in 2005, the states of Oregon and Washington have been working with NMFS to develop and evaluate a management plan that can be used as the basis for their long-term management.

In preparation for a section 7 consultation in 2007, the states provided NMFS a qualitative risk assessment that evaluated the long-term effects of their intended matrix on the ESU (Beamesderfer 2007). However, this risk assessment was not received in time to be included in the analysis for the 2007 biological opinion. In 2007 NMFS concluded that it was still prudent to take a conservative approach to management until remaining questions can be resolved. In 2007

NMFS concluded in a biological opinion that a 20% total combined (ocean and inriver) exploitation rate was not likely to jeopardize the continued existence of LCR coho salmon ESU. Similar to 2006, the exploitation rate limit in 2007 was equivalent to the ocean portion of the Oregon Matrix given the expected marine survival and parental spawner abundance in 2007.

In 2008, NMFS completed a multi-year biological opinion that is still in place. NMFS has continued to rely on the ocean component of the Oregon Matrix to define the total harvest impact rate for ocean fisheries and Columbia River mainstem fisheries up to Bonneville Dam. In 2011, for example, the escapements and marine survival rates were such that the Oregon Matrix would allow for an overall exploitation rate of 21.4%. However, the proposed action in the NMFS' 2008 biological opinion limited the exploitation rate to 15%. This conservative strategy has been used, in part, due to the limited amount of data on status of natural-origin LCR coho populations. Since 2008, state and federal recovery plans for the LCR coho ESU have been adopted (LCFRB 2010; ODFW 2010; NMFS 2013a). The recovery plans include language related to addressing uncertainties in LCR coho population information and developing updated harvest management strategies for the ESU.

In 2010 the states again discussed with NMFS their interest in updating the harvest management strategy. In response, NMFS wrote a letter to the states describing the topics that would need to be addressed prior to reinitiating consultation on the harvest strategy for the LCR coho salmon ESU (Dygert 2011). Dygert (2011) outlined four key areas to be addressed:

- Update LCR coho population status information. This includes information from surveys that ODFW has conducted since 2002 and new surveys that WDFW has implemented since 2010, as well as any other relevant status data.
- Evaluate and update full-seeding targets for adult spawners and provide an explanation of how they relate to target abundances provided in recovery plans.
- Incorporate additional ESU strata and populations from both states into the harvest strategy to allow for weak stock management.
- Conduct a risk assessment for the consultation to demonstrate the likely effects of proposed harvest strategies.

In 2012, the PFMC volunteered to organize an ad hoc workgroup to facilitate the process of updating the harvest management strategies for the LCR coho salmon ESU, addressing the four topics listed above. The Ad Hoc Lower Columbia River Natural Coho Workgroup (Workgroup) spent sixteen months on the project and completed their report in October 2014 (Beamesderfer et al. 2014).

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). At its November 2014 meeting, the PFMC requested that NMFS consider a new abundance based harvest matrix for use in managing fisheries that affect LCR coho in 2015 and beyond (McIssac 2015). The PFMC formally transmitted the request to NMFS to consider the updated harvest matrix on January 21, 2015 (McIssac 2015). The proposed action for this opinion is NMFS' implementation of the PFMC's

Salmon FMP applying the updated harvest matrix, beginning May 1, 2015 and extending for the foreseeable future until consultation is reinitiated by NMFS.

For a detailed description of fisheries implemented refer to PFMC's annual Pre-Season Report III (for example see PFMC 2014c) and the Salmon FMP (PFMC 2014b).

Consistent with the PFMC's request, NMFS is considering in this opinion the new proposed harvest matrix for managing fisheries that impact LCR coho salmon populations (McIssac 2015). The PFMC proposes that NMFS manage the fisheries the new harvest matrix, which identifies exploitation rate limits based on two levels of parental escapement and five levels of marine survival (a 2 x 5 matrix), see Table 3.

Table 3. Harvest management matrix for LCR coho showing allowable fishery exploitation rates based on parental escapement and marine survival index.

Parental Escapement (rate of full seeding)		Marine Survival Index (based on return of jacks per hatchery smolt)					
		Very Low (≤ 6%)	Low (≤ 8%)	Medium (≤ 17%)	High (≤ 40%)	Very High (> 40%)	
Normal	≥ 0.30	10%	15%	18%	23%	30%	Allowable exploitation rate
Very Low	< 0.30	≤ 10%	≤ 15%	≤ 18%	≤ 23%	≤ 30%	

This new matrix is different from the one currently in use in that it has a low point of 10% exploitation rate instead of 8%, and a high point of 30% exploitation rate instead of 45%. According to the Workgroup's analysis, a rate of 10% for LCR coho at the lower end is necessary to conduct Chinook-only PFMC fisheries (Table 4). A rate of 30% on the high end would allow access by the in-river fishery to large returns of Columbia River hatchery coho in years of good marine survival. A 30% exploitation rate at the high end is particularly important to Columbia River mainstem coho fisheries. While these fisheries are not managed under the Salmon FMP and are thus not part of this proposed action, their impact on LCR coho would be considered part of the total fishery impact for purposes of determining if the exploitation rate limit in the matrix has been exceeded.

Table 4. Fishery implications of conservation objectives.

Exploitation Rate	Fishery
10%	No retention
10-20%	Mark-selective
20-25%	Coho target
30%	Maximum usable

Per the proposed action, average seeding level of parental escapement is expressed as a percentage of the full seeding level. Percentages greater than 100% are set at 100% with the average calculated using the seeding levels of the ten LCR coho populations (McIssac 2015). In the event that LCR natural coho average spawning escapements fall below 30 percent of full seeding when considered as an average of the ten reference populations, the Council would then work to the extent possible to minimize LCR coho exploitation rates on adult returns from the corresponding brood year, and in no case exceed the exploitation rate for a given marine survival index category. Full seeding levels for Oregon populations were defined based on a combination of stock-recruitment and habitat analyses. Full seeding levels for Washington populations were defined as equilibrium abundance in stock-recruitment parameters inferred with the Ecosystem Diagnosis and Treatment (EDT) Model from assessments of the available habitat quantity and quality (Beamesderfer et al. 2014).

Because the extent of allowable impacts each year in the PFMC fisheries will be constrained by an exploitation rate limit that includes all marine fisheries and fisheries in the mainstem Columbia River below Bonneville Dam impacting LCR coho salmon, the PFMC's calculation of its specific harvest rate each year is the remainder of the total exploitation rate after taking into account estimated impacts on LCR coho salmon that have or are expected to occur that year in fisheries in Southeast Alaska, Canada, Puget Sound and the Strait of Juan de Fuca (particularly including the fisheries directed at Fraser River sockeye and pink salmon managed by the Fraser River Panel pursuant to the Pacific Salmon Treaty), coastal Washington (Willapa Bay and Grays Harbor), Buoy 10, the Columbia River Estuary and the mainstem Columbia River below Bonneville Dam (located at River Mile 146.1).

Under the proposed action, the PFMC fisheries would be managed each year such that the total exploitation rate on LCR coho salmon in all marine area fisheries and fisheries in the mainstem Columbia River below Bonneville Dam would not exceed the year specific exploitation rate limit. The year specific limits, based on the marine survival index forecast coupled with parental escapement and corresponding exploitation rate in Table 3, would be defined in NMFS's annual guidance letter to the PFMC. NMFS proposes to use this approach in 2015 and for the foreseeable future until consultation is reinitiated. The PFMC recommended and NMFS proposes that the harvest matrix should be reviewed periodically beginning after the third year of implementation. The purpose of the review would be to assess the performance, and assumptions, and expectations described in the Beamesderfer et al. (2014) analysis.

After completing their preseason planning process in April of each year, the PFMC recommends fisheries management that is designed to comply with NMFS' biological opinions and related guidance. For a description of the PFMC salmon fisheries, refer to the most current PFMC Preseason Report III published each year at the conclusion of the preseason planning process in April. The amount of fishing and associated catch allowed in fisheries will vary from year to year depending on stock specific run sizes, catches anticipated in other fisheries, and fishery allocation decisions, but PFMC salmon fisheries in the PFMC Preseason Report III will be consistent with the guidance provided by NMFS through its annual guidance letter to the PFMC.

Successful management of the PFMC salmon fisheries requires monitoring to collect information on the fish stocks, the amount of effort for each fishery, the harvests that occurs in each fishery, the timing of harvest, and other biological and fishery statistics. In general, the information can be divided into that needed for in-season management and that needed for annual and long-term management. The data needs and reporting requirements for the fishery are described in the Salmon FMP (PFMC 2014b). Catch, escapement, and compliance with conservation objectives are reported annually in the PFMC's preseason documents including, in particular, the annual Review of Ocean Salmon Fisheries (see for example PFMC 2015).

"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). For the purpose of future proposed fisheries in 2015 and beyond, NMFS determined that there are no interrelated or interdependent actions.

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 consultation is the EEZ, where the PFMC fisheries occur, and the coastal and inland marine waters off the Washington, Oregon, and California coast that are inside the EEZ (zero to three miles offshore), which may be indirectly affected by the federal action (Figure 1). Fishery-related impacts to LCR coho from fisheries in the coastal and inland marine waters off the Washington, Oregon, and California are included as part of the ESA limit established each year by the application of the proposed harvest matrix.

Figure 1. Pacific Fisheries Management Council Exclusive Economic Zone

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. As required by section 7(a)(2) of the ESA, Federal agencies must 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. 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 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 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 rangewide 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 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 species and critical habitat.

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[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).

- 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 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.

One factor affecting the rangewide status of LCR coho ESU, and aquatic habitat at large is climate change. Climate change has negative implications for designated critical habitats in the Pacific Northwest (CIG 2004; Scheuerell and Williams 2005; Zabel et al. 2006; ISAB 2007). Average annual Northwest air temperatures have increased by approximately 1ºC since 1900, or about 50% more than the global average over the same period (ISAB 2007). The latest climate models project a warming of 0.1 ºC to 0.6 ºC per decade over the next century. According to the Independent Scientific Advisory Board (ISAB), these effects pose the following impacts over the next 40 years:

- Warmer air temperatures will result in diminished snowpacks and a shift to more winter/spring rain and runoff, rather than snow that is stored until the spring/summer melt season.
- With a smaller snowpack, these watersheds will see their runoff diminished earlier in the season, resulting in lower stream-flows in the June through September period. River flows in general and peak river flows are likely to increase during the winter due to more precipitation falling as rain rather than snow.
- Water temperatures are expected to rise, especially during the summer months when lower stream-flows co-occur with warmer air temperatures.

These changes will not be spatially homogeneous across the entire Pacific Northwest. Low-lying areas are likely to be more affected. Climate change may have long-term effects that include, but are not limited to, depletion of important cold water habitat, variation in quality and quantity of tributary rearing habitat, alterations to migration patterns, accelerated embryo development, premature emergence of fry, and increased competition among species (ISAB 2007).

To mitigate for the effects of climate change on listed salmonids, the ISAB (2007) recommends planning now for future climate conditions by implementing protective tributary, mainstem, and estuarine habitat measures, as well as protective hydropower mitigation measures. In particular, the ISAB (2007) suggests increased summer flow augmentation from cool/cold storage reservoirs to reduce water temperatures or to create cool water refugia in mainstem reservoirs and the estuary; and the protection and restoration of riparian buffers, wetlands, and floodplains.

In order to describe a species' status, it is first necessary to define what "species" means in this context. In addition to defining "species" as including an entire taxonomic species or subspecies of animals or plants, the ESA also recognizes listing units that are a subset of the species as a whole. The ESA allows a distinct population segment (DPS) of a species to be listed as threatened or endangered. LCR coho salmon constitute an evolutionarily significant unit (ESU), which is a salmon DPS of the taxonomic species *Oncorhynchus kisutch*, and as such is considered a "species" under the ESA. The discussion in this opinion is limited to the LCR coho ESU. Documents describing the listing status, critical habitat, and protective regulations are summarized in Table 1 above.

The Willamette Lower Columbia Technical Review Team (WLC TRT) developed a hierarchical approach for determining ESU-level viability criteria (Figure 1). Briefly, an ESU is divided into populations (McElhany et al. 2000). The risk of extinction of each population is evaluated, taking into account population-specific measures of abundance, productivity, spatial structure and diversity. Populations are then grouped into Major Population Groups (MPGs), which are evaluated on the basis of population status. In order to be considered viable, an MPG generally must have at least half of its historically present populations meeting their population-level viability criteria (McElhany et al. 2006). At the ESU-level the WLC TRT recommends that each of the ESU's MPGs also be viable. A viable salmonid ESU or DPS is naturally self-sustaining, with a high probability of persistence over a 100-year time period.

In assessing status, we start with the information used in our most recent decision to list, for ESA protection, the salmon species considered in this opinion, and also consider more recent data, where applicable, that are relevant to the species' rangewide status. Recent information from recovery plans is often relevant and is used to supplement the overall review of the species' status. This step of the analysis tells us how well the species is doing over its entire range in terms of trends in abundance and productivity, spatial distribution, and diversity. It also identifies the potential causes of the species' decline.

In July 2013, working with its federal, state, tribal, and local partners, NMFS published a recovery plan for LCR salmon and steelhead (NMFS 2013a). The plan provides a road map to recover four salmon (including LCR coho) and steelhead species that spawn and rear in the LCR or its tributaries in Oregon and Washington. NMFS' Lower Columbia Recovery Plan, hereafter "LCR recovery plan," includes three locally developed plans, each of which covers a different portion of the species' range: the LCR Conservation and Recovery Plan for Oregon Populations of Salmon and Steelhead prepared by the Oregon Department of Fish and Wildlife (ODFW 2010), NMFS's ESA Salmon Recovery Plan for the White Salmon River Watershed (NMFS 2013b), and the Lower Columbia Fish Recovery Board's Washington Lower Columbia Salmon Recovery and Fish & Wildlife Subbasin Plan (LCFRB 2010). Two additional documents informed the development of NMFS' recovery plan, the Columbia River Estuary ESA Recovery Plan Module for Salmon & Steelhead (NMFS 2011), and the Recovery Plan Module: Mainstem Columbia River Hydropower Projects (NMFS 2008c).

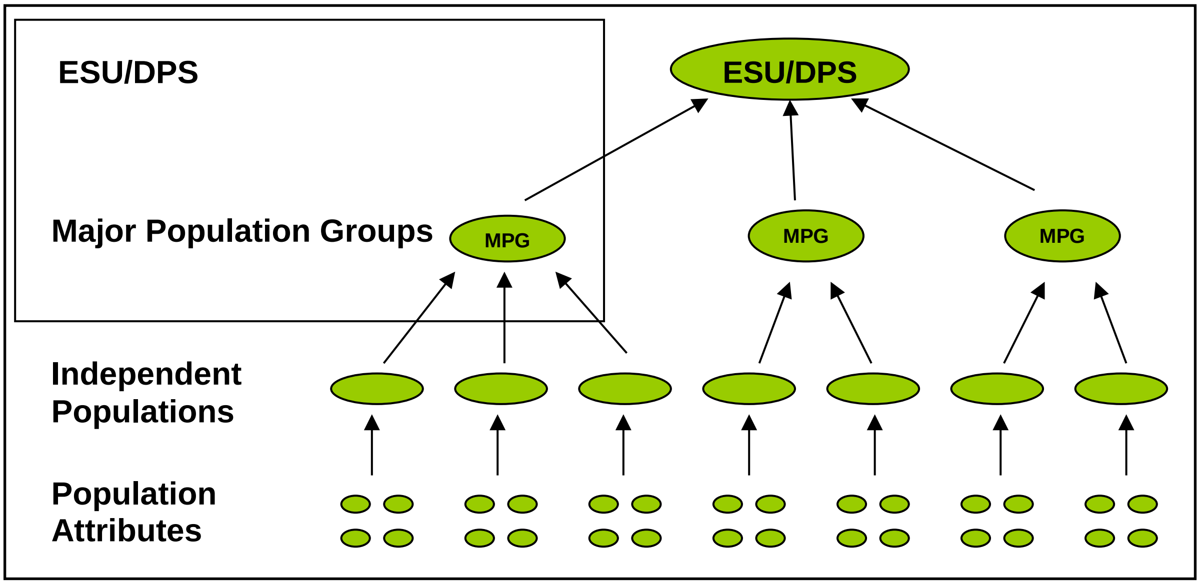


Figure 2. Hierarchical approach to ESU viability criteria.

NMFS' recovery plan contains objective, measurable de-listing criteria, site-specific management actions necessary to achieve the plan's goals, and estimates of the time and costs required to implement recovery actions. NMFS (2013a) proposes the following de-listing criteria for the LCR coho salmon ESU:

- All MPGs that historically existed have a high probability of persistence or have a probability of persistence consistent with their historical condition.
- High probability of MPG persistence is defined as:
  a) At least two populations in the MPG have at least a 95 percent probability of persistence over a 100-year time frame (i.e., two populations with a score of 3.0 or higher based on the TRT's scoring system).
  b) Other populations in the MPG have persistence probabilities consistent with a high probability of MPG persistence (i.e., the average of all MPG population scores is 2.25 or higher, based on the TRT's scoring system (Section 3.2 in NMFS 2013a).
  c) Populations targeted for a high probability of persistence are distributed in a way that minimizes risk from catastrophic events, maintains migratory connections among populations, and protects within-MPG diversity.
- A probability of persistence consistent with historical condition refers to the concept that MPGs that historically were small or had complex population structures may not have met Criteria A through C, above, but could still be considered sufficiently viable if they provide a contribution to overall ESU viability similar to their historical contribution.
- The threats criteria have been met. In addition to a species achieving a certain biological status for reclassification or delisting, the threats to a listed species must have been ameliorated so as not to limit attainment of its desired biological status (Section 3.2.2 in NMFS 2013a).

For coho salmon, NMFS (2013a) identified near-term priorities for implementing a harvest strategy consistent with recovery including:

- Obtaining better information on natural-origin and hatchery-origin spawner escapement and better estimates of natural population productivity
- Obtaining a better estimate of harvest impact rates for natural-origin LCR coho salmon in ocean and Columbia River mainstem fisheries (and, in particular, addressing uncertainties related to harvest impacts in mainstem fisheries)
- Evaluating and refining harvest strategies for periods of poor ocean conditions and for years when returns are strong.
- Incorporating into the matrix a method of managing for weaker stocks that would benefit from harvest reductions
- Developing mark-selective fishing methods that can be used in the commercial mainstem fisheries

Although worded differently, these priorities are largely consistent with topics identified in Dygert (2011) that needed to be addressed prior to reinitiating this consultation and that were discussed above in section 1.3.

2.2.1 Rangewide Status of the Species

The ESU 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 River up to and including the Big White Salmon and Hood rivers, and includes the Willamette River to Willamette Falls, Oregon, as well as 23 artificial propagation programs (Table 5, Figure 3). The Gorge MPG has three populations. The lower Gorge population includes several small tributaries located below Bonneville Dam. There are two populations in the upper Gorge. On the Washington side the Upper Gorge population includes fish returning to the Big White Salmon, Little White Salmon, and Wind rivers and Spring Creek. On the Oregon side the Upper Gorge population includes Hood River and several small tributaries (Myers et al. 2006). The Upper Gorge Early-returning adult coho salmon enter the Columbia River in mid-August and begin entering tributaries in early September, with peak spawning from mid-October to early November. Late-returning coho salmon pass through the lower Columbia from late September through December and enter tributaries from October through January.

Due to hatchery closures and program discontinuations over the past decade NMFS recently updated its list of coho salmon hatchery programs that are included in the ESA listing (79 FR 20810, April 14, 2014) (Table 5). These hatchery stocks were included as part of the listed ESU in part based on a determination that these artificially propagated stocks are no more divergent relative to the local natural population(s) than what would be expected between closely related natural populations within the ESU (70 FR 97160, June 28, 2006). Lack of data and poor data quality has made it difficult to assess rangewide status of LCR coho salmon ESU. However, more recent spawner escapement information from 2002 in Oregon and from 2010 in Washington that was not available during previous status reviews suggests some population may be doing better than previously thought. More on this new information is provided below.

Table 5. Current status for LCR coho salmon populations, recommended status under the recovery scenario (NMFS 2013a), and list of hatchery programs included in the ESU (Jones 2011).

Major Population Group	Population (State)	Status Assessment		Recovery Scenario	
		Baseline Persistence Probability[1]	Contribution[2]	Target Persistence Probability	Abundance Target[3]
Coast	Young's Bay (OR) - *Late*	VL	Stabilizing	VL	--
	Grays/Chinook (WA) - *Late*	VL	Primary	H	2,400
	Big Creek (OR) - *Late*	VL	Stabilizing	VL	--
	Elochoman/Skamokawa (WA) - *Late*	VL	Primary	H	2,400
	Clatskanie (OR) - *Late*	L	Primary	H	3,201
	Mill/Aber/Germ (WA) - *Late*	VL	Contributing	M	1,800
	Scappoose (OR) - *Late*	M	Primary	VH	3,208
Cascade	Lower Cowlitz (WA) - *Late*	VL	Primary	H	3,700
	Upper Cowlitz (WA) - *Early, late*	VL	Primary	H	2,000
	Cispus (WA) - *Early, late*	VL	Primary	H	2,000
	Tilton (WA) - *Early, late*	VL	Stabilizing	VL	--
	South Fork Toutle (WA) - *Early, late*	VL	Primary	H	1,900
	North Fork Toutle (WA) - *Early, late*	VL	Primary	H	1,900
	Coweeman (WA) - *Late*	VL	Primary	H	1,200
	Kalama (WA) - *Late*	VL	Contributing	L	500
	North Fork Lewis (WA) - *Early, late*	VL	Contributing	L	500
	East Fork Lewis (WA) - *Early, late*	VL	primary	H	2,000
	Salmon Creek (WA) - *Late*	VL	Stabilizing	VL	--
	Clackamas (OR) - *Early, late*	M	Primary	VH	11,232
	Sandy (OR) - *Early, late*	VL	Primary	H	5,685
	Washougal (WA) - *Late*	VL	Contributing	M+	1,500
Gorge	Lower Gorge (WA/OR) - *Late*	VL	Primary	H	1,900
	Upper Gorge/White Salmon (WA) - *Late*	VL	Primary	H	1,900
	Upper Gorge/Hood (OR) - *Early*	VL	Primary	H	5,162

Artificial production	
Hatchery programs included in ESU (23)	Grays River (Type-S), Sea Resources (Type-S), Peterson Coho Project (Type-S), Big Creek Hatchery (ODFW stock #13), Astoria High School (STEP) Coho Program, Warrenton High School (STEP) Coho Program, Cathlamet High School FFA Type-N Coho Program, Cowlitz Type-N Coho Program, Cowlitz Game and Anglers Coho Program, Friends of the Cowlitz Coho Program, North Fork Toutle River Hatchery (type-S), Kalama River Type -N Coho Program, Kalama River Type-S Coho Program, Lewis River Type-N Coho Program, Lewis River Type-S Coho Program, Fish First Wild Coho Program, Fish First Type-N Coho Program, Syverson Project Type-N Coho Program, Washougal River Type-N Coho Program, Eagle Creek NFH, Sandy Hatchery (ODFW stock #11), Bonneville/Cascade/Oxbow Complex (ODFW stock #14)
Hatchery programs not included in ESU (1)	Clatsop County Fisheries (CCF) Coho Salmon Program (Klaskanine River origin) *The Elochoman Type S and Type N coho salmon hatchery programs have been discontinued and NMFS has recommended removing them from the ESU (Jones 2011).

[1] *VL = very low, L = low, M = moderate, H = high, VH = very high. These are adopted in the recovery plan*
[2] *Primary, contributing, and stabilizing designations reflect the relative contribution of a population to recovery goals and delisting criteria. Primary populations are targeted for restoration to a high or very high persistence probability. Contributing populations are targeted for medium or medium-plus viability. Stabilizing populations are those that will be maintained at current levels (generally low to very low viability), which is likely to require substantive recovery actions to avoid further degradation.*
[3] *Abundance objectives account for related goals for productivity.*

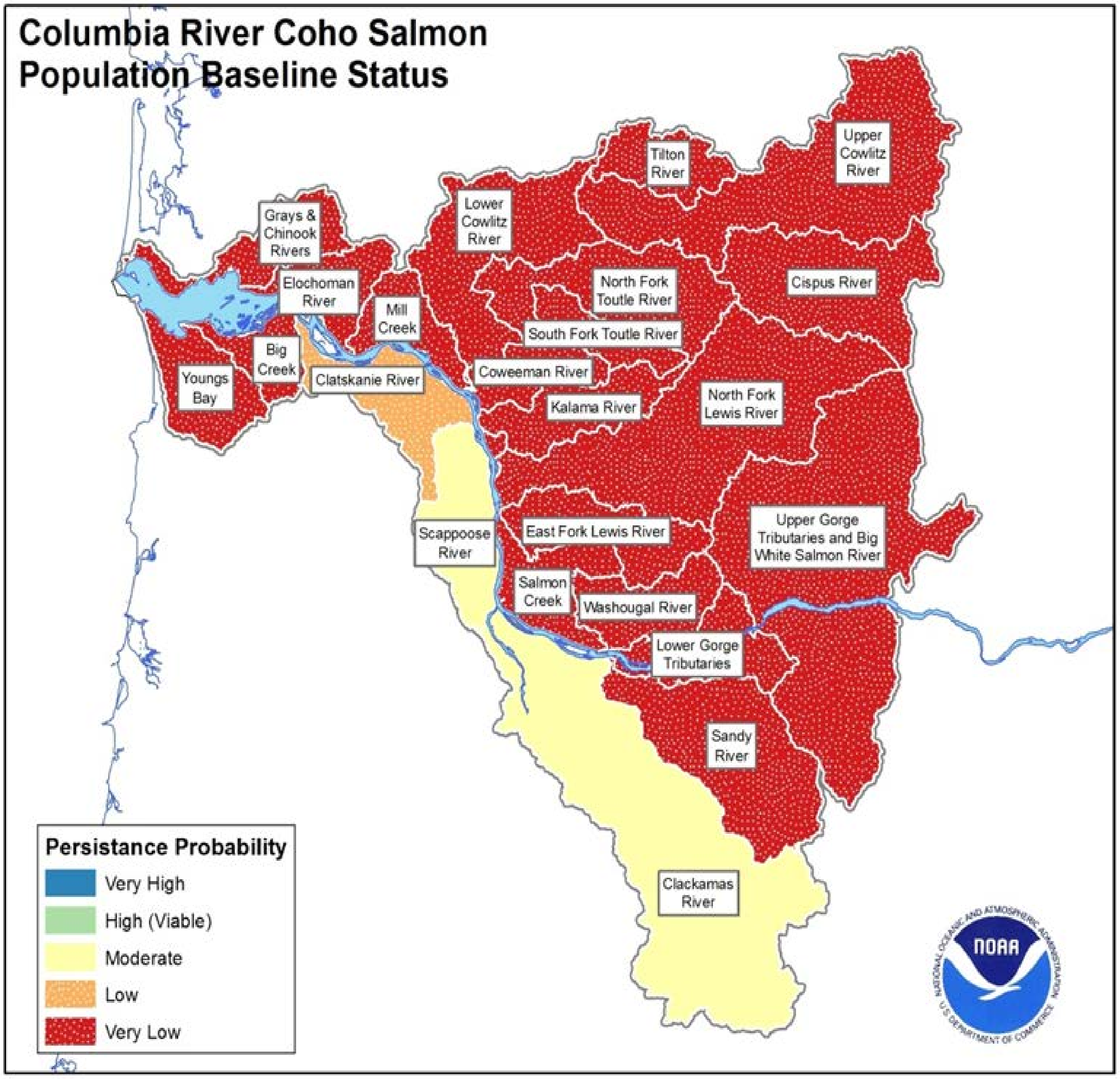


Figure 3. Lower Columbia River coho salmon populations and baseline status (Source: NMFS 2013a).

NMFS conducted status reviews of the LCR coho salmon ESU in 1996 (NMFS 1996a), in 2001 (NMFS 2001c), in 2005 (Good et al. 2005), and again in 2011 (Ford 2011). In 1996, the Biological Review Team (BRT) concluded that they could not identify any remaining natural populations of coho salmon in the lower Columbia River (excluding the Clackamas River) or along the Washington coast south of Point Grenville that warranted protection under the ESA, although this conclusion would warrant reconsideration if new information became available. At that time, LCR coho were thought to be extirpated. In the 2001 review, the BRT was very concerned that the vast majority (more than 90%) of historical populations in the ESU appear to be either extirpated or nearly so. The two populations with any significant production (Sandy and Clackamas rivers) were at appreciable risk because of low abundance, declining trends, and failure to respond after a dramatic reduction in harvest. The large number of hatchery coho salmon in the ESU was also considered an important risk factor.

The 2005 status review concluded, based on information available through 2002, that only Clackamas and Sandy populations had appreciable levels of natural production. Very limited information on the remainder of the 21 populations was available at that time, and most were considered extirpated, or nearly so, during the low marine survival period of the 1990s. Available spawner and juvenile outmigrant trapping information did indicate that there was some natural coho salmon production in the lower Columbia River, but is was generally assumed that most of the smolt production was from hatchery strays that were spawning in the wild.

Three evaluations of LCR coho salmon status, all based on WLC-TRT criteria, were conducted after the 2005 status update (McElhany et al. 2007; LCFRB 2010; ODFW 2010). McElhany et al. (2007) concluded that the ESU is currently at high risk of extinction. ODFW (2010) concluded that the Oregon portion of the ESU is currently at very high risk. The LCFRB (2010) does not provide a statement on ESU-level status, but describes the high fraction of populations in the ESU that are at high or very high risk. The latest status review (Ford 2011) relied on data available through 2008. According to Ford (2011), of the 27 historical populations in the ESU, 24 are considered at very high risk. The remaining three (Sandy, Clackamas, and Scappoose) are considered at high to moderate risk. All of the Washington side populations were considered at very high risk, although uncertainty was considered high because of a lack of adult spawner surveys data at that time. Smolt traps indicated some natural production in Washington populations, though given the high fraction of hatchery-origin spawners suspected to occur in these populations it was not clear that any were self-sustaining. New information up to 2013 is discussed below and is key to subsequent conclusions.

The most recent biological opinion regarding the harvest effects to LCR coho was completed in 2008 and therefore relied on the 2005 status review and McElhany et al. (2007) for the most recent assessments of status.

For Pacific salmon and steelhead, NMFS commonly uses four parameters to assess the viability of the populations that, together, constitute the species: abundance, productivity, spatial structure, and diversity (McElhany et al. 2000). These "viable salmonid population" (VSP) 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 parameters or attributes are substantially influenced by habitat and other environmental conditions.

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

"Productivity," as applied to viability factors, refers to the entire life cycle; i.e., the number of naturally-spawning adults (i.e., progeny) produced per naturally spawning parental pair. 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.

“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 accessibility to the habitat, on habitat quality and spatial configuration, and on 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 and Productivity

Poor data quality has prevented precise quantification of abundance and productivity for LCR coho. Data quality has been poor because of inadequate spawning surveys and, until recently, the presence of unmarked hatchery-origin spawners. Oregon has been doing spawning surveys for some time, but began their improved and expanded survey method in 2002. Washington did not beginning collecting adult escapement estimates for most populations until 2010. WDFW's monitoring program instead relied primarily on smolt monitoring program. Mass marking of hatchery-origin LCR coho began in 1999 (LCFRB 2010). Mass marking allows assessment of hatchery fractions in the spawning escapement and thereby greatly improves our ability to assess the status of populations.

The legacy effects of hatchery fish has contributed to a decline in natural productivity of the LCR coho salmon ESU. While total hatchery production has been reduced from a peak in the 1980s, NMFS’s most recent recovery plan concluded that most populations are still believed to have very low abundance of natural-origin spawners (NMFS 2013a). Thirty to forty million hatchery coho salmon were released each year in the late 1990’s, and approximately 10 million hatchery coho salmon continued to be released annually in the lower Columbia basin, with a slight decline in recent years (pers. comm R. Turner January 15, 2014).

In general, hatchery-origin fish comprise the majority of the LCR coho returns for most populations (Table 6 and Table 7). Until recently, no populations were thought to be naturally self-sustaining, with the majority of spawners believed to be hatchery strays. However, the more recent information suggests that the hatchery contribution for several populations is actually quite low.

Table 6 presents escapement of LCR coho in selected Oregon tributaries updated with the latest information. Table 7 presents escapement of LCR coho in selected Washington tributaries updated with the latest information. This updated and new information for Oregon and Washington tributaries were not available in prior status reviews.

On the Oregon side (Table 6), new information suggests that hatchery fractions are quite low, generally in the single digits, for some populations (Sandy, Clatskanie, Scappoose) and that these in fact may be self-sustaining. There has been a recent increase in the wild fraction of natural-origin coho salmon in their relative abundances and a decrease in hatchery-origin spawners for an important number of populations. It appears that pockets of natural production (such as the Clatskanie and Scappoose) are increasing as reflected in the recent spawning escapement information. In earlier status reviews and until the data became available beginning in 2002 these populations were thought to be extirpated.

On the Washington side (Table 7), new information suggests that hatchery fractions are low for some populations (Mill Creek, Abernathy, Germany, Lower Cowlitz, Coweeman, East Fork Lewis) and that these in fact may also be self-sustaining. There has been a recent increase in the wild fraction of natural-origin coho salmon in their relative abundances and a low to moderate decrease in hatchery-origin spawners for an important number of populations. It appears that pockets of natural production (such as the MAG, EF Lewis, Coweeman) are increasing as reflected in the recent spawning escapement information.

Natural-origin smolt production in selected Washington populations includes a mix of fish from streams that have a substantial amount of hatchery-origin strays and others where hatchery straying is believed to be relatively limited (e.g. Mill/Aber/Germ, Coweman, Toutle, lower Gorge). This conclusion is based on just three years of data. Continued monitoring into the future is needed to verify these early observations. Information gathered between 2010 and 2012 suggests there is more natural-origin smolt production than previously believed (Table 8). The total number of unmarked adult coho salmon on the Washington side accounted for less than 50 percent of adult coho salmon reaching the spawning grounds in 2010 -2012, with their parental origin unclear.

Table 6. Natural-origin spawning escapement numbers and proportion of hatchery-origin fish in the spawning grounds for LCR coho populations in Oregon (http://www.odfwrecoverytracker.org/). For example, Clatskanie in 2007 had 583 natural-origin spawners and 48% hatchery spawners. To calculate hatchery-origin numbers multiply (583/(1-.48))-583 = 538 hatchery-origin spawners.

Major Population Group	Oregon Populations		2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Coast	Young's Bay	Natural Origin	411	113	149	79	74	21	82	26	68	161	129	
		Hatchery Origin	86%	86%	86%	75%	84%	40%	22%	92%	61%	66%	47%	
	Big Creek	Natural Origin	98	435	112	219	225	212	360	792	279	160	409	
		Hatchery Origin	90%	40%	70%	36%	-	51%	15%	54%	30%	52%	21%	
	Clatskanie	Natural Origin	104	563	398	494	421	583	995	1,070	1,609	1,506	619	443
		Hatchery Origin	55%	0%	0%	1%	10%	48%	0%	15%	9%	3%	10%	
	Scappoose	Natural Origin	502	336	755	348	719	375	292	778	1,960	298	210	979
		Hatchery Origin	0%	10%	8%	0%	5%	0%	0%	0%	0%	0%	0%	
Cascade	Clackamas	Natural Origin	1,981	2,507	2,874	1,301	3,464	3,608	1,694	7,982	1,757	2,254	1,580	3,202
		Hatchery Origin	58%	10%	16%	28%	76%	14%	45%	27%	57%	10%	10%	
	Sandy	Natural Origin	382	1,348	1,213	856	923	687	1,277	1,493	901	3,494	1,165	667
		Hatchery Origin	57%	0%	9%	0%	0%	9%	0%	10%	12%	8%	3%	
Gorge	Lower Gorge	Natural Origin	338	-	-	263	226	126	223	468	920	216	96	152
		Hatchery Origin	17%	0	0	85%	70%	67%	46%	29%	7%	54%	56%	6%
	Upper Gorge/ Hood	Natural Origin	147	41	126	1,262	373	170	69	65	223	232	169	889
		Hatchery Origin	60%	-	-	45%	48%	45%	29%	0%	85%	69%	78%	44%

Table 7. Natural-origin and hatchery-origin spawning escapement for LCR coho populations in Washington (WDFW unpublished). For example, Mill Creek in 2010 had 859 natural-origin spawners and 12% hatchery spawners. To calculate hatchery-origin numbers multiply (859/(1-..12))-859 = 117 hatchery-origin spawners.

	Washington LCR Populations													
			2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Coast	Grays/Chinook	natural-origin									381	152	795	
		hatchery-origin									81%	97%	22%	
	Eloch/ Skam	natural-origin									880	851	505	
		hatchery-origin									73%	56%	29%	
	Mill Creek	natural-origin									859	576	207	
		hatchery-origin									12%	21%	2%	
	Abernathy	natural-origin									490	183	256	
		hatchery-origin									12%	21%	2%	
	Germany	natural-origin									322	48	122	
		hatchery-origin									12%	21%	2%	
Cascade	Lower Cowlitz	natural-origin									6,038	3,394		
		hatchery-origin									15%	8%		
	U. Cowlitz/Cispus	natural-origin	8,349	7,988	4,694	5,772	5,486	3,764	4,749	5,751	2,703	7,723	1,618	4
		hatchery-origin	74%	72%	86%	80%	82%	60%	74%	74%	88%	49%	60%	100%
	Tilton	natural-origin	1,732	601	722	1,332	738	827	1,006	1,305	929	2,025	1,301	2,744
		hatchery-origin	91%	92%	95%	85%	69%	66%	64%	70%	80%	75%	79%	67%
	SF Toutle	natural-origin									1,675	490	2,063	
		hatchery-origin									21%	22%	14%	
	NF Toutle	natural-origin									1,071	197	607	
		hatchery-origin									67%	20%	23%	
	Coweeman	natural-origin									3,613	2,436	2,964	
		hatchery-origin									10%	6%	5%	
	Kalama	natural-origin									5	106	69	
		hatchery-origin									99%	66%	78%	
	NF Lewis	natural-origin									705	620	928	
		hatchery-origin									1%	3%	11%	
	EF Lewis	natural-origin									1,367	1,025	3,681	
		hatchery-origin									32%	6.0%	9%	
	Salmon Creek	natural-origin										1,248	1,897	
		hatchery-origin										20%	22%	
	Washougal	natural-origin									879	562	531	
		hatchery-origin									44%	8%	13%	
Gorge	Lower Gorge	natural-origin				32	28				484	533	594	
		hatchery-origin				0%	0%				30%	13%	21%	
	Upper Gorge/White Salmon	natural-origin						152	86	71	35	111	96	106
		hatchery-origin												

Table 8. Estimated smolt production from monitored coho salmon streams in the LCR ESU. (Source: TAC 2008; WDFW wild coho forecast reports for Puget Sound, Washington Coast, and Lower Columbia River available at: http://wdfw.wa.gov/conservation/research/project/wild_coho).

Out-migrant Year	Mill	Abernathy	Germany	Grays	Tilton	Upper Cowlitz	Coweeman	Cedar[a]
1997	--	--	--	--	700	3,700	--	--
1998	--	--	--	--	16,700	110,000	--	38,400
1999	--	--	--	--	9,700	15,100	--	28,000
2000	--	--	--	--	23,500	106,900	--	20,300
2001	6,300	6,500	8,200	--	82,200	334,700	--	24,200
2002	8,200	5,400	4,300	---	11,900	166,800	--	35,000
2003	10,500	9,600	6,200	--	38,900	403,600	--	36,700
2004	5,700	6,400	5,100	--	36,100	396,200	--	37,000
2005	--	--	--	--	40,900	766,100	--	58,300
2006	6,700	4,400	2,300	--	33,600	370,000	--	46,000
2007	6,665	4,410	2,327	--	33,650	370,100	7,995	38,450
2008	7,044	3,282	2,342	--	34,190	277,400	8,784	29,340
2009	9,097	5,077	3,976	4,453	36,240	113,000	12,170	36,340
2010	6,283	3,761	2,576	2,377	40,640	123,800	12,290	61,140
2011	11,230	3,375	1,240	4,051	53,350	216,200	21,640	43,940
2012	8,563	5,520	3,535	2,182	55,950	33,739	23,261	60,778

[a] *Lewis River tributary*

Table 9 presents recent escapement information (2010-2012) compared to recovery abundance targets. Many populations are still below goal. But several are close to or above goal, and all are generally improved from NMFS' earlier assessments that concluded that the LCR coho populations were all extirpated or nearly so.

There is limited information available for the Gorge MPG populations. Table 6 provides estimates of escapement for tributaries on the Oregon side of the lower Gorge population, and Table 7 provides similar estimates for the Washington side tributaries. It is not clear how comprehensive the surveys are or if the estimates are intended to be expanded estimates for the population as a whole. On the Washington side, at least the estimates are characterized as cumulative fish per mile index counts. The information, although limited, indicates there are several hundred spawners in these tributaries that collectively make up the population and that hatchery fractions are actually relatively low. The sum of natural-origin escapement to the Lower Gorge tributaries (Table 6 and Table 7) is 948, which is half of the recovery abundance target (Table 9) and well above the critical abundance threshold of 300 set for primary populations.

Table 6 provides estimates of escapement for the Upper Gorge Oregon-side population but is limited to Hood River and does not include returns to other Oregon-side tributaries. Table 7 provides a limited set of information for the Upper Gorge Washington-side population but these estimates are limited to the Wind River. The Big White Salmon is the largest tributary on the Washington side of the Upper Gorge MPG. Condit Dam, formerly located at river mile 3 on the Big White Salmon, was completed in 1913. Condit Dam was built without fish passage and there was little or no suitable habitat in the lower river. As a result, coho in the Big White Salmon are considered extirpated. Condit Dam was taken out with removal completed in 2012, freeing up 21 miles of new habitat above the dam location. The recovery plan for the Big White Salmon calls for a period of passive reintroduction following dam removal, a process that is currently underway. Unfortunately, funding for spawning surveys has been limited and prioritized to look for Chinook. As a consequence, there is no recent information on coho abundance in the Big White Salmon.

Table 9. Recent (2010-2012) escapement average compared to recovery abundance targets.

MPG	Population	Recovery Abundance Target	Ave. Annual Unmarked Spawners 2010-2012	Recent Ave. as % of Escapement Goal
Coast	Grays/Chinook (WA)	2,400	438	18%
	Elochoman/Skamokawa (WA)	2,400	741	31%
	Clatskanie (OR)	3,201	1,246	39%
	Mill/Aber/Germ (WA)	1,800	1,022	57%
	Scappoose (OR)	3,208	806	25%
Cascade	Lower Cowlitz (WA)	3,700	4,725	128%
	Upper Cowlitz/Cispus (WA)	4,000	4,139	103%
	South Fork Toutle (WA)	1,900	1,446	76%
	North Fork Toutle (WA)	1,900	1,095	58%
	Coweeman (WA)	1,200	2,994	250%
	Kalama (WA)	500	37	7%
	North Fork Lewis (WA)	500	751	150%
	East Fork Lewis (WA)	2000	2,024	101%
	Clackamas (OR)	11,232	1,855	17%
	Sandy (OR)	5,685	1,859	33%
	Washougal (WA)	1,500	659	44%
Gorge	Lower Gorge (WA/OR)	1,900	948	50%

Spatial Structure and Diversity

The most recent summary of the status for LCR coho salmon populations for the VSP characteristics of persistence and spatial structure and diversity for Washington coho populations is shown in Table 10. The results are expressed as categorical scores and are based on data available only through 2006. The scores for spatial structure were generally in the intermediate categories. The scores for diversity were moderate to low risk for spatial structure and, in general, high risk from issues related to diversity (Table 10). However, scores in Table 10 do not reflect the most recent escapement data, which suggest either relative improvement for some populations or an improved assessment due to more and better information available, or both. Diversity scores for MAG (1), EF Lewis (2), and Coweeman (2) seem inconsistent with information in Table 7 and Table 8.

Table 10. Summary of current status for Lower Columbia River coho salmon populations in Washington for VSP characteristics expressed as a categorical score (LCFRB 2010).

Strata	State	Population	Persistence[1]	Spatial Structure[2]	Diversity[3]
Coast	WA	Grays	0	3	0
	WA	Elochoman	0	3	0
	WA	Mill/Abernathy/Germany	0	3	1
Cascade	WA	Lower Cowlitz	0	2	2
	WA	Upper Cowlitz	0	2	1
	WA	Cispus	0	2	1
	WA	Tilton	0	2	1
	WA	SF Toutle	0	3	2
	WA	NF Toutle	0	2	1
	WA	Coweeman	0	3	2
	WA	Kalama	0	3	2
	WA	NF Lewis	0	1	1
	WA	EF Lewis	0	3	2
	WA	Salmon	0	2	0
	WA	Washougal	0	3	1
Gorge	WA	Lower Gorge	0	2	0
	WA	Upper Gorge	0	2	0

[1] Persistence: 0 = extinct or very high risk of extinction (0-40% probability of persistence in 100 years); 1 = Relatively high risk of extinction (40-75% probability of persistence in 100 years); 2 = Moderate risk of extinction (75-95% probability of persistence in 100 years); 3 = Low (negligible) risk of extinction (95-99% probability of persistence in 100 years); 4 = Very low risk of extinction (>99% probability of persistence in 100 years)

[2] Spatial Structure: 0 = Inadequate to support a population at all (e.g., completely blocked); 1 = Adequate to support a population far below viable size (only small portion of historic range accessible); 2 = Adequate to support a moderate, but less than viable, population (majority of historical range accessible but fish are not using it); 3 = Adequate to support a viable population but sub criteria for dynamics or catastrophic risk are not met; 4 = Adequate to support a viable population (all historical areas accessible and used; key use areas broadly distributed among multiple reaches or tributaries)

[3] Diversity: 0 = functionally extirpated or consist primarily of stray hatchery fish; 1 = large fractions of non-local hatchery stocks; substantial shifts in life-history; 2 = Significant hatchery influence or periods of critically low escapement; 3 = Limited hatchery influence with stable life history patterns. No extended intervals of critically low escapements; rapid rebounds from periodic declines in numbers; 4 = Stable life history patterns, minimal hatchery influence, no extended intervals of critically low escapements, rapid rebounds from periodic declines in numbers.

Figure 4 shows the extinction risk ratings for all four VSP parameters, including spatial structure and diversity attributes, for Oregon populations (ODFW 2010). This figure was updated in 2010 using data available through 2008. The results indicate low to moderate extinction risk for spatial structure for most LCR coho salmon populations in Oregon but high diversity risk for all but two populations, the Sandy and Clackamas River populations. The assessments of spatial structure are combined with those of abundance and productivity to give an assessment of the overall status of LCR populations in Oregon. Extinction risk is rated as high or very high in overall status for all populations except the Scappoose and Clackamas river populations (Figure 4). Where updated ratings differ from those of McElhany et al. (2007) assessment the older rating is shown as an open diamond with a dashed outline.

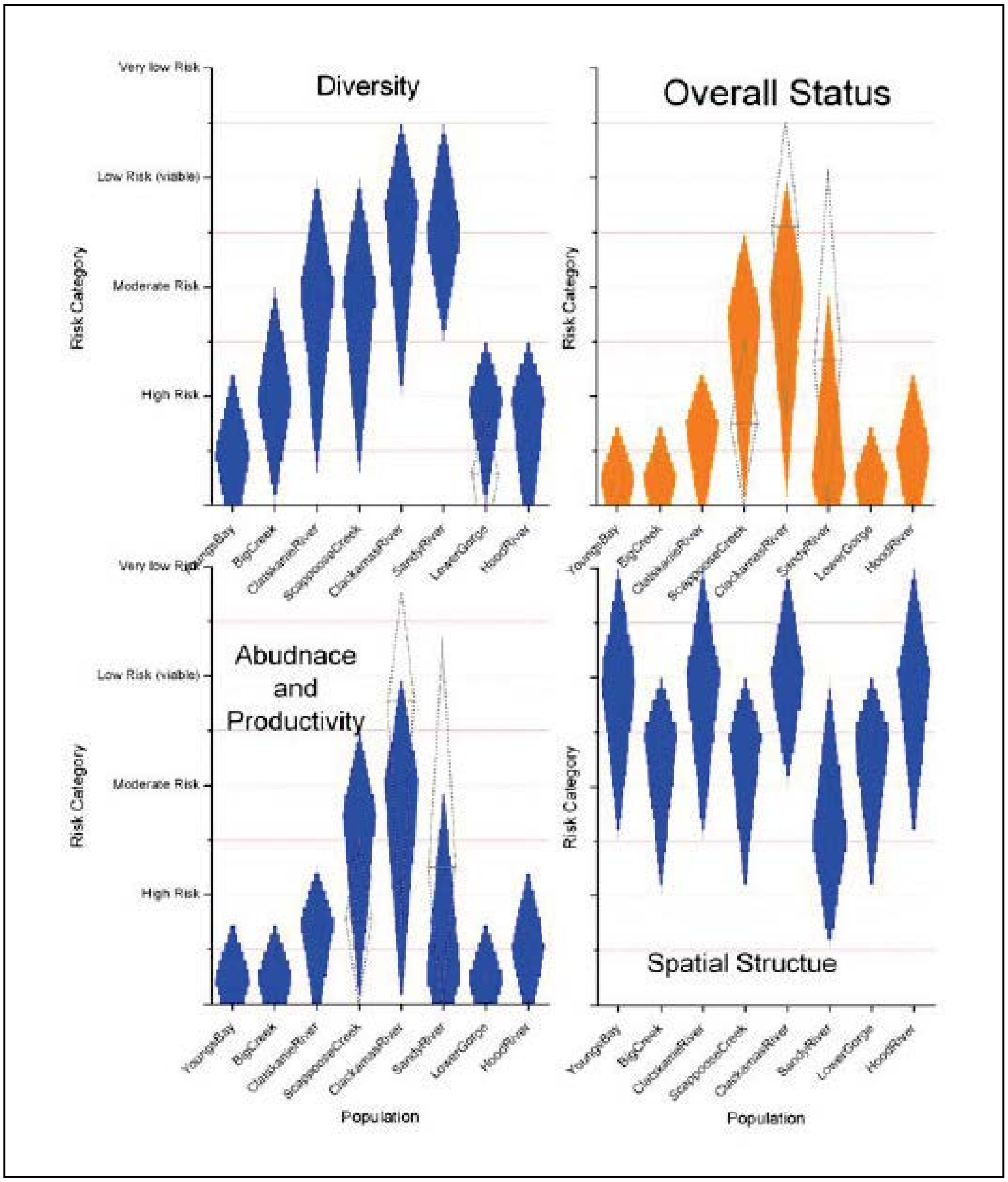


Figure 4. Extinction risk categories for LCR coho salmon populations in Oregon for the assessment attributes abundance/productivity, diversity, and spatial structure, as well as an overall rating for populations that combines the three attribute ratings (ODFW 2010).

The lack of data, as well as poor data quality, has made it difficult to assess spatial structure and diversity VSP attributes for LCR coho salmon. Low abundance, past hatchery stock transfers, other legacy hatchery effects, and hatchery straying may have reduced genetic diversity within and among coho salmon populations (LCFRB 2010; ODFW 2010). The low persistence probability and risk category for the majority of LCR coho salmon populations reported above is related to the loss of spatial structure and reduced diversity. Spatial structure of some coho salmon populations is constrained by migration barriers (i.e., tributary dams) and development of lowland areas (NMFS 2013a). Inadequate spawning survey coverage along with the presence until recently of unmarked hatchery-origin coho salmon mixing with natural-origin spawners, also has made it difficult to assess the spatial structure of natural-origin populations. The mass marking of hatchery fish and more extensive spawning surveys have provided better information regarding species status in recent years. A new status review is currently underway and should be completed by the end of 2015.

Limiting Factors

Understanding the limiting factors and threats that affect the LCR coho ESU provides important information and perspective regarding the status of a species. One of the necessary steps in recovery and consideration for delisting is to ensure that the underlying limiting factors and threats have been addressed. LCR coho salmon populations began to decline by the early 1900s because of habitat alterations and harvest rates that were unsustainable given these changing habitat conditions. Human impacts and limiting factors come from multiple sources including hydropower development on the Columbia River and its tributaries, habitat degradation, hatchery effects, fishery management and harvest decisions, and ecological factors including predation and environmental variability. The ESU-level recovery plan consolidates the information regarding limiting factors and threats for the LCR coho ESU available from various sources (NMFS 2013a).

The LCR recovery plan provides a detailed discussion of limiting factors and threats and describes strategies for addressing each of them. Chapter 4 of the recovery plan describes limiting factors on a regional scale and how they apply to the four listed species from the LCR considered in the plan (NMFS 2013a). Chapter 6 of the recovery plan discusses the limiting factors that pertain to LCR coho salmon in particular with details that apply to the major population groups in which they reside.

The discussion of limiting factors in Chapter 6 is organized to address:

- Tributary Habitat
- Estuary Habitat
- Hydropower
- Hatcheries
- Harvest
- Predation

Chapter 4 includes additional details on large scale issues including:

- Ecological Interactions

- Climate Change
- Human Population Growth

Harvest-related mortality is identified as a primary limiting factor for all populations within the ESU and occurs as a result of direct and incidental mortality of natural-origin fish in ocean fisheries, Columbia River recreational fisheries, and commercial gillnet fisheries. The LCR recovery plan envisions refinements in coho salmon harvest through (1) replacement or refinement of the existing harvest matrix to ensure that it adequately accounts for weaker components of the ESU, (2) continued use of mark-selective recreational fisheries, and (3) management of mainstem commercial fisheries to minimize impacts to natural-origin coho salmon (NMFS 2013a). In refining the harvest matrix, the objective is to ensure that harvest management is consistent with maintaining trajectories in populations where natural production is beginning to be observed (e.g., the Clatskanie and Scappoose), with the assumption that additional refinements will be evaluated as natural production is documented in additional populations. Managing coho salmon harvest to minimize impacts to natural-origin fish has been complicated by uncertainties regarding annual natural-origin spawner abundance and actual harvest impacts on natural-origin fish (in both ocean and mainstem Columbia fisheries). The recovery plans note these uncertainties and highlight the need for improved monitoring of harvest mortality and natural-origin spawner abundance (NMFS 2013a).

In terms of recommended harvest rates, the Oregon recovery plan (ODFW 2010) modeled a harvest rate of 25 percent as a long-term average under an abundance-based framework. The Washington recovery plan (LCFRB 2010) recommends a phased harvest strategy involving lower near-term rates to reduce population risks until habitat has improved. Modeling in the Washington recovery plan shows a scenario in which harvest rates would be managed for benchmarks of 8 to 25 percent throughout the first three of multiple 12-year evaluation periods (i.e., from 1999 through 2034). Then, the modeling shows that, assuming that benchmarks for habitat and other improvements have been met, harvest rates could rise (to 15 to 35 percent in the 2035 to 2046 period and to 20 to 50 percent thereafter) (LCFRB 2010). These modeling results were planning targets and not predictions of future harvest rates; managers will establish future harvest rates based on observed indicators in LCR coho salmon populations.

Past Harvest

Annual exploitation rates of LCR coho have been substantially reduced from very high historical levels as management has shifted from maximizing harvest of hatchery fish to protecting natural populations. The total exploitation rate on LCR coho generally ranged from ~ 60 to 90 plus percent from 1970 to 1993 when harvest impacts were first reduced to address conservation concerns. Since 1994 ocean fisheries have accounted for 62% of the LCR coho harvest mortality. Exploitation rates for ocean fisheries averaged 80% from 1970-1983, 49% from 1984-1993, 10% from 1994-2007, and 7% 2008-2014 (Table 11).

Table 11. Annual exploitation rates of Lower Columbia River coho salmon, 1970-2013.

Year[a]	Ocean Exploitation Rate	Inriver Exploitation Rate	Total Exploitation Rate	Allowable Exploitation Rate
1970	65%	28%	94%	NA
1971	83%	10%	92%	NA
1972	84%	9%	93%	NA
1973	82%	11%	93%	NA
1974	84%	9%	93%	NA
1975	81%	10%	92%	NA
1976	90%	6%	95%	NA
1977	89%	5%	94%	NA
1978	83%	8%	90%	NA
1979	79%	10%	89%	NA
1980	73%	25%	98%	NA
1981	81%	7%	88%	NA
1982	62%	21%	82%	NA
1983	79%	4%	83%	NA
1984	32%	27%	59%	NA
1985	43%	22%	66%	NA
1986	34%	40%	73%	NA
1987	60%	19%	79%	NA
1988	56%	20%	77%	NA
1989	55%	23%	78%	NA
1990	69%	8%	76%	NA
1991	45%	19%	65%	NA
1992	51%	9%	60%	NA
1993	42%	11%	53%	NA
1994	7%	4%	11%	NA
1995	12%	0%	12%	NA
1996	8%	4%	12%	NA
1997	12%	2%	14%	NA
1998	8%	0%	8%	NA
1999	9%	19%	28%	NA
2000	7%	18%	25%	NA
2001	7%	6%	13%	NA
2002	12%	2%	14%	NA
2003	14%	9%	23%	NA
2004	15%	9%	24%	NA
2005	11%	7%	18%	21%
2006	7%	7%	13%	15%
2007	12%	7%	19%	20%
2008	4%	4%	7%	8%
2009	11%	10%	21%	20%
2010	5%	8%	13%	15%
2011	6%	8%	13%	15%
2012	10%	4%	14%	15%
2013	10%	3%	13%	15%
2014	12.0%	5.3%	17.4%	22.5%

During recent years, total exploitation rates have been limited from 8 to 22.5% (Table 12). The average allowable exploitation rate over the last ten years was 16.6%. Post-season rates have averaged approximately 2% less than pre-season limits during this period (Table 12).

Table 12. Lower Columbia natural-origin adult coho conservation objectives and fishery impacts.[a]

Year	Objective	Pre-season	Post- season
2005	≤0.15	0.10	0.179
2006	≤0.15	0.10	0.146
2007	≤0.20	0.13	0.208
2008	≤0.08	0.08	0.073
2009	≤0.20	0.20	0.187
2010	≤0.15	0.15	0.107
2011	≤0.15	0.15	0.111
2012	≤0.15	0.15	0.140
2013	≤0.15	0.15	0.137
2014	≤0.225	0.225	0.174
Avg.		*0.144*	*0.146*

[a] *rates do not include Columbia River tributary fisheries.*

Table 13 provides LCR coho historic harvest information for coho in tribal fisheries in the Bonneville Pool section of Zone 6 of the Columbia River (area between Bonneville Dam and the Dalles Dam). Tribal fisheries in the Bonneville Pool may affect two of the three Gorge MPG populations – upper Gorge/Hood River and upper Gorge/White Salmon populations. Most of the effort in tribal fisheries in the Bonneville Pool occurs in late-September and October. The Upper Gorge/Hood River population is early timed so the fish begin entering the tributary by early September. As a consequence, they likely have mostly cleared the Bonneville Pool prior to the peak of the fall season tribal fisheries also are likely subject to little or none of the harvest in the pool. Upper Gorge/White Salmon population is late timed and is presumably present during the peak of the tribal fisheries. These harvest rates also apply to all of Bonneville Pool. The Big White Salmon and Hood River which mark the upstream boundary of the ESU which are located about midway in the pool. For the reasons stated above harvest rates shown in Table 13 likely overestimate the actual impact on the upper Gorge populations. With the preceding reservations the harvest rates for coho in the Bonneville Pool (catch in Bonneville Pool/runsize over Bonneville Dam) averaged 5.6% from 2008-2014.

Columbia River tributary fisheries are not included in the harvest matrix. Tributary fisheries generally are mark-selective sport terminal fisheries that are population specific, managed by the states, and implemented to target surplus hatchery fish. Some populations are subject to these additional terminal fishery impacts and others are not. Additional impacts to the Coast and Cascade MPG populations range from 0 to 5%.

Table 13. Harvest rate of for LCR coho in tribal Zone 6 fisheries (Ellis 2015).

Year	Harvest Rate
2001	1.37%
2002	0.76%
2003	0.59%
2004	2.37%
2005	2.16%
2006	2.98%
2007	3.33%
2008	7.75%
2009	2.96%
2010	4.67%
2011	8.87%
2012	3.75%
2013	5.18%
2014	5.65%

*define HR

2.2.2. Current Rangewide Status of Critical Habitat

On Monday, January 10, 2011, NMFS announced an *Advance Notice of Proposed Rulemaking* for designation of critical habitat for the LCR coho salmon ESU and the Puget Sound Steelhead DPS in the *Federal Register*. On Monday, January 14, 2013, NMFS announced a proposed rulemaking to designate critical habitat for the LCR coho salmon ESU and the Puget Sound Steelhead DPS. The specific areas proposed for designation for LCR coho salmon include approximately 2,288 miles (3,681 kilometers) of freshwater and estuarine habitat in Oregon and Washington (FR 28 2726, January 14, 2013); the comment period closed on April 15, 2013. The final rule has not been issued.

The designated critical habitat for the LCR coho ESU does not include offshore marine areas of the Pacific Ocean and therefore does not overlap with the action area. The areas designated are all occupied and contain physical and biological features essential to the conservation of the species and that may require special management considerations or protection. No unoccupied areas were identified that are considered essential for the conservation of the species, but several areas above Condit Dam on the White Salmon River may warrant consideration in the future. There are 55 watersheds within the range of LCR coho ESU. Three watersheds received a low conservation value rating, 18 received a medium rating, and 34 received a high rating (NMFS 2013a). The lower Columbia River rearing/migration corridor downstream of the spawning range is considered to have a high conservation value.

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 following environmental baseline section refers to the historical and current effects under the environmental baseline. However, by definition, the proposed action is not part of the environmental baseline, therefore no effects on coho from future PFMC salmon fisheries are assumed or implied in the baseline.

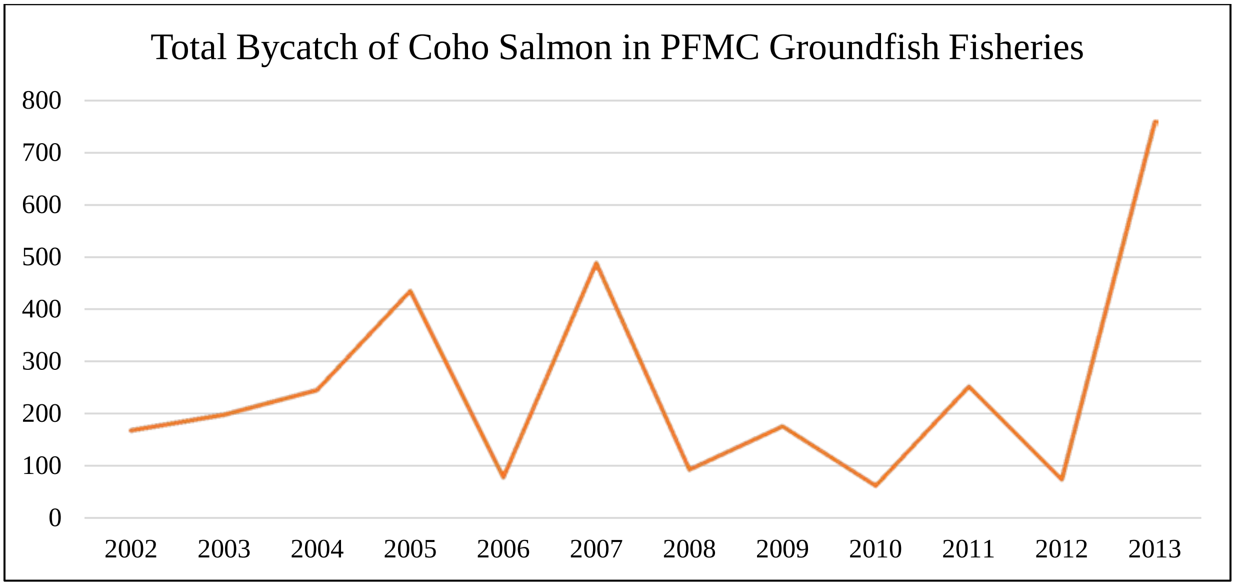
As described in section 1.2, the action area comprises the offshore and near shore marine areas in the EEZ, and the coastal and inland marine waters of the states of Washington, Oregon and California which may be indirectly affected by the federal action (Figure 1). The discussion of activities under the environmental baseline that affect the LCR coho ESU focuses on salmon and groundfish fisheries in the action area. We are not aware of other activities in the action area that have significant effects on the ESUs in question.

2.3.1 Harvest Actions

2.3.1.1 Groundfish Fisheries

The PFMC also manages groundfish fisheries off the West Coast under their Groundfish FMP. NMFS completed a supplemental biological opinion on the groundfish FMP in 2006 with particular attention to the whiting fishery and limited entry trawl fisheries. NMFS has recently reinitiated consultation to consider new information related to the effects of the groundfish fishery on listed salmonids.

The total bycatch of all coho (listed and non-listed fish) in the whiting fishery has averaged 250 fish per year coast-wide since 1991. More recent information on the bycatch of coho salmon for 2002 to 2013 is provided in Somers et al. (2015). The bycatch of coho salmon in the non-hake sectors of the fishery ranged from 11 to 630 between 2002 and 2013, and averaged 99 fish per year. In the fishery directed at Pacific hake the bycatch of coho ranged from 31-478 and averaged 168 fish per year.



The coho that are caught in the fishery are a mix of all hatchery and natural origin stocks from primarily the Washington and Oregon coast, the Columbia River, and Puget Sound with some additional contribution from California and Canada. LCR coho are caught in the fishery likely in the amount of a few tens of fish per year including both hatchery and natural origin fish belonging to the LCR coho ESU (Somers et al. 2015). For comparison the abundance of hatchery and natural-origin LCR coho over the last nine years averaged about 570,000 and 28,000 respectively.

2.3.1.2 PFMC Salmon Fisheries

PFMC salmon fisheries in 2015 and beyond are the subject of this opinion, so they are not included in the environmental baseline. However, historical PFMC salmon fisheries have contributed to the current status of LCR coho in the action area and are therefore considered here.

In general, annual exploitation rates of LCR coho have been substantially reduced from very high historical levels as management has shifted from maximizing harvest of hatchery fish to protecting natural populations. The total exploitation rate on LCR coho generally ranged from ~ 60 to 90 plus percent from 1970 to 1993, when harvest impacts were first reduced to address conservation concerns. Since 1994, ocean fisheries have accounted for 62% of the LCR coho harvest mortality. Exploitation rates for ocean fisheries averaged 80% from 1970-1983, 49% from 1984-1993, 10% from 1994-2007, and 7% 2008-2014 (Table 11).

During recent years, total exploitation rates have been limited from 8 to 22.5% (Table 12). Total exploitation rate has been limited to 15% or less in seven of the last ten years. Post-season rates have averaged approximately 1% less than pre-season limits during this period (Table 12).

2.3.1.3 Treaty Indian Fisheries

Treaty Indian fisheries occur in the action area and are accounted for in the Salmon FMP and during the annual preseason planning process. Implementation of treaty Indian fishing rights involves, among other things, application of the sharing principles of *United States v. Washington* and *United States v. Oregon*, annual calculation of allowable harvest levels and exploitation rates, the application of the "conservation necessity principle" articulated in United States v. Washington to the regulation of treaty Indian fisheries, and an understanding of the interaction between treaty rights and the ESA on non-treaty allocations. Exploitation rate calculations, in turn, are dependent upon various biological parameters, including marine survival and seeding levels. The treaty fishing right itself exists and must be accounted for in the environmental baseline, although the precise quantification of treaty Indian fishing rights during a particular fishing season cannot be established by a rigid formula.

2.4 Effects on the species

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 Effects on the species

Salmon fisheries may affect LCR coho salmon in several ways that have bearing on the likelihood of continued survival and recovery of the species. Immediate mortality occurs from the capture, by hook or net, and subsequent retention of individual fish - those direct effects are considered explicitly in the following subsection of this opinion.

In addition, other effects occur when fish that are caught and released alive to comply with non-retention requirements that may be related to species or size limits are injured or subsequently die. Non-retention regulations are also sometimes used in mark-selective fisheries that target marked hatchery-origin fish for retention while requiring the release of unmarked fish. These effects are accounted for in the review of fishery management actions, as catch-and-release mortalities primarily result from implementation of management regulations designed to reduce mortalities to listed natural-origin fish through live release.

The catch-and-release mortality rate varies for different gear types, different species, and different fishing conditions, and those values are often not well known. Catch-and-release mortality rates have been estimated from available data and applied by the PFMC Salmon Technical Team (STT) and co-managers in the calculation of impacts to listed fish evaluated in this consultation. The STT applies a 14.0 to 26.0 percent incidental mortality rate to coho salmon caught and released during recreational fishing and ocean troll activities in PFMC fisheries, depending on the area caught and the age of the fish.

The STT also applies an incidental mortality rate to coho salmon that encounter the gear but drop off the gear before they can be handled by the fishermen. This drop off or 'other' mortality is estimated as 5 percent of total encounters for commercial troll and recreational gear (MEW 2006). Estimates of catch-and-release mortality are combined with landed catch estimates when reporting the expected total mortality, and so are also specifically accounted for in this opinion.

The action as defined in Section 1.3. In simple terms, the proposed action is the management of PFMC salmon fisheries under the new harvest matrix for LCR coho (Table 14) starting in 2015.

As described in the Section 1.3, effects also occur in marine waters off the Washington, Oregon, and California coast that are inside the EEZ (zero to three miles offshore). The harvest that occurs in these state marine area fisheries are specifically included in the overall assessment of the impacts of PFMC salmon fisheries that are reported as part of the overall impact in the PFMC's preseason and postseason reporting documents (e.g., PFMC 2014c; PFMC 2015) and relied on for assessing impacts in this consultation. Similarly, effects also occur in mainstem Columbia River fisheries up to Bonneville Dam. Assessments of the impacts of mainstem fisheries relative to the effects of the new harvest matrix as a whole are also reported as part of the overall impact in the PFMC's preseason and postseason reporting documents cited above. Past harvest for mainstem Columbia River fisheries up to Bonneville Dam are considered in the Species Status section of this opinion.

The Workgroup's risk assessment report addresses one of the topics that NMFS indicated needed to be considered prior to reinitiating consultation (Dygert 2011). The risk assessment uses additional and up-to-date information relative to population status (Beamesderfer et al. 2014). The analysis of effects that follows incorporates parts of this report in support of our analysis of effects.

The frequency of year-specific exploitation rates modeled into the future is shown in Table 14. The frequencies are based on projections of marine survival rates. For example, the expected frequency of 30 % exploitation rate is only 1 percent (Table 14). Fisheries are expected to be managed between 15% and 23% exploitation rates 88 percent of the time, with an expected average exploitation rate of 18%.

Table 14. Frequency of expected exploitation rates modeled into the future using the harvest matrix.

	Marine Survival Index				
	Very Low ≤0.06%	Low ≤0.078%	Medium ≤0.174%	High ≤0.40%	Very High >0.40%
Exploitation rate	10%	15%	18%	23%	30%
(Frequency of occurrence)	*(10%)*	*(12%)*	*(55%)*	*(21%)*	*(1%)*
Coho ocean abundance (thousands)	*< 300*	*300-400*	*400-700*	*700-1,600*	*>1,600*

Population Risk Assessment: The Workgroup developed a model to perform a risk assessment using the same methodology developed by ODFW and WDFW for LCR coho in 2013 (Beamesderfer et al. 2014). The risk assessment model is also an adaptation of the LCR tule fall Chinook risk model (Beamesderfer et al. 2014). The risk assessment model analyzes effects of fishing on population status using a stochastic stock-recruitment model in a Population Viability Analysis (PVA) framework similar to that employed in salmon ESA status assessments and recovery plans. Spawner-recruit functions and full seeding levels were developed for all populations included in the analysis. Methods for estimating spawner-recruit functions and seeding levels varied among populations, depending on available data and the specifics of the Washington and Oregon recovery plans.

The Workgroup's risk assessment analysis incorporates the more recent and new information into the analytical framework to evaluate the new harvest matrix for LCR coho salmon (Beamesderfer et al. 2014). The more recent data and data for an additional eight populations (compared to what was used to evaluate effects of the previous matrix) now provides an empirical basis for assessing ten populations of the ESU instead of just two (Sandy and Clackamas) that were used in the previous analysis. The additional eight populations and new and more precise status information for these ten populations used in the Workgroup's analysis were not included in prior risk assessments or Status Reports. The Workgroup's risk assessment was based on effects on primary populations, representative of two of the three MPGs of the LCR coho salmon ESU. The ten primary populations used in this analysis were: Clatskanie, Scappoose, Elochoman/Skamakowa, Grays/Chinook (Coast Strata), and Clackamas, Sandy, Lower Cowlitz, Toutle, Coweeman, and East Fork Lewis (Cascade strata). Primary populations listed in Table 5 are a subset of populations targeted for high levels of viability based VSP parameters. All of the primary populations in the Coastal MPG and six of nine primary populations in the Cascade MPG are included in the analysis. There was limited data available for Gorge MPG populations and these were not included directly in the analysis.

Viability risks associated with the proposed matrix were calculated with the model for each of the ten selected primary populations. The Workgroup compared effects of the proposed matrix on LCR coho risk based on: 1) median risk value for all ten populations, and 2) average risk value for the five weakest and most sensitive populations among those evaluated. The five weakest populations were included to provide a precautionary assessment of fishery-related risks. These weaker populations were at the greatest absolute risk even with zero fisheries effects modeled in the analysis and the most sensitive to changes in exploitation rates.

Population risk sensitivity to fishing

Table 15 present risk values with increasing exploitation rates for the ten primary populations used in the Workgroup's risk assessment report (Beamesderfer et al. 2014). Risk estimates are intended to provide a measure of relative risk and should not be interpreted as extinction risk. Risk in this context is defined specifically as the frequency of model simulations where wild spawning escapement falls below critical levels during three successive years over a 20-year period. Critical levels are defined as 300 for all primary populations. Table 16 presents two risk values with increasing exploitation rates: the median value for all ten populations and the average value for the five weakest and most sensitive populations (Beamesderfer et al. 2014). Using fixed exploitation rates as indicators simplifies the analysis and still allows for an evaluation of the change in relative risk of a variable harvest rate strategy using the average as an indicator. The results can therefore be used to compare the change in risk associated with an increase in average exploitation rate from 0% to 16%, from 16% to 18% and so forth.

Table 15. Risk values for the ten populations used in the Workgroup's risk assessment report (Beamesderfer, 2014).

	ER	Clatskanie	Scappoose	Eloch	Grays	Clackamas	Sandy	L Cowlitz	Toutle	Coweeman	EF Lewis
% <CRT (20y)	0	0.0%	0.0%	19.1%	68.1%	0.0%	1.1%	1.7%	0.9%	2.1%	48.3%
	0.1	0.0%	0.3%	23.5%	73.2%	0.0%	3.8%	2.8%	1.6%	3.8%	58.2%
	0.2	0.0%	1.7%	29.9%	78.2%	0.0%	11.4%	5.0%	2.5%	6.8%	68.9%
	0.3	0.0%	9.3%	39.8%	83.0%	0.0%	31.7%	8.0%	4.5%	10.7%	78.9%
	0.4	0.0%	31.2%	49.7%	87.6%	0.0%	60.3%	14.1%	7.7%	18.8%	88.8%
	0.5	0.0%	65.8%	62.1%	93.4%	1.7%	88.7%	26.3%	15.2%	31.4%	95.7%
	0.6	0.2%	92.4%	79.9%	97.3%	48.1%	98.6%	48.1%	29.9%	55.5%	99.0%
	0.7	20.7%	99.6%	93.7%	99.5%	98.2%	99.8%	76.4%	56.2%	81.3%	99.8%
	0.8	96.8%	100.0%	99.4%	100.0%	100.0%	100.0%	95.6%	86.8%	97.2%	100.0%

Table 16. Risk estimates for the median and average of the five weakest populations associated with increasing exploitation rates (Beamesderfer et al. 2014).

	ER	**Median**	**Avg 5 weakest**
% <CRT (20y)	0	0.014	0.273
	0.1	0.033	0.318
	0.2	0.059	0.380
	0.3	0.100	0.485
	0.4	0.250	0.635
	0.5	0.467	0.811
	0.6	0.677	0.934
	0.7	0.959	0.985
	0.8	0.997	0.999

Sensitivity of individual populations can be greater, particularly among the smaller, less-productive populations evaluated (Table 15). For example, at 0% exploitation rate, Clatskanie, Scappoose, and Clackamas have 0% probability of falling below Critical Threshold (CRT) during three successive years over a 20-year period. At 0% exploitation rate the Sandy, Cowlitz, Toutle, and Coweeman have less than 2% probability of falling below Critical Threshold (CRT). The respective risk for East Fork Lewis is 48%, and for Grays is 68% even without any harvest. At 10% exploitation rate, the risk values increase by some margin compared to zero harvest. For

Scappoose, the risk goes from 0% to 0.3%, and from 68% to 73% for Grays. For the Lower Cowlitz, the risk goes from 1.7% to 2.8%. Compared to zero harvest, a 10% exploitation rate increases the risk for most populations but the risk is not significantly larger. Even at 30% exploitation rate, the risk of falling below critical threshold (CRT) during three successive years over a 20-year period is less than 11% for six of the ten populations (Clatskanie, Scappoose, Clackamas, L Cowlitz, Toutle, and Coweeman).

The 2005-2014 average total exploitation rate for LCR coho ESU was 16% (Table 11). The Proposed Action can also be understood as a small increase in the allowed average exploitation rate from a long-term average of 16% based on the "old" harvest matrix to a long-term average looking into the future of 18%, based on the "new" matrix. The risk metrics for the "old" matrix and the "new" matrix can be interpolated from the results in Table 15 and Table 16.

The median risk associated with no harvest is 0.014 (Table 16). Again, by interpolation, the median risk estimate associated with an exploitation rate of 16% is 0.049; the risk associated with an average exploitation rate of 18% is 0.051.

The risk of falling below CRT during three successive years over a 20-year period for the five weakest and most sensitive populations modeled can be also be interpolated from Table 16 or calculated by $Y=0.2704e^{1.6459x}$ (Figure 5). At an exploitation rate of 0, the risks is 27.3%. At exploitation rates of 16% and 18%, the risk estimates are 35.2% and 36.4% respectively. These populations are at higher risk because escapement is lower relative to the critical threshold and therefore more likely to fall below the risk criterion. Absent population specific estimates, we assume that the Gorge MPG populations are best represented by the risk metrics for the average of the five weakest populations.

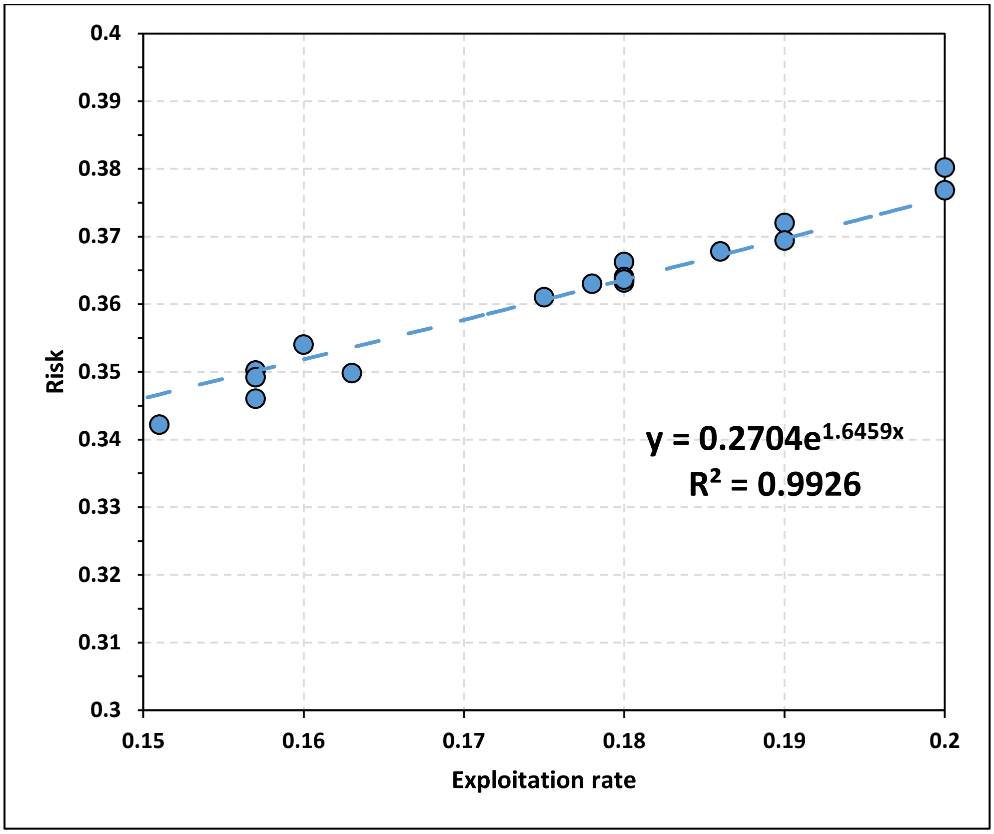


Figure 5. Relationship of effective exploitation rate and average risk for the 5 highest risk and most sensitive model populations.

Populations identified as stabilizing or contributing in the recovery plans (Table 5) were not modeled in the Workgroup report. However, it can be assumed that the status of these stabilizing or contributing populations is showing similar improvement trends as the ten primary populations included in the analysis, and that exploitation rates in the range of the proposed action will allow these populations to survive and recover continue to progress toward their respective recovery objectives.

2.4.2 Effects of the Actions on Critical Habitat

The designated critical habitat for the LCR coho ESU does not include offshore marine areas of the Pacific Ocean and therefore does not overlap with the action area. The activities considered in this consultation will therefore not result in the destruction or adverse modification of any of the essential features of designated critical habitat for the LCR coho ESU.

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. For the purpose of this analysis, the action area for PFMC Fisheries is the U.S. West Coast EEZ (which is directly affected by the proposed federal action) and the marine waters, other than internal, of the states of Washington, Oregon, and California.

Future tribal, state, and local government actions will likely be in the form of legislation, administrative rules, or policy initiatives and fishing permits. Activities in the action area are primarily those conducted under state, tribal or federal government management. These actions may include changes in ocean policy and increases and decreases in the types of activities currently seen in the action area, including changes in the types of fishing activities, resource extraction, and designation of marine protected areas, any of which could impact listed species or their habitat. Government actions are subject to political, legislative and fiscal uncertainties. These realities, added to geographic scope of the action area which encompasses several government entities exercising various authorities, and the changing economies of the region, make any analysis of cumulative effects difficult and, frankly, speculative. Although state, tribal and local governments have developed plans and initiatives to benefit listed fish, they must be applied and sustained in a comprehensive way before NMFS can consider them "reasonably foreseeable" in its analysis of cumulative effects. However, for the purpose of this analysis, NMFS assumes that effects of future tribal, state or private activities in the action area will have a neutral or positive effect for the duration of this opinion

Future tribal, state, and local government actions in the action area of the types described above are not likely to have an effect on climate change. However, if climate chance reduces ocean productivity or seeding levels, it may require tribes, states, and local governments to consider actions to mitigate climate change effects.

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.

As discussed in Section 2.4.3, the proposed actions will have no effect on designated critical habitat for LCR coho salmon, so this section summarizes the information relevant to NMFS' jeopardy determination. This ESU has 24 historical populations among three MPGs (Table 5). Therefore, in reaching a decision at the ESU level, NMFS must first review the direct and indirect effects of the action, when added to the environmental baseline and cumulative effects, on the three MPGs and their component populations and then use that information to support a conclusion for the entire ESU.

Consideration of the effects of the proposed actions requires an understanding of the scope of the ongoing review of information related to status of the ESU, and of reform and recovery related activities. The jeopardy determination is made in the context of a comprehensive recovery strategy that has been articulated through recovery planning and is described in NMFS' LCR recovery plan (NMFS 2013a), and the continuing development of new information over the last several years.

The proposed harvest matrix (Table 14) accounts for all harvest mortality in ocean and mainstem Columbia River up to Bonneville Dam. PFMC fisheries account for part of the ocean harvest mortality and are managed subject to the total exploitation rate limit while accounting for other ocean and inriver fishery impacts. The conclusions in this opinion therefore focus on the overall effects of implementing the proposed harvest matrix. The proposed action allows for a small increase relative to what has been in place under the 2008 Biological Opinion (NMFS 2008a). This increase can be characterized by comparing the observed 2008-2014 average exploitation rate of 16% with the expected long-term average under the proposed action of 18%.

Our perception of the status of LCR coho has changed over time partly as a result of improving information but also due to real improvements in status. Assessments for the LCR coho ESU since the 1990's indicate improved status with each successive report. LCR coho were considered extirpated in the 1996 and were not listed, however the 2005 status review concluded that Clackamas and Sandy populations at least did have appreciable natural production and that LCR coho ESU had enough of its legacy to warrant protection under the ESA (Good et al. 2005). In the 2011 Status Review, Ford (2011) concluded that 21 of the 24 populations of the ESU were at very high risk. The remaining three (Sandy, Clackamas, and Scappoose) were considered at high to moderate risk. The most recent status review (Ford 2011) and recovery plan (NMFS 2013a) used status information available only through to 2008.

New information suggests an improvement in status for many of the LCR coho populations relative to the latest status report (Ford 2011). The new information indicates that the proportion of hatchery-origin fish in the spawning grounds in the Coast and Cascade MPGs are quite low in the Sandy, Clatskanie, Scappoose, Mill Creek, Abernathy, Germany, Lower Cowlitz, Coweeman, East Fork Lewis and that these in fact may be self-sustaining (Table 15 and Table 16). Smolt production shown in Table 8 for several Washington populations coupled with the low hatchery fractions provides further evidence that these populations may be self-sustaining. According to Table 6 and Table 7, all three populations of the Gorge MPG have some level of natural production. Escapement estimates for the lower Gorge population in particular show low hatchery fractions and abundance that is about half of the recovery target. Average annual natural-origin spawners for 2010-2012 in Table 9 also offer a better assessment for all MPGs and the ESU as a whole compared to previous status reviews up to 2011 (Ford 2011). Several populations are near or above recovery abundance targets for natural-origin fish (Table 9).

Existing recovery plans provide comprehensive all-H strategies for survival and recovery (LCFRB 2010; ODFW 2010; NMFS 2013a). Harvest and hatcheries were identified as key limiting factors for the LCR coho ESU. Harvest has been reduced from exploitation rates of 90% and higher to what is now a proposed long-term average of 18%. Hatchery production for LCR coho has been reduced from 30-40 million smolts to 10 million smolts currently. Hatchery reductions and other reforms specifically designed to reduce the effects of straying are also consistent with the hatchery provisions of the recovery plans in particular and overall recovery strategy in general (LCFRB 2010; ODFW 2010; NMFS 2013a).

The abundance-based approach and the structure of the proposed harvest matrix is consistent with the harvest provisions of the LCR recovery plan (NMFS 2013a). The recovery plan envisions refinements of the existing harvest matrix to ensure that it adequately accounts for weaker components of the ESU, and that harvest management is consistent with maintaining the improvement trajectories in populations where natural production is beginning to be observed. Using average exploitation rates as an indicator simplifies the analysis and still allows for an evaluation of the change in relative risk of a variable harvest rate matrix. The results can therefore be used to compare the increase in risk associated changes in harvest from 0% to 16% or from 16% to 18%. The recovery scenario considered in the Oregon recovery plan (ODFW 2010) modeled a harvest rate with a long-term average of 25% under an abundance-based framework. The Washington management unit plan recommended a phased harvest strategy with a near term benchmark for harvest that ranged from of 8% to 25% to reduce population risks until habitat has improved. The proposed 18% average exploitation rate that will range from 10 to 30% is more conservative than what was modeled in the Oregon Recovery Plan (ODFW 2010) and very close to what was anticipated in the Washington Recovery Plan (LCFRB 2010).

In simple terms, the proposed action will result in a reduction in natural origin spawners by an average of 18% compared to no harvest. Year-specific exploitation rates will fall between 10% and 30% depending on marine survival but will most often be between 15% and 23% (Table 14). The Workgroup’s risk assessment helps quantify the relative risk to ten indicator populations (Beamesderfer et al. 2014). It is important to emphasize that these are not measures of absolute risk. “Risk” is the probability of a population falling below the critical level (300 spawners for primary populations) in three consecutive years in a 20 year period. Therefore, “risk” as defined in the Workgroup’s risk assessment report should not be equated with risk of extinction.

The status of LCR coho ESU has improved significantly as a result of the current management framework in combination with other factors affecting the species’ status. The question is whether the positive trend in survival and towards recovery will continue with a moderate increase in harvest. Table 15 and Table 16 suggest that an increase from 16% and 18% would not appreciably change the risk values for any of the populations analyzed or alter the trajectory towards survival and recovery.

Coast and Cascade MPGs

Ten out of the thirteen populations for these two MPGs that are identified as primary populations are specifically included in the Workgroup's risk assessment. These ten primary populations are: Clatskanie, Scappoose, Elochoman/Skamakowa, Grays/Chinook (Coast MPG), and Clackamas, Sandy, Lower Cowlitz, Toutle, Coweeman, and East Fork Lewis (Cascade MPG).

For the Coast and Cascade MPGs, risk values associated with step increases in exploitation rate appear relatively insensitive to fishing within the 10% to 30% range of exploitation rates for many populations and for median value for all of the indicator populations (Table 16). Smaller, less-productive populations were more sensitive (Table 15 and 16).

For example, at 0% exploitation rate, stronger populations have 0% probability of falling below Critical Threshold (CRT) in 20 years. The respective probability for the weakest populations even with no harvest, EF Lewis and Grays, are 48.3% and 68.1%, respectively. At 10% exploitation rate, the risk values increase by some margin compared to zero harvest for all populations. For Scappoose and L. Cowlitz (strong populations), the risk goes from 0% to 0.3% and from 1.7% to 2.8%, respectively. For EF Lewis and Grays (weak populations) the risk goes from 48.3 to 58.2% and from 68.1% to 73.2%, respectively. Therefore, compared to zero harvest rate, 10% harvest rate increases the risk for all populations but the risk is not significantly larger. Even an average 30% exploitation rate, the risk is less than 11% for six of the ten populations (Clatskanie, Scappoose, Clackamas, L Cowlitz, Toutle, and Coweeman).

The 2005-2014 average total exploitation rate for LCR coho ESU was 16% (Table 11). The proposed action can be characterized as a small increase in the allowed average exploitation rate from a long-term average of 16% based on the "old" harvest matrix to a long-term average looking into the future of 18%, based on the "new" matrix. The risk metrics for the "old" matrix and the "new" matrix can be interpolated from the results in Table 15 and Table 16. The median risk for the ten indicator populations associated with no harvest is 0.014. The median risk estimate associated with an exploitation rate of 16% is 0.049; the risk associated with an average exploitation rate of 18% is 0.051.

The risk of falling below Critical Threshold (CRT) during three successive years over a 20-year period for the five weakest and most sensitive populations modeled can be also be interpolated from Table 16 or calculated by $Y=0.2704e^{1.6459x}$ (Figure 5). At an exploitation rate of 0 the risks is 27.3%. At exploitation rates of 16% and 18% the risk estimates are 35.2% and 36.4% respectively. These populations are at higher risk because escapement is lower relative to the critical threshold and therefore more likely to fall below the risk criterion. Absent population specific estimates we assume that the Gorge MPG populations are best represented by the risk metrics for the average of the five weakest populations.

Reductions in harvest rates, in combination with reductions in hatchery releases, habitat improvement and other all-H benefits, have contributed to improved status and prospects for the survival and recovery of Coast MPG and Cascade MPG populations of the LCR coho ESU as evidenced by the apparent improvement in status since the last status review (Ford 2011). In particular, the harvest matrix that has been in place since 2008 (with an average exploitation rate of 16%) appears to be consistent with maintaining and even increasing recovery trajectories for LCR coho populations (Table 6 and 7). Increased numbers of natural-origin spawners and decreased fractions hatchery spawners for most Coast MPG and Cascade MPG populations are consistent with the notion that fishery management actions taken up to 2014 have contributed to and not impeded progress towards survival and recovery of most if not all the populations in these two MPGs. Table 15 suggests that an increase from 16% and 18% would not appreciably change the risk values for any of the populations analyzed. WDFW and ODFW will continue to collect status information for all LCR coho populations. NMFS expects to review information related to status and other indicators after three years and periodically thereafter to confirm our assessment that the implementation of the new harvest matrix or other factors are not reversing the positive trends recently observed for these populations.

Gorge MPG

The Gorge MPG has three populations. The Lower Gorge population includes several small tributaries located on the Washington and Oregon side below Bonneville Dam. There are two populations in the Upper Gorge. On the Washington side the Upper Gorge population includes fish returning to the Big White Salmon, Little White Salmon and Wind rivers, and Spring Creek. On the Oregon side the Upper Gorge population includes Hood River and several small tributaries (McElhany et al. 2006).

There is less information available for the Gorge MPG populations. Tables 6 and 7 provide estimates of escapement for Oregon and Washington tributaries that make up the Lower Gorge population. It is not clear how comprehensive the surveys are or if the estimates are intended to represent all escapement. In Washington at least the numbers are characterized as estimates for index areas which suggest that they are incomplete. The information, although limited, indicates there are a several hundred spawners in these tributaries that collectively make up the population and that hatchery fractions are relatively low. The sum of natural-origin escapement to the Lower Gorge tributaries (Table 6 and Table 7) is 948 which is half of the recovery abundance target (Table 9) and well above the critical abundance threshold of 300 set for primary populations.

Table 6 provides estimates of escapement for the Upper Gorge Oregon-side population but is limited to Hood River and does not include returns to other Oregon-side tributaries. Table 7 provides a limited set of information for the Upper Gorge Washington-side population but these estimates are limited to the Wind River. The Big White Salmon is the largest tributary on the Washington side of the Upper Gorge MPG. Coho in the Big White Salmon were extirpated by Condit Dam that was built in 1913. Condit Dam was removed in 2012 freeing up 21 miles of new habitat above the dam location. The recovery plan for the Big White Salmon calls for a period of passive reintroduction following dam removal, a process that is currently underway. Unfortunately funding for spawning surveys has been limited and prioritized to look for Chinook. As a consequence, there is no recent information on coho abundance in the Big White Salmon.

The two Upper Gorge populations are subject to some additional harvest in Zone 6 fisheries above Bonneville Dam. Table 13 provides LCR coho harvest information for coho in tribal fisheries in the Bonneville Pool section of Zone 6 of the Columbia River (area between Bonneville Dam and The Dalles Dam). The harvest rates for coho in the Bonneville Pool (catch in Bonneville Pool/runsize over Bonneville Dam) averaged 5.6% from 2008-2014. However, these likely overestimate the impacts that actually occured. The Upper Gorge/Hood River population is early timed so the fish begin entering the tributaries by early September. As a consequence, the Oregon side population has likely largely cleared the Bonneville Pool prior to the peak of the fall season tribal coho fisheries and so are likely subject to relatively little of the harvest in Bonneville Pool. Upper Gorge/White Salmon population is late timed and is presumably present during the peak of the tribal fisheries. However, the harvest rates shown in Table 13 apply to all of Bonneville Pool. The Big White Salmon and Hood River mark the upstream boundary of the ESU and are located about midway in the pool. For these reasons harvest rates shown in Table 13 likely overestimate the actual impact to the Upper Gorge populations.

The risk assessment was not applied to the Gorge MPG populations directly because of the limited data. Instead the risk assessment for the five weakest populations is used as a surrogate. The risk of falling below Critical Threshold levels during three successive years over a 20-year period for the five weakest can be estimated by interpolation from Table 16 or calculated by $Y=0.2704e^{1.6459}$ (Figure 5). At an exploitation rate of 0 the risks is 27.3%. At exploitation rates of 16% and 18% the risk estimates are 35.2% and 36.4% respectively. These populations are at higher risk because escapement is lower relative to the critical threshold and therefore more likely to fall below the risk criterion.

Reductions in overall harvest rates, in combination with reductions in basin-wide hatchery releases, habitat improvement and other all-H benefits, has contributed to the survival and recovery of Gorge MPG populations as evidenced by the apparent improvement in status since the last status review (Ford 2011). In particular, the harvest matrix that has been in place since 2008 (with an average exploitation rate of 16%) appears to be consistent with maintaining and even increasing recovery trajectories for Gorge MPG populations. The improvement is most evident for the Lower Gorge population. Escapement information for the Upper Gorge populations is limited and our sense that the status of the populations is improving must be inferred largely from the evidence available for other populations in the ESU.

WDFW and ODFW will continue to collect status information for all LCR coho populations. This information will be periodically reviewed in the future to confirm our assessment that the implementation of the new harvest matrix is not reversing the positive recovery trends recently observed for these populations.

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, any effects of interrelated and interdependent activities, and cumulative effects, it is NMFS' biological opinion that the proposed action is not likely to jeopardize the continued existence of LCR coho or destroy or adversely modify its designated critical habitat.

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. "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 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). "Incidental take" is defined by regulation 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.

2.8.1 Amount or Extent of Take

In the biological opinion, NMFS determined that incidental take would occur as follows:

NMFS anticipates incidental take of ESA-listed LCR coho to occur each year in PFMC salmon fisheries starting May 1, 2015, through contact with fishing gear. NMFS anticipates PFMC salmon fisheries occurring each year, together with all marine and Columbia River mainstem fisheries up to Bonneville Dam approved under existing consultations, will not exceed the exploitation rates for natural-origin LCR coho summarized in (Table 3). These exploitation rates account for landed and non-landed mortality of listed LCR coho encountered in the consultation fisheries. Exploitation rates are used to define the extent of take for several reasons: (1) they are a direct measure of the take of the listed species; (2) they are a key parameters used to analyze the effects of the proposed actions; (3) fisheries are designed and managed based on exploitation rates; (4) they can be monitored and assessed; and, (5) they are responsive to changes in abundance. As an example, in 2015 the new matrix allows for a total allowable exploitation rate of LCR coho of 23%. This rate will be shared between all marine fisheries and those in the mainstem Columbia River up to Bonneville Dam.

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 Terms and Conditions

The terms and conditions described below are non-discretionary, and the NMFS or any applicant must comply with them in order to implement the reasonable and prudent measures (50 CFR 402.14). The NMFS or any applicant has 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.

NMFS shall confer with the affected states and tribes, and the PFMC chair, as appropriate, to ensure that inseason management actions taken during the course of the fisheries are consistent with the exploitation rate limits specified in Section 2.8.1 of the Incidental Take Statement above.

1. NMFS shall confer with the affected states and tribes, and the PFMC chair to account for the catch of the PFMC Fisheries throughout the season. If it becomes apparent inseason that the fisheries have changed in any way such that estimates of exploitation rates may exceed those specified in the Incidental Take Statement, then NMFS, in consultation with the PFMC, and states and tribes, shall take additional management measures to reduce the anticipated catch as needed to conform to the Incidental Take Statement.

2. NMFS shall ensure that monitoring of catch in the PFMC commercial and recreational fisheries by the PFMC, states, and tribes is sufficient to provide catch estimates necessary for inseason management and post season assessment. The catch monitoring program shall be stratified by gear, time and management area. Sampling of the commercial catch shall entail daily contact with buyers regarding the catch of the previous day. The recreational fishery shall be sampled using effort surveys and suitable measures of catch rate. The monitoring is necessary to ensure that the fisheries that are the subject of this opinion are sampled for contribution of hatchery and natural-origin fish and the collection of biological information (age, sex, and size) to allow for a thorough analysis of fishery impacts on listed species.

3. NMFS, in cooperation with the affected states and tribes, and the PFMC chair shall monitor the catch and implementation of other management measures at levels that are comparable to those used in recent years. The purpose of the monitoring is to ensure full implementation of, and compliance with, management actions specified to control the various fisheries within the scope of the action.

4. NMFS, in cooperation with the affected states and tribes, and the PFMC chair shall sample the fisheries for stock composition, including the collection of coded-wire-tags in all fisheries and other biological information, to allow for a thorough representative and statistically valid annual post-season analysis of fishery impacts on the Lower Columbia

River coho ESU. A postseason summary of the previous year's PFMC Fisheries shall be provided annually by February 28.

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). NMFS believes the following conservation recommendations are consistent with these obligations, and therefore should be implemented.

1. NMFS, in collaboration with the PFMC, states, and tribes should evaluate the abundance based management framework for consistency with expectations described in the Beamesderfer et al. (2014) report and this opinion every three years or as needed to consider new information. The review should include, but is not limited to information about, forecast methods, natural-origin spawner escapement, proportion of hatchery-origin spawners, marine survival, and other information used in the Beamesderfer et al. (2014) risk analysis.

2. NMFS, in collaboration with the PFMC, states, and tribes, should evaluate, where possible, improvement in gear technologies and fishing techniques that reduce the mortality of listed species, e.g., use of live tanks, net configuration, and release methods.

3. NMFS, in collaboration with the PFMC, states, and tribes, should continue to evaluate the effects to listed species of mark/selective, non-retention commercial and recreational fishing methods. Additional information is needed on:

    a. Release mortality rates, particularly in inriver, fall season fisheries;

    b. The design of sampling programs that provide necessary estimates of encounter rates of unmarked fish that are released;

    c. Criteria that can be used to evaluate the scale of mark/selective fisheries with the goal of limiting potential adverse effects.

4. NMFS, in collaboration with the PFMC, states, and tribes, should continue to improve the quality of information gathered on marine survival and ocean rearing and migration patterns to improve the understanding of the utilization and importance of these areas to listed Pacific salmon.

5. NMFS, in collaboration with the PFMC, states, and tribes, should continue to evaluate the potential selective effects of fishing on the size, sex composition, and age composition of salmon populations.

2.10 Reinitiation of Consultation

This concludes formal consultation for NMFS' implementation of the PFMC's Pacific Coast Salmon FMP beginning May 1, 2015 and extending for the foreseeable future.

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.

NMFS has also proposed as part of the Proposed Action to reevaluate the assumptions and conclusions of the opinion every three years at a minimum (referred to subsequently as the five year check in), and more frequently if new information becomes available that may affect NMFS' conclusion in this opinion. This opinion relies significantly on the assumption that harvest will be managed consistent with the interim strategies and provisions described in the recovery plan (NMFS 2013a) and that progress will be made over time addressing the full range of other limiting factors. Conclusions about harvest and related expectations about the species survival and recovery therefore depend on the success of the all-H strategy described in the recovery plan. The purpose of this review therefore is to reconsider the status of the species, the effect of the action, key assumptions in the all-H strategy, and other information that may lead to a reconsideration of NMFS' conclusion in this opinion.

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

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 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. Adverse 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 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 NMFS and descriptions of EFH for Pacific coast groundfish (PFMC 2014a), coastal pelagic species (PFMC 2011a), Pacific coast salmon (PFMC 2014b); and highly migratory species (PFMC 2011b) contained in the fishery management plans developed by the PFMC and approved by the Secretary of Commerce.

3.1 Essential Fish Habitat Affected by the Project

For this EFH consultation, the proposed action and action area (Figure 1) are described in detail above in Section 1.3. Briefly, the proposed action is NMFS promulgation of ocean fishing regulations within the EEZ of the Pacific Ocean. The action area is the EEZ (Figure 1), which is directly affected by the federal action, and the coastal and inland marine waters of the states of Washington, Oregon and California. The estuarine and offshore marine waters are designated EFH for various life stages of Pacific Coast salmon, Pacific Coast groundfish, coastal pelagic species, and highly migratory species managed by the PFMC.

Pursuant to the MSA, the PFMC has designated EFH for five coastal pelagic species (PFMC 2011a), over 80 species of groundfish (PFMC 2014a), 13 highly migratory species (PFMC 2011b), and three species of federally-managed Pacific salmon: Chinook salmon (*O. tshawytscha*);coho salmon (*O. kisutch*); and Puget Sound pink salmon (*O. gorbuscha*)(PFMC 2014b). The PFMC does not manage the fisheries for chum salmon (*O. keta*) or steelhead (*O. mykiss*). Therefore, EFH has not been designated for these species.

EFH for coastal pelagic species includes all marine and estuarine waters from the shoreline along the coasts of California, Oregon, and Washington offshore to the limits of the EEZ and above the thermocline where sea surface temperatures range between 10○ C to 26○ C. A more detailed description and identification of EFH for coastal pelagic species is found in Amendment 8 to the Coastal Pelagic Species Fishery Management Plan (PFMC 2011a).

EFH for groundfish includes all waters, substrates and associated biological communities from the mean higher high water line, or the upriver extent of saltwater intrusion in river mouths, seaward to the 3500 m depth contour plus specified areas of interest such as seamounts. A more detailed description and identification of EFH for groundfish is found in the Appendix B of Amendment 10 to the Pacific Coast Groundfish Management Plan (PFMC 2014a).

EFH for highly migratory species range from vertical habitat within the upper ocean water column form the surface to depths generally not exceeding 200 m to vertical habitat within the mid-depth ocean water column, from depths between 200 and 1000 m. These range from coastal waters primarily over the continental shelf; generally over bottom depths equal to or less than 183 m to the open sea, beyond continental and insular shelves. A more detailed description and identification of EFH for highly migratory species in Appendix F of the Fishery Management Plan for U.S. West Coast Fisheries for Highly Migratory Species (PFMC 2011b).

Marine EFH for Chinook, coho and Puget Sound pink salmon in Washington, Oregon, and California includes all estuarine, nearshore and marine waters within the western boundary of the EEZ, 200 miles offshore. Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other water bodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers, and longstanding, naturally-impassable barriers (i.e., natural waterfalls in existence for several hundred years). A more detailed description and identification of EFH for salmon is found in Appendix A to Amendment 18 to the Pacific Coast Salmon Plan (PFMC 2014b). Assessment of potential adverse effects to these species' EFH from the proposed action is based, in part, on this information.

The harvest-related activity of the proposed action considered in this consultation involves boats using hook-and-line gear. The use of hook-and-line gear affects the water column rather than estuarine and near shore substrate or deeper water, offshore habitats.

3.2 Adverse Effects on Essential Fish Habitat

The PFMC assessed the effects of fishing on salmon EFH, mostly in freshwater, and provided recommended conservation measures in Appendix A to Amendment 18 of the Pacific Coast Salmon Plan (PFMC 2014b). The PFMC identified five types of impact on EFH: 1) gear effects; 2) harvest of prey species by commercial fisheries; 3) removal of salmon carcasses; 4) redd or juvenile fish disturbance; and 5) fishing vessel operation on habitat.

Harvest related activities described in this opinion for intercepted salmon are accounted for explicitly in the ESA analyses regarding harvest related mortality. Changes to overall salmon fishing activities have decreased over the last decade, as described in this opinion in Sections 1.2 and 2.2.1. Therefore any gear related effects have also been reduced over this time frame. Derelict gear effects occur in fishing activities managed under all four Pacific Coast FMPs, as well as recreational and commercial fishing activities not managed by the PFMC. However, the action considered in this opinion does not include commercial trawl nets, gillnets, long lines, purse seines, crab and lobster pots or recreational pots. These types of gear losses are those most commonly associated as having an effect on EFH. Hook-and-line gear is not placed into this category, and so long as the action continues to authorize fisheries using hook-and-line regulations, gear effects will not be present on EFH.

Prey species can be considered a component of EFH (NMFS 2010b). However, the action considered in this opinion is promulgation of fisheries targeting adult salmon, which are not considered prey for any of the remaining species managed under the other three Pacific coast FMPs. Furthermore, the salmon fisheries considered in this opinion have not documented interception of prey species for the adult species managed under the other three FMPs either.

The PFMC addresses the third type of possible EFH impact, the removal of salmon carcasses, by continuing to manage for maximum sustainable spawner escapement and implementation of management measures to prevent overfishing. The use of proper spawner escapement levels ensures PFMC Fisheries are returning a consistent level of marine-derived nutrients back to freshwater areas.

Fishing vessel operation will occur in the EEZ as a result of the action. Vessels can adversely affect EFH by affecting physical or chemical mechanisms. Physical effects can include physical contact with spawning gravel and redds (freshwater streams) and propeller wash in eelgrass beds (estuaries). However, the bounds of the action area are outside the bounds of freshwater EFH. Derelict, sunk, or abandoned vessels can cause physical damage to essentially any bottom habitat the vessel comes into contact with (PFMC 2011c). Vessels operate in the EEZ as a result of implementing fisheries governed by any of the four FMPs, and for other non-fishing related activities. All of these operations provide potential for physical damage to any bottom habitat.

As discussed above the use of hook-and-line gear in the fisheries promulgated through the action in Section 1.3 of this opinion does not contribute to a decline in the values of estuarine and near shore substrate or deeper water, offshore habitats through gear effects. As adult salmon are not known prey species to the other species in the remaining three FMPs, prey removal is also not considered to have a discernable impact on EFH. Additionally the bounds of the action area are outside the bounds of freshwater EFH, therefore redd or juvenile fish disturbance will not result from the action in this opinion. Fishing vessel operation as a result of the action may result in physical damage to marine EFH. Based on Pacific Coast Fisheries Information Network (PacFIN) data, a total of 1,145 vessels participated in the West Coast commercial salmon fishery in 2014. This is 4 percent more than participated in 2013 (1,098), 12 percent greater than the number participating in 2012 (1,021), and 36 percent more vessels than participated in 2011 (842). The preliminary number of vessel-based ocean salmon recreational angler trips taken on the West Coast in 2014 was 354,500, an increase of 15 percent over 2013, and 22 percent above the 2012 level, but 41 percent below the 1979-1990 annual average of 599,700 (PFMC 2015). These vessels, both commercial and recreational, also fish for Chinook salmon, therefore the number solely attributable to the action considered in this opinion are unknown. However, based on the gear type used and these total operating vessel estimates the effect on essential habitat features of the affected species from the action discussed in this biological opinion will be minimal, certainly not enough to contribute to a decline in the values of the habitat.

It is NMFS opinion that current PFMC actions address EFH protection, and no discernible adverse effects on EFH for species managed under the Coastal Pelagic Species Fishery Management Plan (PFMC 2011a), the Pacific Coast Groundfish Management Plan (PFMC 2014a), the Fishery Management Plan for U.S. West Coast Fisheries for Highly Migratory Species (PFMC 2011b), and the Pacific Coast Salmon Plan (PFMC 2014b) will result from the proposed action considered in this biological opinion.

3.3 Essential Fish Habitat Conservation Recommendations

Pursuant to Section 305(b)(4)(A) of the MSA, NMFS is required to provide EFH conservation recommendations to Federal agencies regarding actions which may adversely affect EFH. However, because NMFS concludes that sufficient measures addressing possible EFH impact, as described in Section 3.2 of this opinion, have been made and adopted for the PFMC Fisheries and the proposed fisheries will not adversely affect the EFH, no additional conservation recommendations beyond those identified and already adopted are needed.

3.4 Statutory Response Requirement

Because there are no conservation recommendations, there are no statutory response requirements.

3.5 Supplemental Consultation

The NMFS 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. FISH AND WILDLIFE COORDINATION ACT

The purpose of the FWCA is to ensure that wildlife conservation receives equal consideration, and is coordinated with other aspects of water resources development (16 USC 661). The FWCA establishes a consultation requirement for Federal agencies that undertake any action to modify any stream or other body of water for any purpose, including navigation and drainage (16 USC 662(a)), regarding the impacts of their actions on fish and wildlife, and measures to mitigate those impacts. Consistent with this consultation requirement, NMFS provides recommendations and comments to Federal action agencies for the purpose of conserving fish and wildlife resources, and providing equal consideration for these resources. NMFS' recommendations are provided to conserve wildlife resources by preventing loss of and damage to such resources. The FWCA allows the opportunity to provide recommendations for the conservation of all species and habitats within NMFS' authority, not just those currently managed under the ESA and MSA.

Because the Proposed Action does not modify any stream or other body of water for any purpose no recommendations apply here and there are no statutory response requirements. This concludes the FWCA portion of this consultation.

5. 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.

5.1 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 NMFS and PFMC. Other interested users could include the WDFW, ODFW, NWIFC and the CRITFC is consistent with their roles as fishery managers for the affected ESUs and with NMFS' obligations under Secretarial Order 3206 (Department of Interior Order 3206, American Indian Tribal Rights, Federal-Tribal Trust Responsibilities and the Endangered Species Act). Individual copies of this opinion were provided to the PFMC and WDFW, ODFW, NWIFC and the CRITFC. This opinion will be posted 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.

5.2 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.

5.3 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.

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 reviewed in accordance with West Coast Region ESA quality control and assurance processes.

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