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

National Marine Fisheries Service (NMFS) Evaluation of the Ozette Lake Sockeye Hatchery and Genetic Management Plan under Limit 6 of the Endangered Species Act Section 4(d) Rule (Reinitiation 2015)

Action Agencies: NOAA's National Marine Fisheries Service (NMFS) and the Bureau of Indian Affairs (BIA)

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

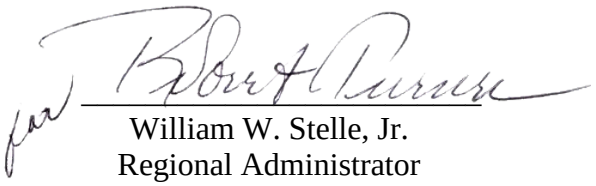
NMFS Consultation Number: WCR-2015-2484

Affected Species and Determinations:

ESA-Listed Species	Status	Is the Action Likely to Adversely Affect Species or Critical Habitat?	Is the Action Likely To Jeopardize the Species?	Is the Action Likely To Destroy or Adversely Modify Critical Habitat?
Ozette Lake sockeye salmon (*Oncorhynchus nerka*)	Threatened	Yes	No	No

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

Issued By:



William W. Stelle, Jr.
Regional Administrator

Date: June 9, 2015

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1 INTRODUCTION

This biological opinion analyzes whether the National Marine Fisheries Service's (NMFS) 2003 determination on the Lake Ozette Sockeye Hatchery and Genetic Management Plan (HGMP), provided as a resource management plan (RMP) and implemented with federal funds as noted by the Makah Tribe, continues to not jeopardize species listed as threatened under the Endangered Species Act (ESA) or adversely modify designated critical habitat. NMFS had issued a prior biological opinion—hereinafter 2003 RMP biological opinion (NMFS 2003)—that analyzed NMFS' initial determination that the RMP met the standard for an exemption under Limit 6 of the agency's ESA §4(d) regulations (50 CFR 223.203(b)(6)); the present biological opinion incorporates by reference elements of the 2003 RMP biological opinion, as warranted. For ease of reference, the 2003 RMP biological opinion, which has expired and is no longer in effect, is attached to this biological opinion (Appendix 2).

1.1 Background

On July 7, 2003, NMFS completed the 2003 RMP biological opinion which, as indicated, evaluated the effects of determining that activities implemented as described in the RMP proposed by the Makah Tribe and Washington Department of Fish and Wildlife (WDFW) met the criteria for an exemption from the ESA's prohibition on take of threatened salmonids pursuant to the 4(d) Rules for listed salmonid species. The 2003 RMP biological opinion also evaluated the effects on listed fish of the Bureau of Indian Affairs' ongoing disbursement of funds for operation and maintenance of the Makah Tribe's Umbrella Creek hatchery program. In its 2003 RMP biological opinion, NMFS concluded that the proposed actions were not likely to jeopardize the continued existence of the Ozette Lake Sockeye Salmon ESU, or to destroy or adversely modify their designated critical habitat.

Simultaneously, NMFS issued its determination that the Lake Ozette Sockeye Salmon RMP qualified for a 4(d) rule, limit 6 exemption (consistent with standard process, NMFS also reviewed the action under the National Environmental Policy Act (NEPA) which resulted in preparation of an environmental assessment (EA) and finding of no significant impact (FONSI). The 2003 RMP biological opinion included a December 31, 2012, expiration date, and the biological opinion is therefore no longer in effect. The component of the RMP addressing the Lake Ozette tributary sockeye salmon aggregation supplementation and reintroduction program (Umbrella Creek and Big River – henceforth Umbrella Creek Hatchery) was to be terminated after 12 years as well if the program was successful in establishing self-sustaining sockeye runs that meet determined escapement goals for release areas.[1] However, if, after 12 years, the program was meeting performance standards, and was expected to accomplish, but had not yet fully accomplished, program goals, the Tribe would request to continue specific components of the program. Similarly, if aspects of the program were not meeting goals or standards, but alternative adaptive management measures were available that would be likely to achieve goals and standards providing a net benefit to the ESU, program elements may be changed and continued upon evaluation and reassessment before or after the 12-year evaluation. On March 17, 2015, the Makah Tribe requested continuation of the Umbrella Creek Hatchery program

[1] NMFS' determination pursuant to 50 CFR 223.203(b)(6) did not include an expiration date and remains in effect until withdrawn or until the underlying program is terminated.

component of the approved RMP (Greene 2015), citing the provision in the RMP and 2003 RMP biological opinion that, "if, after 12 years, the program is meeting performance standards, and is expected to achieve, but has not yet fully accomplished program goals, continuation of specific components will be proposed and reevaluated."

The 2003 RMP is open-ended for all other RMP actions (i.e., all stock status and hatchery performance monitoring, evaluation, and research activities). The tributary hatchery programs proposed for continuation are the only actions for which a conditional 12-year limit in duration was envisioned.

1.2 Consultation History

The consultation history set out in the 2003 RMP biological opinion is hereby incorporated in its entirety into this biological opinion. This consultation analyzes NMFS' 2003 Limit 6 exemption, taking into account any new information since the 2003 RMP biological opinion. Like the 2003 RMP biological opinion, this biological opinion also includes a consultation on the associated federal funding of hatchery operations in the Ozette watershed. Consultation was initiated on April 6, 2015.

1.3 Proposed Action

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

The proposed actions analyzed in this biological opinion are: (1) NMFS's determination under limit 6 of the ESA 4(d) rules for listed Ozette Lake sockeye salmon (50 CFR § 223.203(b)(6)) concerning the Makah Tribe's hatchery program in the Ozette Lake watershed; (2) BIA's ongoing disbursement of funds for operation and maintenance of the Makah Tribe's hatchery facilities in the Ozette watershed. Both proposed actions are ongoing; the 4(d) determination was made in 2003 and remains in effect, whereas the disbursement of funds recurs regularly. Collectively, NMFS and BIA are the Action Agencies. Pursuant to letters received by NMFS from the BIA, NMFS has been designated as the lead agency for the conduct of this consultation (BIA 2015).

The proposed action was thoroughly described in the 2003 RMP biological opinion, and that description is hereby incorporated in its entirety into this biological opinion. NMFS has identified one area of the proposed action that merits new evaluation, relating to continuation of the program's duration beyond 12 years, per the various scenarios envisioned in the RMP. This new NMFS biological opinion addressing the effects of the 4(d) determination includes new scientific information provided by the co-managers through their submittal of annual reports required by NMFS to identify hatchery program performance and effects as part of normal reporting requirements for approved RMP actions.

To reiterate, information that is analyzed in the opinion, which was not available when the prior opinion was completed, include:

- Ozette Lake sockeye salmon stock status and origin data collected since the 2003 RMP biological opinion was completed, and provided through annual RMP (Resource Management Plan) reporting of approved program actions as required by the 2003 RMP biological opinion; and
- Consideration of new studies or other information relevant to the RMP.

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 was thoroughly detailed in the 2003 RMP biological opinion for the Lake Ozette Sockeye RMP, and is hereby incorporated in its entirety into this biological opinion. In brief, the action area includes the Ozette River, Ozette Lake, and tributaries of Ozette Lake accessible to anadromous salmonids.

2 ENDANGERED SPECIES ACT: BIOLOGICAL OPINION AND INCIDENTAL TAKE STATEMENT

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

2.1 Approach to the Analysis

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

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

This biological opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR 402.02. Instead, it relies on the statutory provisions

of the ESA to complete the following analysis with respect to critical habitat.[2] We will use the following approach to determine whether the Proposed Action is likely to jeopardize a listed species or destroy or adversely modify critical habitat:

- First, the current status of listed species and designated critical habitat, relative to the conditions needed for recovery, are described in Section 2.2.
- Next, the environmental baseline in the action area is described in Section 2.3.
- In Section 2.4, we consider how the Proposed Action would affect the species' abundance, productivity, spatial structure, and diversity and the Proposed Action's effects on critical habitat features.
- Section 2.5 describes the cumulative effects in the action area, as defined in our implementing regulations at 50 CFR 402.02
- In Section 2.6, the status of the species and critical habitat (Section 2.2), the environmental baseline (Section 2.3), the effects of the Proposed Action (Section 2.4), and cumulative effects (Section 2.5) are integrated and synthesized to assess the effects of the Proposed Action on the survival and recovery of the species in the wild and on the conservation value of designated or proposed critical habitat.
- Our conclusions regarding jeopardy and the destruction or adverse modification of critical habitat are presented in Section 2.7.
- If our conclusion in Section 2.7 is that the Proposed Action is likely to jeopardize the continued existence of a listed species or destroy or adversely modify designated critical habitat, we must identify a "Reasonable and Prudent Alternative (RPA) to the action in Section 2.8.

ESA-listed anadromous salmonid species in the action area (see Section 1.4) are described in Table 1.

In addition, NMFS has further determined that the proposed action would have no effect on other ESA-listed species under NMFS regulatory purview, including Pacific eulachon, southern resident killer whales, or rockfish. This determination is based on the likely absence of any adverse effects on any of these species, considering the very small proportion of the total numbers of fish present in the Pacific Ocean areas where these ESA-listed species occur that would be represented by hatchery-origin sockeye salmon produced by proposed program. These species will not be addressed further in this biological opinion.

2.2 Range-Wide 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

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

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.

The range-wide status of the species and critical habitat was thoroughly detailed in the 2003 RMP biological opinion for the Lake Ozette Sockeye Salmon RMP. NMFS has completed two status updates (Good et al. 2005; Ford 2011) for the listed species addressed within this biological opinion since the 2003 RMP biological opinion was issued. In addition, critical habitat has been designated since the issuance of the 2003 RMP biological opinion. This biological opinion therefore provides a fresh analysis of the status of Ozette Lake sockeye salmon (Section 2.2.1.1) and designated critical habitat (Section 2.2.1.2) that would be affected by the Proposed Action. The species and the designated critical habitat that are likely to be affected by the Proposed Action, and any existing protective regulations, are described in Table 1.

Table 1. Federal Register notices for the final rules that list species, designate critical habitat, or apply protective regulations to ESA listed species considered in this consultation.

Species	**Listing Status**	**Critical Habitat**	**Protective Regulation**
Sockeye salmon (*Oncorhynchus nerka*)			
Ozette Lake	Threatened, March 24, 1999; 64 FR 14508	Sept 2, 2005; 70 FR 52630	June 28, 2005; 70 FR 37160

Ozette Lake sockeye salmon constitute an ESU (salmon DPS) of the taxonomic species *Oncorhynchus nerka*, and as such is considered a "species" under the ESA.

For Pacific salmon, 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).

In describing the range-wide status of listed species, we rely on viability assessments and criteria in NMFS Technical Recovery Team (TRT) documents and NMFS recovery plans, when available, that describe VSP parameters at the population, major population group (MPG), and species scales (i.e., salmon ESUs and steelhead DPSs). For species with multiple populations, once the biological status of a species' populations and MPGs have been determined, NMFS assesses the status of the entire species. Considerations for species viability include having multiple populations that are viable, ensuring that populations with unique life histories and phenotypes are viable, and that some viable populations are both widespread to avoid concurrent extinctions from mass catastrophes and spatially close to allow functioning as meta-populations (McElhany et al. 2000).

2.2.1 Ozette Lake Sockeye Salmon ESU

2.2.1.1 Life History and Status

Sockeye salmon, *Oncorhynchus nerka*, are the second most abundant of the seven Pacific salmon species (Quinn 2005). They display more life history diversity than all other members of the *Oncorhynchus* genus (Burgner 1991). Sockeye salmon are generally anadromous, but distinct populations of non-anadromous *O. nerka* also exist; these fish are commonly referred to as kokanee (*O. nerka kennerlyi*) or silver trout (Wydoski and Whitney 2003). The vast majority of sockeye populations spawn in or near lakes. Spawning can take place in lake tributaries, lake outlets, rivers between lakes, and on lake shorelines or beaches where suitable upwelling or intra-gravel flow is present. Spawn timing is often determined by water temperature. In spawning habitats with cooler water temperatures, sockeye typically spawn earlier (August) than in warmer habitats (November) (Burgner 1991). Sockeye fry spawned in lake tributaries typically exhibit a behavior of rapid downstream migration to the nursery lake after emergence, whereas lake/beach spawned sockeye rapidly migrate to open limnetic waters after emergence. Lake-rearing juveniles typically spend 1 to 3 years in their nursery lake before emigrating to the marine environment (Gustafson et al. 1997). Other life history variants include sea-type and river-type sockeye. Sea-type (also referred to as ocean-type) populations typically use large rivers and side channels or spring-fed tributary systems for spawning and emigrate to sea soon after emergence. River-type sockeye rear in rivers for one year before emigrating to sea. Quinn (2005) describes the differences between sea-type and river-type sockeye as a continuum of rearing patterns rather than as two discrete types.

Upon smoltification, sockeye emigrate to the ocean. Peak emigration to the ocean occurs in mid-April to early May in southern sockeye populations (generally south of 52ºN latitude) and as late as early July in northern populations (62ºN latitude and north) (Burgner 1991). Typically, river-type sockeye populations make little use of estuaries during their emigration to the marine environment (Quinn 2005). Estuarine habitats may be more extensively used by sea-type sockeye (Quinn 2005). Upon entering marine waters, sockeye may reside in the nearshore or coastal environment for several months but are typically distributed offshore by fall (Burgner 1991).

In the marine environment, Asiatic sockeye are restricted to the zone north of 42ºN latitude and North American sockeye stocks to the zone north of 46ºN latitude. Within these zones, sockeye salmon have a wide distribution. In North America, their range is south to the Sacramento River (California; historical) and as far north as Kotzebue Sound (Alaska). However, sockeye in commercially important numbers occur only from the Columbia River to the Kuskokwim River in the Bering Sea (Foerster 1968; Burgner 1991; Quinn 2005). The Fraser River and Bristol Bay watersheds are the two dominant sockeye producing systems in North America (Gustafson et al. 1997). Other significant sockeye producing systems include the Chignik, Karluk, Copper, Skeena, Nass, and Somass rivers. Within the Gulf of Alaska, southern North American stocks (B.C/Washington) tend to be farther south than Alaskan stocks (Burgner 1991). In the Western Pacific, sockeye can be found from the Kuril Islands (Japan) to Cape Chaplina (Russia). More than 90 percent of all Asiatic sockeye are produced on the Kamchatka Peninsula, in the Ozernaya and Kamchatka River systems (Burgner 1991; Gustafson et al. 1997).

The extant sockeye populations of Washington State represent the current southern extent of the species' range. The NMFS West Coast Sockeye Biological Review Team (BRT) examined genetic, life history, biogeographic, geologic, and environmental information to define salmon ESUs in Washington State. They identified six sockeye salmon ESUs: Okanogan, Wenatchee, Quinault, Ozette, Baker, and Pleasant. Lake Ozette sockeye are distinguished from other Washington sockeye ESUs based upon unique genetic characteristics, early river entry, the relatively large adult body size, and large average smolt size relative to other coastal Washington sockeye populations (Gustafson et al. 1997).

Status of the species is determined based on the abundance, productivity, spatial structure, and diversity of its constituent natural populations. Best available information indicates that the Ozette Lake Sockeye Salmon ESU is at high risk and is threatened with extinction (Good et al. 2005; Ford 2011). The NMFS issued results of a five-year species status review on August 15, 2011 (76 FR 50448), and concluded that Ozette Lake sockeye salmon should remain listed as threatened under the ESA.

The NMFS adopted the recovery plan for Ozette Lake sockeye salmon on May 29, 2009 (74 FR 25706). The Recovery Plan describes the ESU's population structure, identifies spawning aggregations essential to recovery of the ESU, establishes recovery goals for the population, and recommends habitat, hatchery and harvest actions designed to contribute to the recovery of the ESU (NMFS 2009). The Recovery Plan includes a companion document, the Lake Ozette Sockeye Limiting Factors Analysis (LFA) (Haggerty et al. 2009), prepared for NMFS in

cooperation with the Lake Ozette Sockeye Steering Committee. The Recovery Plan adopts ESU population structure (Currens et al. 2009) and population level viability criteria recommended by the Puget Sound Technical Recovery Team (PSTRT) (Rawson et al. 2009). The PSTRT's Biological Recovery Criteria will be met when the following conditions are achieved:

1. **Spatial Structure:** A viable sockeye salmon population in Lake Ozette includes multiple, spatially distinct, and persistent spawning aggregations throughout the historical range of the population. Therefore, a viable population contains multiple spawning aggregations along the lake beaches, which are the known historical spawning areas. The certainty that the population achieves a viable condition would be further increased if spawning aggregations in one or more tributaries to the lake were also established.

2. **Diversity:** A viable Lake Ozette sockeye salmon population includes one or more persistent spawning aggregations from each major genetic and life history group historically present within that population. Since there is little historical diversity information for Lake Ozette sockeye, research is needed on current diversity types and retrospective analyses on the likely historical diversity range. A viable population of sockeye in Lake Ozette also maintains the historical genetic diversity and distinctness between anadromous sockeye salmon and resident kokanee salmon in Lake Ozette.

3. **Abundance:** Based on currently available information, a viable sockeye salmon population in Lake Ozette will range between 31,250 and 121,000 adult spawners.

4. **Productivity:** The growth rate for Lake Ozette sockeye salmon, once viability is achieved, should average 1. Until the ESU achieves viability, the growth rate must be greater than 1.

Ozette Lake Sockeye Salmon Spatial Structure, Diversity, Abundance, and Productivity.
The PSTRT determined that the Ozette Lake Sockeye Salmon ESU is composed of one population with multiple subpopulations (i.e., spawning aggregations), based on consideration of geographic isolation, genetic attributes, life history characteristics, and environmental and ecological diversity (Currens et al. 2009, and following). The PSTRT determined that genetic data provided the best evidence of differences among spawning aggregations, but considered it weak evidence of independent populations because of the magnitude of the differences. They therefore determined that a subpopulation structure among spawning aggregations was much more likely than the existence of multiple populations. They noted that potential differences in peak spawning time between beach spawning aggregations and differences in incubation temperatures between beach and tributaries suggested that subpopulations exist in Lake Ozette now and probably were more extensive historically. The strongest evidence of genetic differences among sockeye salmon within the Ozette watershed occurred between different brood cycles. Within the Ozette watershed beach-spawning sockeye salmon return, spawn, and die almost exclusively as four-year-olds, which limits potential genetic exchange between fish in the four different four-year brood cycle lines. The PSTRT found that all genetic analyses showed major evolutionary divergence between sockeye salmon and kokanee in the Ozette

watershed, supporting the conclusion that Ozette Lake kokanee (also *O. nerka*) are not in the same ESU as anadromous Ozette Lake sockeye salmon.

Over 99-percent of the juvenile sockeye emigrating from the lake to ocean are age 1+, indicating that few juvenile sockeye rear in the lake for more than one summer (Jacobs et al. 1996; MFM, unpublished otolith age data). Adult sockeye return to the Ozette watershed from mid-April through mid-August; with peak entry from mid-May through June (Haggerty et al. 2009; Haggerty 2015). Adult sockeye salmon hold for an extended period in the lake prior to spawning. The average adult holding time in the lake is 6 months, although individual fish may hold for as little as 3 months, or as long as 9 months (Haggerty et al. 2009). Adults return primarily as four year old fish although both age-3 and age-5 sockeye make up a component of the return. The current, known spawning distribution of Lake Ozette sockeye salmon is limited to: Olsen's Beach, Allen's Beach, Umbrella Creek, and Big River. Otolith data collected for return years 2000 through 2004 indicates that 96- and 97-percent of spawning adults were age-4 at Olsen's and Allen's Beaches, respectively (Haggerty et al. 2015, and following). Umbrella Creek spawners during the same time period averaged 2%, 90%, and 8% age-3, age-4, and age-5, respectively. Otolith age data is available for hatchery-origin sockeye returning to Umbrella Creek for return years 2000 through 2012. These data indicate that the proportion of age-4 sockeye has ranged from 100% to 16%; with an annual average of 69% (Figure 1). The proportion of age-3 sockeye has ranged from 0% to 81%, with an annual average of 22%. The proportion of age-5 sockeye has ranged from 0% to 64%, with an annual average of 9%.

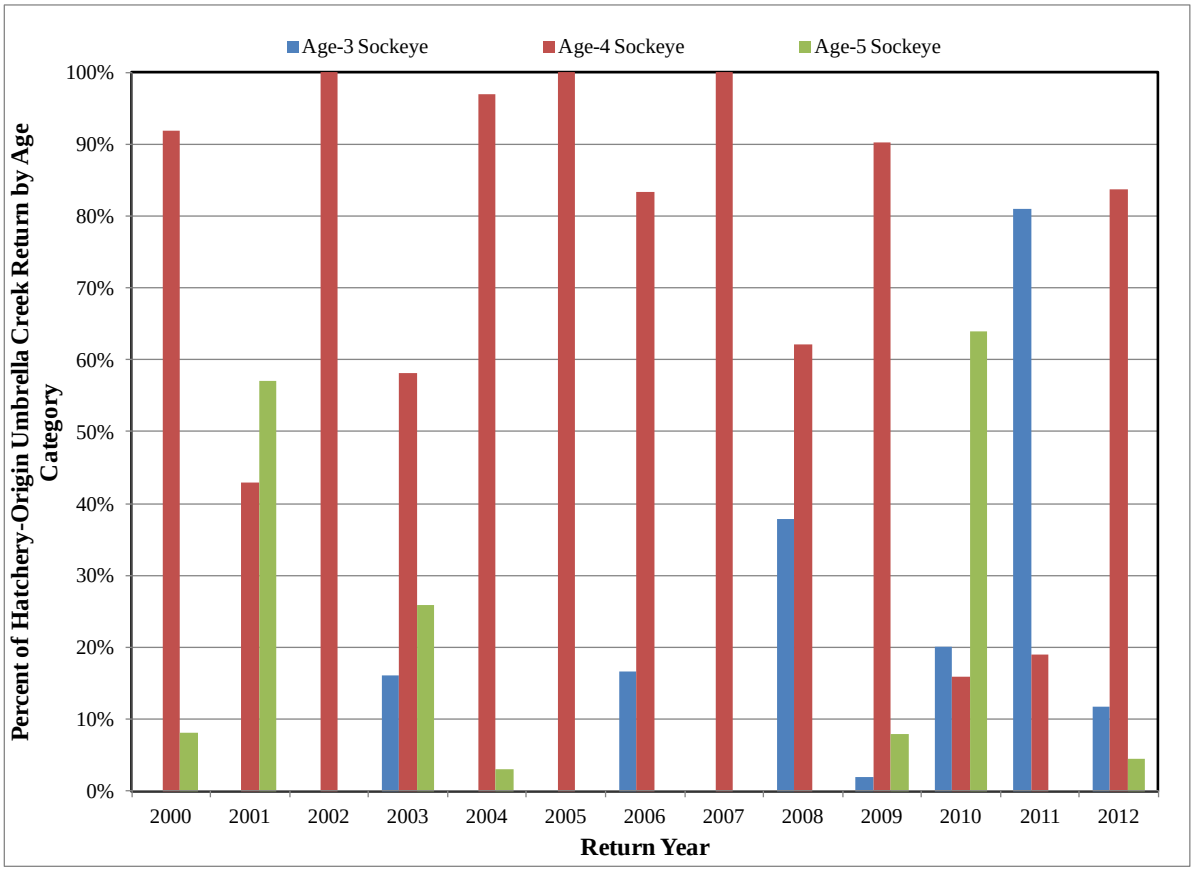

Figure 1. Percent of hatchery-origin Umbrella Creek return by age category for return years 2000 through 2012 (source: Haggerty et al. 2015).

Recent abundance of Ozette Lake sockeye salmon continues to be a small fraction of historical levels (63 FR 11750, March 10, 1998). Recent abundance data and estimates of escapement exist in several forms: run-size estimates of sockeye salmon transiting the Ozette River weir, Umbrella Creek spawning ground surveys and mark-and-recapture estimates, Big River spawning ground survey data, and visual and sonar counts for beach spawning sockeye. The most recent Ozette River sockeye salmon run-size estimates are included below in Figure 2. Sockeye salmon run-sizes averaged 3,348 fish from 2000 through 2011 (Haggerty 2015). During the most recent 4-years, the run-size has averaged 3,532 fish (Haggerty 2015). The most recent Umbrella Creek sockeye salmon escapement estimates, including hatchery- and natural-origin contributions, are included in Figure 3. Umbrella Creek sockeye salmon escapements averaged 2,558 fish from 2000 through 2013 (Haggerty et al. 2015). During the most recent 4-years, the adult return to Umbrella Creek has averaged 3,442 fish (Haggerty et al. 2015).

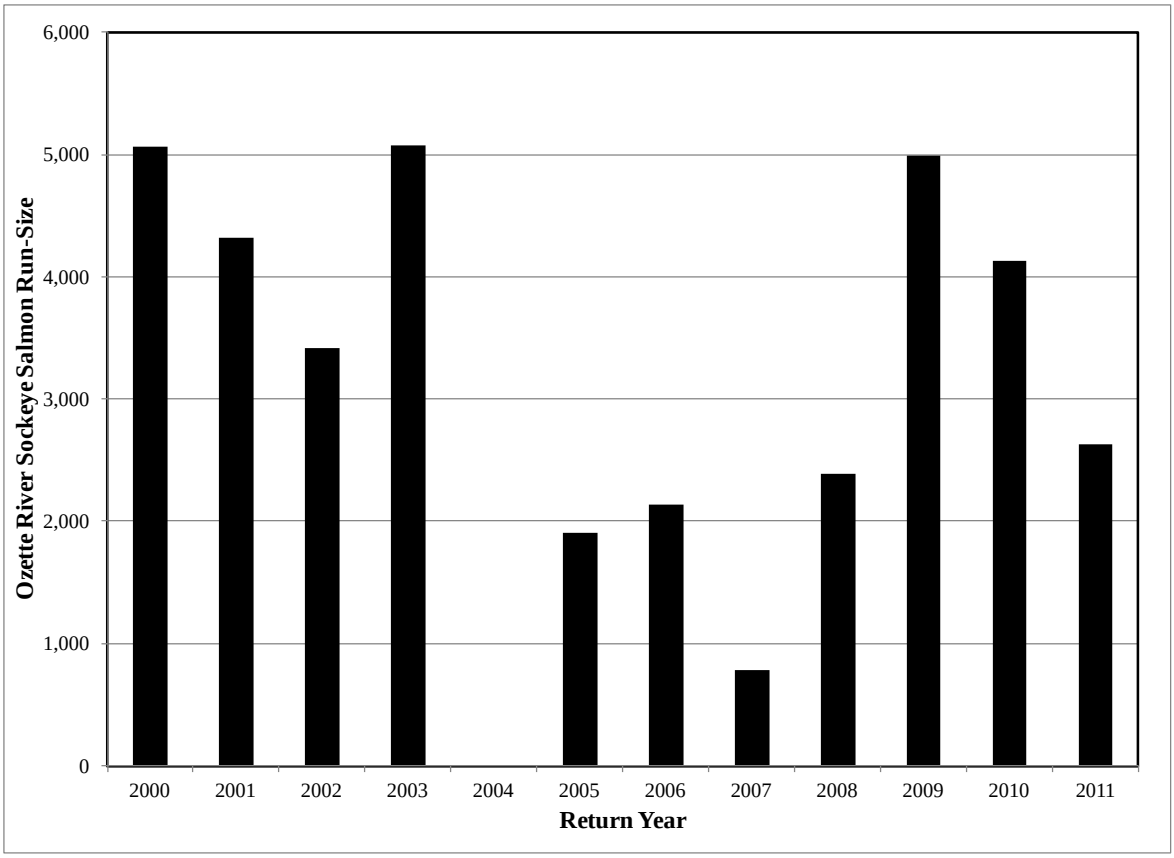

Figure 2. Ozette River sockeye salmon run-size estimates for return years 2000 through 2011 (source: Haggerty 2015; 2010 is a preliminary estimate, final estimate is currently not available).

Hatchery-origin sockeye were not 100-percent otolith marked until brood year 1999 (return year 2003), so no estimates of hatchery- and natural-origin sockeye salmon contributions could be made for return years 2000 through 2002; return year 2013 contribution proportions are not yet available (Haggerty et al. 2015, and following). From return year 2003 through 2012, the number of hatchery- and natural-origin sockeye salmon returning to Umbrella Creek has averaged 488 and 1,680, respectively. During this same time period, the proportion of hatchery-origin fish returns to Umbrella Creek has ranged from 8.1 percent to 52.4 percent; averaging 19.3 percent annually. On average, the vast majority of returning sockeye salmon to Umbrella Creek and the Ozette watershed are natural-origin sockeye salmon. For the Big River subbasin, there are no estimates of total escapement. Big River annual peak sockeye counts for return years 2003 through 2013 have ranged from 0.6 sockeye/mile (RY 2007) to 38.1 sockeye/mile (RY 2005), averaging 15.3 sockeye/mile (see Figure 4). Carcass sampling has been quite limited in the Big River subbasin. From 2003 through 2012, a total of 1,371 sockeye have been observed but only 42 (3.1%) carcasses have been sampled. Of the 42 carcasses sampled, 34 (81%) have been hatchery-origin fish.

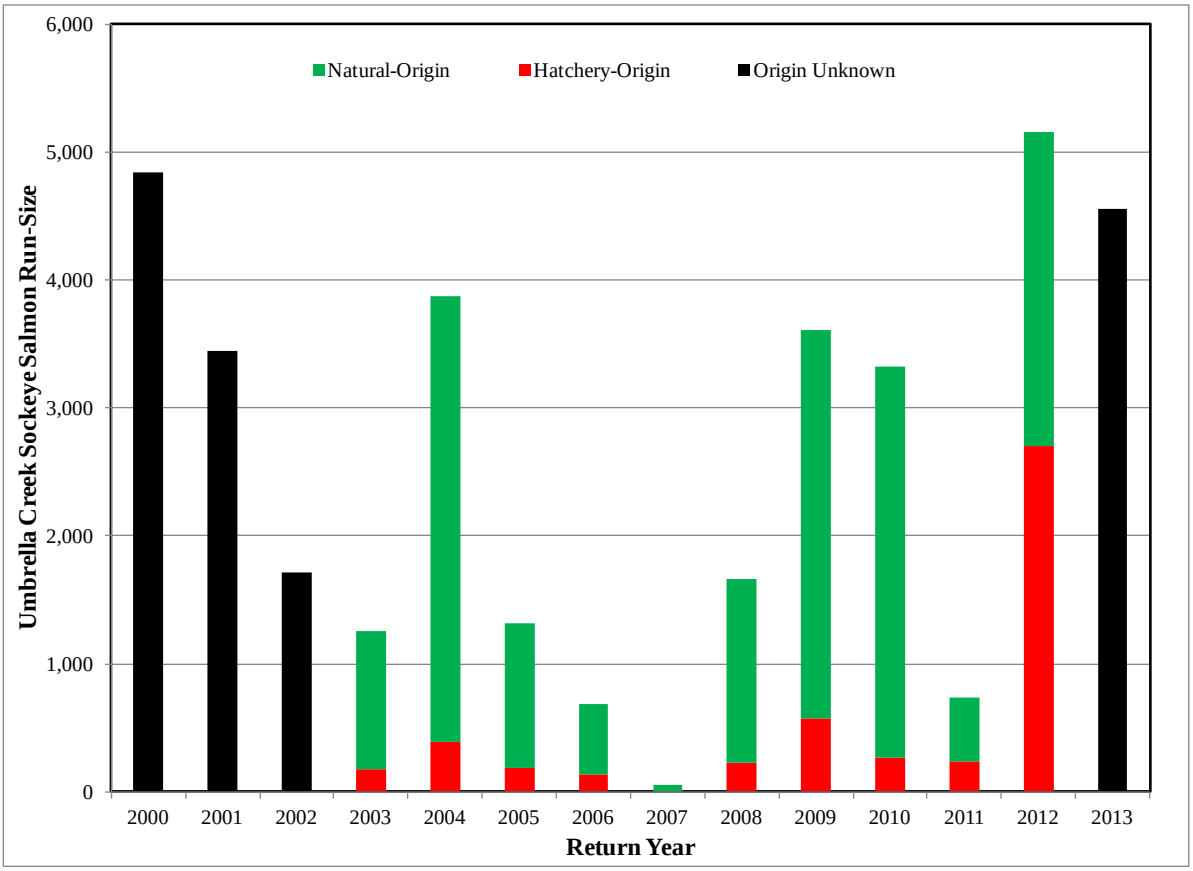

Figure 3. Umbrella Creek sockeye salmon run-size estimates for return years 2000 through 2013; run composition for 2013 return year is not yet available (source: Haggerty et al. 2015).

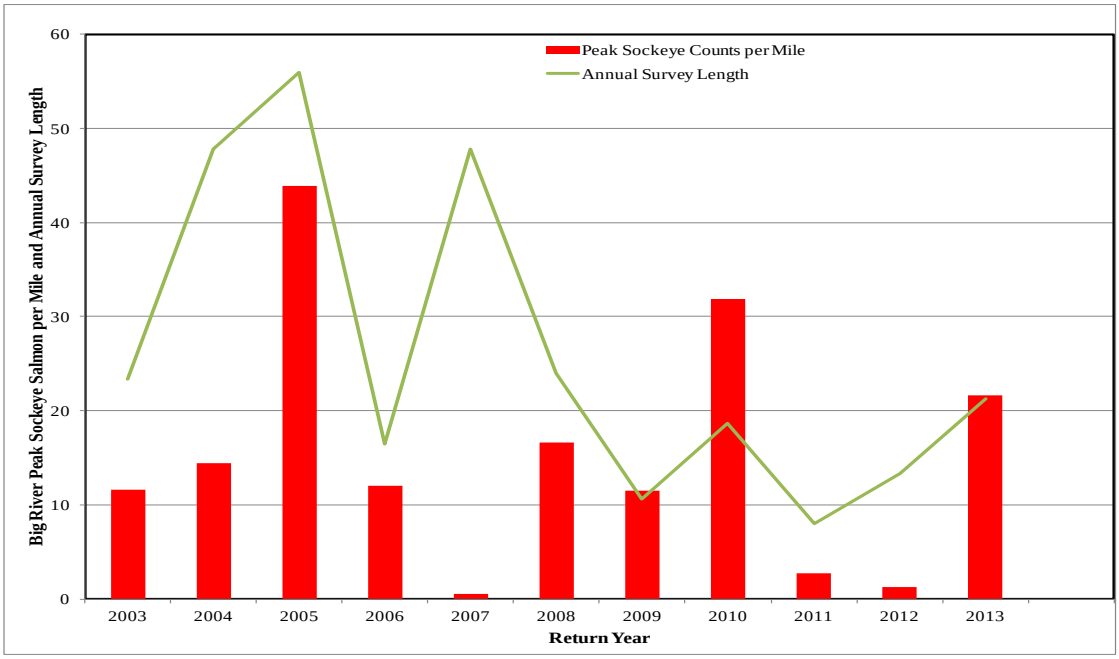

Figure 4. Big River peak sockeye salmon counts and annual miles of survey effort. Note survey area includes the mainstem Big River and Stony Creek (source: Haggerty et al. 2015).

The Recovery Plan (NMFS 2009) and the most recent five-year status review for Lake Ozette sockeye salmon Ford 2011) identify the current lack of sufficient data regarding abundance and distribution of the beach spawning portion of this population as a critical uncertainty preventing NMFS from fully understanding the viability status of the species. Identifying the abundance and distribution of the beach-spawning component of the population has been especially problematic due to adverse lake visibility and weather conditions that disrupt and often prevent stock assessment surveys based on visual observations of fish. The lack of reliable spawning estimates makes it difficult to assess current beach spawner status, or any changes in status that might be occurring over time for this population. The use of imaging sonar, combined with visual surveys, was initiated in return year 2011. Figure 5 depicts the minimum number of beach spawning sockeye salmon from peak sockeye counts for return years 2000 through 2013. The

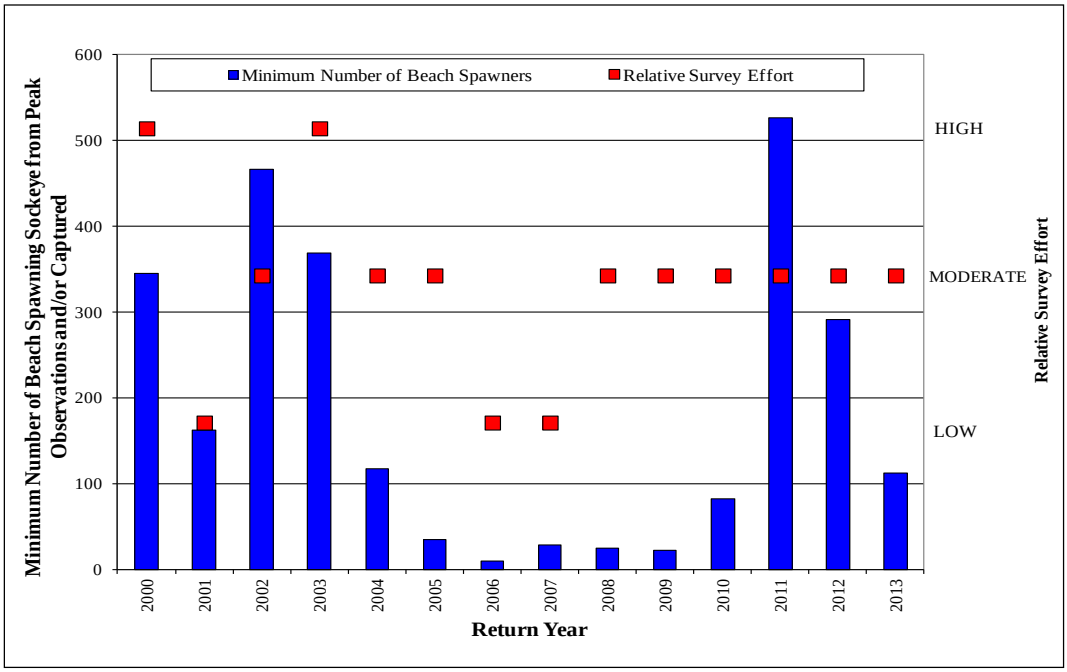

Figure 5. Minimum number of beach spawning sockeye from peak observations by return year contrasted with spawning ground survey effort. Survey effort was defined as "low" if three or fewer surveys were conducted within the survey season. Survey effort was defined as "moderate" for years with four to six surveys and "high" for years with more than six surveys (source: Haggerty et al. 2009; Haggerty et al. 2015).

minimum number of beach spawners ranged from 10 fish (RY 2006) to 527 fish (RY 2011), averaging 185 fish (Haggerty et al. 2015, and following). From return year 2003 through 2012, the estimated proportion of hatchery-origin spawning sockeye salmon at Allen's and Olsen's beaches has been 0.5% (1/195) and 0.8% (4/497), respectively.

One factor affecting the range-wide status of the Ozette Lake Sockeye Salmon ESU, and the ESU's aquatic habitat, 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). This in turn is likely to affect the distribution and productivity of

salmon populations in the region (Beechie et al. 2006). 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). A warming of 0.1 ºC to 0.6 ºC per decade is projected for 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. As climate change progresses and stream temperatures warm, thermal refugia will be essential to persistence of many salmonid populations. Thermal refugia are important for providing salmon and steelhead with patches of suitable habitat while allowing them to undertake migrations through or to make foraging forays into areas with greater than optimal temperatures. To avoid waters above summer maximum temperatures, juvenile rearing may be increasingly found only in the confluence of colder tributaries or other areas of cold water refugia (Mantua et al. 2009).

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 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).

High stream temperatures in the Ozette River are a natural condition (Haggerty et al. 2009). Shortreed (2007), in comparing more recent conditions to assessments from the 1940s, suggests that water temperatures in Cultus Lake (a similar lake in which sockeye salmon spawn and rear) have increased substantially, which he conjectures is likely due to climate change, and likely also increased productivity in the lake. Increased lake productivity could improve rearing conditions for sockeye juveniles, depending on the actual character of the prey composition.

Haggerty et al. (2009) observe that "increased summer air temperatures resulting from climate change have increased average water temperatures during the sockeye migration period by 1 to 2°C (based on average air temperature increases observed during the last 90 years for the months of June, July, and August in Forks WA). Continued and predicted climate change will likely continue to increase the temperature of the Ozette River, negatively affecting adult migrants."

Juvenile sockeye salmon could be adversely affected by changes in precipitation, which would impact both water temperature and the facilitation of juvenile movement out of the system. Due

to the watershed's proximity to the coast, fog drip is likely a significant, but locally unquantified, contributor to overall ground surface precipitation. Climate change in the future could alter the timing of the onset of the wet season (i.e., the first few rains). Climate change into the future could alter the timing and magnitude of flows needed to transport sockeye fry down into Lake Ozette (Haggerty et al. 2009). An increase in spring and summer stream temperatures resulting from predicted rapid changes over a geological scale in climate conditions in the Olympic Mountains would be expected to increase spring and summer water temperatures, impairing water quality in primary fish rearing habitat located in Lake Ozette, as well as affecting the migratory corridor of the Ozette River. In addition, predicted increases in rain-on-snow events could increase the frequency and intensity of floods in mainstem spawning areas, leading to scouring flows that would threaten the survival and productivity of natural-origin listed sockeye salmon.

Habitat preservation and restoration actions can help mitigate the adverse impacts of climate change on salmon. Examples include restoring connections to historical floodplains and freshwater and estuarine habitats to provide fish refugia and areas to store excess floodwaters, protecting and restoring riparian vegetation to ameliorate stream temperature increases, and purchasing or applying easements to lands that provide important cold water or refuge habitat (Battin et al. 2007; ISAB 2007). Harvest and hatchery actions can respond to changing conditions associated with climate change by incorporating greater uncertainty in assumptions about environmental conditions and conservative assumptions about salmon survival in setting management and program objectives and in determining rearing and release strategies (Beer and Anderson 2013).

2.2.1.2 Status of Critical Habitat for Ozette Lake Sockeye Salmon

Designated critical habitat for the Ozette Lake sockeye salmon ESU includes the Ozette River estuary, Ozette Lake, and specific stream reaches associated with the Ozette Lake watershed: the Ozette River; lower Coal Creek; Umbrella Creek, unnamed tributary to Umbrella Creek (below hatchery), unnamed tributary WRIA 20.0056 (Hatchery Creek), East Branch Umbrella Creek; Big River, Stony Creek; Crooked Creek, North Fork Crooked Creek, and South Fork Crooked Creek (NMFS 2005b; 70 FR 52630, September 2, 2005). The designation does not include nearshore areas or offshore marine areas. The Ozette Lake watershed supports the one and only population constituting this ESU and therefore received a high conservation value rating by the Critical Habitat Analytical Review Team (CHART [NMFS 2005a]).

NMFS determines the range-wide status of critical habitat by examining the condition of its physical and biological features (also called "primary constituent elements," or PCEs, in some designations) that were identified when the critical habitat was designated. These features are essential to the conservation of the listed species because they support one or more of the species' life stages (e.g., sites with conditions that support spawning, rearing, migration and foraging). PCEs for Ozette Lake sockeye salmon (NMFS 2005b) include:

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

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

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

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

(5) Nearshore marine areas free of obstruction and excessive predation with: (i) Water quality and quantity conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation; and (ii) Natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels;

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

Critical habitat is designated for Ozette Lake sockeye salmon within the Ozette watershed and includes the estuarine area and the stream channels within the Ozette Lake watershed, as well as the lateral extent of the areas and channels as defined by the ordinary high-water line (33 CFR 319.11). Potential effects of the proposed action are limited to the freshwater environment. The Ozette Lake CHART identified management activities that may affect the PCEs in the watershed, which include, but are not limited to: forestry and introduction of exotic invasive plants (NMFS 2005a).

2.3 Environmental Baseline

Under the Environmental Baseline, NMFS describes what is affecting listed species and designated critical habitat before including any effects resulting from the Proposed Action. 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 Environmental Baseline was thoroughly detailed in the 2003 RMP biological opinion for the Ozette Lake sockeye salmon, and we consider those descriptions to still represent the best available science. We therefore incorporate by reference the Environmental Baseline section from the 2003 RMP biological opinion in its entirety. We also include the 12 years of operations that have taken place since that time. The effects of those operations on listed species are discussed below (Section 2.4.1.1).

2.4 Effects on ESA Protected Species and on Designated Critical Habitat

This section describes the effects of the Proposed Action, independent of the environmental baseline and cumulative effects. The "effects of the action" means the direct and indirect effects of the action on the species and on designated critical habitat, together with the effects of other activities that are interrelated or interdependent, 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 of the Proposed Action

Analysis of the proposed actions identified three risk factors that may potentially have negative effects on ESA protected Ozette Lake sockeye salmon and on designated critical habitat: (1) the risk of adverse genetic affects to the listed beach-spawning sockeye salmon, (2) the risk of disease transfer effects on listed, natural-origin sockeye salmon, (3) the risk of competition for food resources between tributary-origin sockeye and beach-origin sockeye salmon in Lake Ozette. This opinion reaches new conclusions with respect to whether the proposed action results in jeopardy or adverse modification, but for background purposes we point out that, for all other RMP-related risk factors, NMFS concluded in the 2003 RMP biological opinion that the proposed actions would have either a negligible effect or no effect. Furthermore, NMFS concluded in the 2003 RMP biological opinion that:

(1) the risk of adverse genetic effects on listed beach-spawning sockeye is adequately minimized by avoiding use of beach spawning fish as broodstock, imprinting hatchery fish to the tributary release locations to minimize straying, and mass marking hatchery fish to allow for effective stray rate monitoring;

(2) measures implemented to minimize disease transfer effects on listed natural-origin sockeye, and to the propagated sockeye populations, are described in the RMP. Infectious hematopoietic necrosis virus (IHN) is a ubiquitous fish pathogen affecting many west coast sockeye salmon populations. The RMP acknowledges the importance of screening adult and juvenile sockeye salmon used in the hatchery programs for this pathogen, and in reducing the risk of fish disease amplification. Disease monitoring and control protocols in the RMP comply with the "Salmonid Disease Control Policy of the Fisheries Co-managers of Washington State" (WDFW and WWTIT 1998, updated 2006). Fish health monitoring, fish disease control, and hatchery sanitation practices are applied under the direction of fish pathologists to limit disease risks. In its evaluation and recommended determination document, NMFS identified general and specific implementation measures of the RMP that are designed to protect the listed sockeye population (NOAA Fisheries 2001); and

(3) the release of tributary-origin fry is unlikely to overwhelm available food resources in Ozette Lake, and is unlikely to pose substantial competition risks to natural-origin listed sockeye juveniles.

The effects of the action on species and critical habitat are, for the most part, the same as the effects of the action described in the 2003 RMP biological opinion. Accordingly, the analysis presented in the "Effects of the Proposed Action" section of the 2003 RMP biological opinion is hereby incorporated in this biological opinion, except to the extent that it is inconsistent with the changes described below – in which case the description of the changes prevail.

The balance of this section analyzes effects on listed species or critical habitat of the proposed action to the extent there has been a change or clarification of the action since completion of the 2003 RMP biological opinion.

2.4.1.1 New Information

Subsequent to NMFS's completion of the 2003 RMP biological opinion, and consistent with the terms of that biological opinion, the co-managers have provided data and reports describing the status of Lake Ozette sockeye salmon populations, the performance of the hatchery program approved by NMFS, and the effects of fish produced by the programs on listed natural-origin sockeye salmon. These reports include:

- Updated status of federally listed ESUs of west coast salmon and steelhead (BRT 2003).
- Updated status of federally listed ESUs of west coast salmon and steelhead (Good et al. 2005).
- Updated status of federally listed ESUs of west coast salmon and steelhead (Ford 2011).
- Lake Ozette sockeye run-size estimate for return year 2002 (Haggerty 2004).
- Lake Ozette sockeye run-size estimate for return year 2003(Haggerty 2005a).
- Lake Ozette sockeye run-size estimate for return year 2001 (Haggerty 2005b).
- Lake Ozette sockeye run-size estimate for return year 2000 (Haggerty 2005c).
- Lake Ozette sockeye run-size estimate for return years 1999, 1998, 1997, and 1996 (Haggerty 2005d).
- Development and testing of methods for determining Lake Ozette sockeye salmon beach spawning abundance and distribution (Haggerty 2012).
- Field testing the use of imaging sonar technology as a tool for beach spawning ground surveys: year 2 (Haggerty and Makah Fisheries Management 2013).
- Field testing the use of imaging sonar technology as a tool for beach spawning ground surveys: year 3 (Haggerty and Makah Fisheries Management 2014).
- A summary of Lake Ozette sockeye salmon run-size estimates for return years 2004 through 2012 (Haggerty 2015).
- A summary of Lake Ozette sockeye salmon spawning escapement estimates for return years 2000 through 2013 (Haggerty et al. 2015).
- FY-2002 hatchery reform Lake Ozette sockeye smolt out-migration monitoring project (Crewson 2003).
- Lake Ozette sockeye smolt out-migration monitoring project 2003 and 2004 (Peterschmidt 2005).
- Resource management plan report for Lake Ozette sockeye 2003 (Peterschmidt and Hinton 2004).
- Resource management plan report for Lake Ozette sockeye 2004 (Peterschmidt and Hinton 2005).

- Resource management plan report for Lake Ozette sockeye 2005 (Peterschmidt and Hinton 2006).
- Resource management plan report for Lake Ozette sockeye 2006 (Peterschmidt et al. 2007).
- Resource management plan report for Lake Ozette sockeye 2007 (Rossi and Hinton 2008).
- Resource management plan report for Lake Ozette sockeye 2008 (Hinton 2009).
- Resource management plan report for Lake Ozette sockeye 2009 (Hinton 2010).
- Resource management plan report for Lake Ozette sockeye 2010 (Hinton 2013).
- Resource management plan report for Lake Ozette sockeye 2011 (Hinton 2013).
- Microsatellite DNA analysis of sockeye and kokanee (Oncorhynchus nerka) form Lake Ozette, Washington (Hawkins 2004).
- Salmon hatchery inventory and evaluation report for Ozette Lake sockeye salmon hatchery programs (NMFS 2004).
- Ozette River water quantity analysis (Shellberg 2003).
- Lake Ozette tributary habitat conditions: A summary of Ozette watershed baseline habitat inventory data (Haggerty and Ritchie 2005).
- Hydraulic and geomorphic evaluation: analysis of wood loading in the Ozette River and its effect on water levels in Lake Ozette, Clallam County, Washington (Herrera 2005).
- Reconnaissance study of geomorphic conditions: Lake Ozette watershed (Herrera 2006).
- Appendix G CHART assessment for the Ozette Lake sockeye salmon ESU from Final Assessment of NOAA Fisheries' Critical Habitat Analytical Review Teams For 12 Evolutionarily Significant Units of West Coast Salmon and Steelhead (NMFS 2005a).
- Endangered and threatened species; designation of critical habitat for 12 evolutionarily significant units of West Coast salmon and steelhead in Washington, Oregon, and California. Final rule (NMFS 2005b).
- Lake Ozette Sockeye limiting factors analysis (Haggerty et al. 2009).
- Recovery plan for Lake Ozette sockeye salmon (*Oncorhynchus nerka*) (NMFS 2009).
- Identification of an independent population of sockeye salmon in Lake Ozette, Washington (Currens et al. 2009)
- Viability criteria for the Lake Ozette sockeye salmon evolutionarily significant unit (Rawson et al. 2009).
- Late Quaternary sediment source and deposition history of Lake Ozette (Ritchie and Bourgeois 2010).
- A Hydrological assessment of sockeye salmon spawning beaches on Lake Ozette, WA: A pilot study (Brooks 2010).
- Food habits of river otters (*Lutra canadensis*) in the Lake Ozette watershed (Scordino et al. 2010)

Information provided by the co-managers and others indicates that environmental baseline conditions, the species status, and hatchery program effects remain substantively unchanged from those described in the 2003 RMP biological opinion. From this information, it is evident that the current (2015) status of Lake Ozette sockeye salmon population is essentially unchanged relative to 2003 baseline conditions, and, the hatchery program has been implemented consistent with fish production, monitoring and evaluation, and annual reporting actions evaluated and

approved in the 2003 RMP biological opinion. Adult returns to the tributaries remain low for at least one brood cycle line (2003/2007/2011) (Figure 3). Beach spawning ground survey data collected during return years 2005 through 2010 indicate that the beach spawning aggregations likely experienced a period of very low abundance (Figure 5).

The HSRG released its report "On the Science of Hatcheries: An updated perspective on the role of hatcheries in salmon and steelhead management in the Pacific Northwest" (HSRG 2014). This report discusses the group's updated findings and introduces an updated hypothesis for assessing natural-origin salmon population fitness loss risks associated with hatchery production. The group concludes that, in particular, isolated hatchery programs may pose more risk to natural-origin salmonids than the HSRG had previously determined. The Ozette sockeye RMP is not an isolated program, so this HSRG conclusion does not alter NMFS' analysis of effects. Overall, NMFS has reviewed the report and determined that the Lake Ozette sockeye salmon RMP remains consistent with the HSRG's recommendations for integrated hatchery programs.

Hawkins (2004) found that there was very little genetic difference among the sockeye salmon spawning aggregations at Olsen's Beach, Allen's Beach, and Umbrella Creek. However, the author found significant genetic differences between cohort lineages along the predominant 4-year brood cycle lines, and found that those lineages were most closely related among common brood years, independent of sampling locations. Hawkins (2004) described the Lake Ozette kokanee population structure as likely one panmictic[3] group, having found no genetic differences among the sample collections (between locations or brood years) within the study. Sockeye and kokanee-sized *O. nerka* are known to interact during the spawning phase on both beaches and in the tributaries; however, visual observations may confuse kokanee and residual, jack, or hybrid sockeye salmon. Hawkins (2004) indicated that hybridization between sockeye and kokanee is persistent but of low enough frequency to maintain the large genetic differences observed between these two *O. nerka* races. Stray rates of hatchery-origin sockeye onto the beach spawning grounds has remained low (<1%) during the implementation of the RMP and poses little genetic threat to the extant beach spawning aggregations.

2.4.1.2 Program Beyond 12 Years

This portion of the analysis focuses on the potential effects of the program continuing beyond the twelve-year period contemplated in the RMP. Consistent with the 2003 RMP biological opinion, the RMP was to be terminated after 12 years if the program was successful in establishing self-sustaining sockeye runs that meet determined escapement goals for release areas. However, if after 12 years, the program was meeting performance standards, and is expected to, but has not yet fully accomplished program goals, the program was expected to continue. Similarly, if aspects of the program were not meeting goals or standards, but alternative adaptive management measures were available that would likely achieve goals and standards providing a net benefit to the ESU, program elements may be changed and continued upon evaluation and reassessment before or after the 12-year evaluation. As described above, on March 17, 2015, the Makah Tribe requested a continuation of the programs pursuant to the RMP (Greene 2015), citing the provision in the RMP and 2003 RMP biological opinion that, "if, after 12 years, the program is

[3] A panmictic group or population is one where all individuals are potential partners, as there are no mating restrictions, neither genetic nor behavioral, between individual population members.

meeting performance standards, and is expected to achieve, but has not yet fully accomplished program goals, continuation of specific components will be proposed and reevaluated." Since the adoption of the 2003 RMP biological opinion, hatchery efforts within the Ozette watershed have made progress toward, but have not been able to fully restore, viable, self-sustaining sockeye runs that meet determined escapement goals for the specified release areas. In addition, the goal of releasing 3 brood cycles for each of the four brood lines, in both Big River and Umbrella Creek, has not been achieved. These two factors are the basis of the argument to continue the hatchery program.

With continued operation beyond 12-years, the tributary hatchery program would continue to use brood stock collected each year from adult returns to Umbrella Creek. Consistent with the 2000 RMP, maximum broodstock removals from Umbrella Creek would be limited to 15% of the total annual adult return to Umbrella Creek, or 200 adults (100 pairs), whichever is lower (see RMP limits below, from MFM 2000). Juvenile sockeye salmon released through the hatchery program would continue to be limited to 80,000 fed fry released into Umbrella Creek and 135,800 fry released into Big River. Takes resulting in the removal from the natural environment of listed sockeye salmon adults for artificial propagation would continue to be limited to the tributary broodstock collection program (NOR fish only). The actual numbers of adults returning each year to the Ozette Lake Sockeye Salmon ESU will be substantially higher (e.g., 12-year average run-size of 3,348) than total numbers proposed for take through these actions that will continue to be implemented consistent with the 2000 RMP (MFM 2000).

Regarding the effects of continued sockeye fry releases through the Umbrella Creek hatchery program, sockeye salmon prey composition and availability, as well as competition for prey in Lake Ozette, have been investigated in part or whole by Bortleson and Dion (1979), Dlugokenski et al. (1981), Blum (1988), Beauchamp and LaRiviere (1993), and Meyer and Brenkman (2001). Beauchamp et al. (1995) estimated that juvenile sockeye and all year classes of kokanee consumed less than 1% of the monthly standing stock of *Daphnia pulicaria* that were greater than 1.0 mm in size, indicating that food availability for rearing fish was not limiting *O. nerka* productivity. All researchers (Bortleson and Dion 1979; Dlugokenski et al. 1981; Blum 1988; Beauchamp and LaRiviere 1993), independent of methodologies, have concluded that Lake Ozette sockeye productivity and survival are not limited by food availability or competition. Given the size of the lake rearing area available, the apparent high sockeye salmon productivity (Beauchamp et al. 1995), the low abundance status of beach spawning sockeye salmon fry populations, and the modest annual hatchery production levels proposed through the RMP, the continued release of tributary-origin fry beyond 12 years is unlikely to overwhelm available food resources in Lake Ozette, and is unlikely to pose substantial competition risks to natural-origin listed sockeye juveniles.

The 2003 RMP is open-ended for all other RMP actions (the tributary hatchery programs are the only actions for which a conditional 12-year limit in duration was envisioned). Commensurate with continuation of the tributary hatchery programs, the Makah Tribe would continue to implement annual research, monitoring, and evaluation programs to determine the status of the Lake Ozette sockeye salmon spawning aggregations, and monitor the performance and effects of the hatchery programs on listed sockeye salmon. As described in the 2003 RMP biological

opinion, these research, monitoring, and evaluation programs are projected to affect the sockeye salmon population as follows, annually (see Appendix 1):

- 200 sockeye salmon adults from the run at large captured at the Ozette River weir, handled, externally or internally tagged, and released for a lake migration, spawning behavior, and pre-spawning survival survey in Ozette Lake if identified as needed for recovery planning purposes. Of the total number of adult sockeye salmon handled, 20 may be injured, and 10 fish may be unintentionally killed (NMFS 2003);
- 1,000 sockeye salmon adults captured at the Umbrella Creek weir, handled, externally tagged and released for Umbrella Creek mark-and-recapture abundance monitoring. Of the total number of adult sockeye salmon handled, 50 may be injured, and 25 sockeye salmon may be unintentionally killed (note: not included in the 2003 RMP BiOp);
- spawning, fertilization, and incubation of 12,000 eyed eggs planted in egg baskets or incubators on Ozette Lake beaches. Beach spawner survival research will involve sacrificing all of the surviving eggs or fry incubated on the beaches (estimated at 10% of the total planted) after a period of time to examine development and mortality rates. The source of the eggs may include Umbrella Creek natural- or hatchery-origin adult sockeye salmon. The intent of the RMP is to allow broodstock removal from Umbrella Creek to the lesser of 210 sockeye or 15% of the returning adults, or up to 10 natural-origin beach spawning sockeye, if the total take remains low (less than 0.7% of the estimated abundance of beach spawning sockeye (NMFS 2003);
- up to 1,000 natural-origin fry captured, handled and released in a sockeye fry predation assessment study in the lake directed at piscine predators. Of the total fry handled, 20 may be injured and 20 may be unintentionally killed (NMFS 2003);
- 10,000 tributary-origin fry captured, handled, and released in a fyke net study of tributary sockeye spawner productivity in Umbrella Creek. Of the 10,000 fish captured, 400 may be injured, and 300 may be unintentionally killed (NMFS 2003); and
- 5,000 to 10,000 (dependent on the annual total emigrating population size) lake and tributary-origin smolts captured, handled, biologically sampled, and released through an upper Ozette River juvenile out-migrant study. Of the total number of smolts captured over this range, 250 may be incidentally injured and 150 may be unintentionally killed (NMFS 2003).

Other monitoring and evaluation actions conducted under the RMP will not lead to physical contact with live listed sockeye salmon or any incidental take effects. Habitat and spawning ground surveys may lead to the temporary disturbance of spawners during foot, scuba, snorkel, or boat (including DIDSON/ARIS) spawner surveys and carcass and mark recovery projects. Approximately 200 to 500 sockeye salmon carcasses may be sampled annually for otoliths, scales, genetic stock identification, and other biological information during spawner surveys, broodstock collection, and through routine monitoring and evaluation activities.

The actual numbers of adult fish returning each year to the Ozette Lake Sockeye Salmon ESU will be substantially higher (2000-2012 average adult abundance of 3,348) than total numbers proposed for research-related take (maximum annual adult take equal to 35 adults or approximately 1% of total annual abundance) by one to two orders of magnitude or more. It is realistic to expect a similar relationship between juvenile fish abundances and projected take

levels occurring through implementation of the RMP as well. Actual fish mortalities resulting from the research programs are expected to be a small fraction of the total research take (handling and lethal take) for both adults and juveniles. Also, the research activities are distributed throughout the Ozette Lake Sockeye Salmon ESU's freshwater range, thereby further diminishing the impacts of any take on a single critical life stage or habitat. For these reasons, take related to monitoring, evaluation, and research, are not expected to reduce the Ozette Lake sockeye salmon population, their reproductive capacity, or their distribution to the point of appreciably reducing their ability to survive and recover in the wild.

2.4.1.3 Critical Habitat

Critical habitat was proposed at the time of 2003 RMP biological opinion for the Ozette Lake sockeye salmon. Since that time, a final rule designating critical habitat for the Ozette Lake Sockeye Salmon ESU has been adopted (70 FR 52630, September 2, 2005). The effects of the proposed hatchery actions on designated critical habitat were considered through this consultation, and NMFS found that operation of the hatchery programs will have a negligible effect on PCEs in the action area. Existing hatchery facilities in Umbrella Creek and Big River have not led to: degradation of water quantity and quality conditions and substrate sockeye salmon supporting spawning, incubation and larval development; alteration of channel morphology and stability in freshwater rearing and migration area; reduced and degraded floodplain connectivity; excessive sediment input; or the loss of habitat diversity. No new facilities or construction are proposed as part of the proposed actions considered in this opinion. With the exception of the Umbrella Creek weir (when operated), all hatchery facilities are located away from the Lake Ozette tributaries, and do not affect designated critical habitat for listed Ozette Lake sockeye salmon. The weir is temporary and removable, and is placed to rest on the creek bed and bank such that Chinook salmon habitat is not adversely affected. Artificial propagation activities associated with the tributary hatchery programs rely on low impact, gravity-fed water supplies. Water use is non-consumptive and water used to hold and rear fish is returned to the tributaries near the point of withdrawal. The hatchery incubation and rearing sites on Umbrella Creek and Big River are small in size, and employ temporary, removable stream-side structures and rearing vessels.

The programs operate under Washington State water right permit criteria for diverting water from the creeks, and would not have any discernible effect on, or result in any adverse modification to, critical habitat. Permitted water withdrawal levels for fish rearing are a small fraction of average annual flows in the tributaries where the programs are located, and water withdrawn for hatchery use is returned near the point of withdrawal. Hatchery diversion screens protect listed natural-origin juvenile sockeye salmon entrainment and injury, and meet NMFS screen criteria (NMFS 2011). Sockeye salmon fry and fingerling production by the hatchery programs are very low in annual levels of fish poundage, below levels of concern regarding effluent water quality effects (WDOE 2010). No hatchery maintenance activities are expected to adversely modify designated critical habitat, including water quality and quantity. Research, monitoring, and evaluation activities involve only transitory habitat alteration effects on freshwater spawning, rearing, and migration habitats, such as installing a temporary seasonal weir and a screw trap in the Ozette River (e.g., cabling the weir or trap to adjacent trees and rocks; weir rests on existing streambed) or conducting foot or boat surveys to count spawning salmon or sample carcasses for biological data collection. For these reasons, NMFS concludes

that continuation of the tributary hatchery programs will not result in adverse effects on freshwater spawning, rearing, and migration areas included as critical habitat for Ozette Lake sockeye salmon. In addition, NMFS concludes that research monitoring and evaluation will not destroy or adversely modify any of the listed sockeye salmon ESU's designated critical habitat (e.g., freshwater spawning, rearing, or migration habitats).

2.5 Cumulative Effects

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

The NMFS recovery plan for Lake Ozette sockeye salmon (NMFS 2009) describes in detail, drawing from the plan's companion limiting factors analysis (Haggerty et al. 2009), on-going and proposed state, tribal, and local government actions that are targeted to reduce known threats (e.g., loss of adequate quality and quantity of spawning and reading habitat, predation and disruption of natural predator-prey relationships, introduction of non-native fish and plant species) and address limiting factors for the listed ESU. In addition to continued operation of the Umbrella Creek hatchery program approved by NMFS in 2003, future tribal, state, and local government actions will likely continue to be in the form of legislation, administrative rules, or policy initiatives, and land use and other types of permits. Government and private actions may include changes in land and water uses, including ownership and intensity, any of which could impact listed sockeye salmon or their habitat. Government actions are subject to political, legislative and fiscal uncertainties. These realities, added to the geographic scope of the action area, which encompasses several government entities exercising various authorities and the many private landholdings, continue to make any analysis of cumulative effects difficult and speculative.

Non-Federal actions are likely to continue affecting listed sockeye salmon. The cumulative effects of non-Federal actions in the action area remain difficult to analyze considering the geographic landscape of the action area, the political variation in the action area, the uncertainties associated with government activities affecting areas outside of Olympic National Park, private actions, and the changing economies of the region. Whether these effects will increase or decrease is a matter of speculation, with the likelihood for future effects depending on the activity affecting the species, and on the non-Federal entity regulating the activity. Consistent with implementation of the NMFS (2009) recovery plan, we expect the activities identified in the baseline as adversely affecting listed sockeye salmon to be reduced in magnitude and intensity over the short and longer terms. On-going salmon restoration and recovery actions implemented through the NMFS (2009) recovery plan would likely continue to help lessen the effects of non-Federal land and water use activities on the status of the listed Ozette Lake Sockeye Salmon ESU. The temporal pace of such decreases would likely be similar to the pace observed in recent years.

Timber harvest activities are the primary non-Federal actions that are reasonably certain to occur in the future on non-Federal lands in the Ozette Lake watershed. Compliance with forest

practice regulations adopted and implemented by the Washington Forest Practices Board, and with regulatory elements of the Forest and Fish Report dated April 29, 1999, and submitted to the Forest Practices Board, are expected to reduce the future effects of timber harvest actions on listed sockeye salmon. Monitoring actions and protective regulations applied by the Washington Department of Natural Resources to timber harvest activities on non-Federal lands in the Basin should also act to minimize the risk of adverse effects on listed sockeye salmon.

With these improvements, however, based on the trends discussed above, there is also the potential for adverse cumulative effects associated with some non-Federal actions to increase. State, tribal, and local governments have developed resource use plans and initiatives to benefit listed sockeye salmon and off-set any growing adverse effects that are proposed to be applied and sustained in a comprehensive way. But the actions must actually be funded and in the process of implementation (most are not) before NMFS can consider them "reasonably foreseeable" in its analysis of cumulative effects, and it continues to be speculative for NMFS to do so given these uncertainties.

Ozette Lake sockeye salmon may be adversely affected by climate change. The hydrologic effects described in section 2.2, above, are expected to continue to accrue. Spring and summer water temperatures are likely to continue to increase, with mixed effects, but including impairment of water quality in primary fish rearing habitat located in Lake Ozette, earlier and potentially smaller transport of juveniles out of the Ozette River, and increased frequency and intensity of floods in mainstem spawning areas that would threaten the survival and productivity of natural-origin listed sockeye salmon. Any such adverse impacts that might occur would be expected to be seen over a longer time frame than the timeframe in which the hatchery program is expected to continue, though with an open-ended approval it is possible that climate change effects would coincide with hatchery effects.

Sockeye salmon are the only species under propagation in the Lake Ozette watershed, and there are no other hatchery programs in the analysis area that could affect listed sockeye salmon. Hatchery programs propagating other anadromous salmonid populations are located in other Washington coastal watersheds (e.g., Quinault River, Hoh River). Due to their distance from the Lake Ozette watershed, and because these other programs are located in watersheds that are separate, direct tributaries to the Pacific Ocean, there is a negligible risk that any juvenile and adult fish they produce would stray and interact with listed Lake Ozette sockeye salmon. No effects from other Washington coastal hatchery programs on listed Lake Ozette sockeye salmon are therefore expected.

2.6 Integration and Synthesis

This section is the final step of NMFS' assessment of the effects on listed fish species and critical habitat as a result of implementing the proposed actions. In this section, we add the effects of the actions (Section 2.4) to the environmental baseline (Section 2.3) and the cumulative effects (Section 2.5) to formulate the agency's biological opinion as to whether the proposed actions are likely to: (1) result in appreciable reductions in the likelihood of both survival and recovery of the species in the wild by reducing its numbers, reproduction, or distribution; or (2) reduce the value of designated critical habitat for the conservation of the

species. These assessments are made in full consideration of the status of the species and critical habitat (Section 2.2).

The Integration and Synthesis section of the 2003 RMP opinion is incorporated by reference here, except to the extent that it is inconsistent with the changes described below – in which case the description of the changes prevail.

To the extent incorporated by reference into this biological opinion, the 2003 RMP biological opinion's assessment of the effects on listed fish species and critical habitat remains accurate with respect to the proposed action analyzed in this biological opinion, as discussed above. Environmental baseline conditions (including the status of listed fish populations and their critical habitat) and the status of cumulative effects are consistent with conditions and effects assumed for NMFS's analysis of effects in the 2003 RMP biological opinion, except to the extent modified in this document. To date, the on-going implementation of the RMP has not led to a change in the effects on listed sockeye salmon or their critical habitat. Data and reports provided to NMFS by the co-managers and others since 2003 indicate that: (1) the approved hatchery programs have been implemented as authorized in the original NMFS ESA approval documents; (2) environmental conditions, sockeye stock status, and hatchery performance have remained consistent with the analysis in the 2003 RMP biological opinion, and (3) the hatchery program activities, including effects monitoring, evaluation, and reporting actions, have been implemented as required in the 2003 RMP biological opinion. These data and new information indicate that program effects have been as expected in the 2003 RMP biological opinion and the program has been successful at creating upward trending population abundance in the Umbrella Creek and Big River basins. Over a longer period of time, climate change effects would be expected to become more noticeable and more severe, but would not be exacerbated by the proposed program—because, first, the program is likely to end before climate change effects become substantial (compared to typical environmental variability), and, second, the effects of the program that would extend over the period of time pertinent to important climate change effects are likely to be at least partly beneficial, represented by improved sockeye salmon populations, which could serve as a buffer to adverse climate change impacts compared to the recent species status.

Because nothing material is expected to change in terms of how the programs will operate, and no other factors indicate that the effects are likely to change, the proposed hatchery actions analyzed in this biological opinion are not likely to: (1) result in appreciable reductions in the likelihood of both survival and recovery of the species in the wild by reducing its numbers, reproduction, or distribution; or (2) reduce the value of designated critical habitat for the conservation of the species.

2.7 Conclusion

After reviewing the current status of the listed species, the environmental baseline within the action area, the effects of the proposed action, and cumulative effects, it is NMFS' biological opinion that the proposed action is not likely to jeopardize the continued existence of the Ozette Lake Sockeye Salmon ESU or to destroy or adversely modify the ESU's designated critical habitat.

2.8 Incidental Take Statement

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is further defined by regulation to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering (50 CFR 222.102). "Incidental take" is defined as take that is incidental to, and not the purpose of, the carrying out of 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 prohibited under the ESA, if that action is performed in compliance with the terms and conditions of this Incidental Take Statement (ITS).

2.8.1 Amount or Extent of Take

In the biological opinion, NMFS determined that incidental take would occur as follows: Listed sockeye salmon take as a result of the proposed action would potentially occur through several mechanisms, described below: (1) propagation of sockeye salmon in the hatchery environment, causing genetic (hatchery influenced selection) effects; (2) straying by returning hatchery-origin adult sockeye salmon, leading to genetic effects on listed beach-spawning sockeye salmon through interbreeding and genetic diversity loss; (3) ecological effects (competition) impacting lake-rearing listed natural-origin sockeye salmon; (4) broodstock collection in Umbrella Creek, impacting sockeye salmon spawner condition and natural spawning abundance; and (5) methods implemented to conduct research, monitoring, and evaluation that may injure or kill listed sockeye salmon.

(1)-(2) Genetic Effects
Take of listed sockeye salmon is expected to occur as a result of artificial propagation of the species in the hatchery environment, resulting in hatchery-induced selection effects. This take pathway consists of harm caused by genetic effects. It is not possible to ascertain the exact amount of such take, because it is not possible to meaningfully measure the number of interactions, nor their precise effects. NMFS will therefore rely on a surrogate in the form of number or percentage of returning adults removed from Umbrella Creek for use as broodstock.

The number of adults removed for broodstock is rationally related to take that may result from hatchery-influenced selection through this pathway because selection can only occur when sockeye salmon are exposed to hatchery practices (e.g. feeding, handling) and living in the hatchery environment, the experiences that lead to selection. Relevant to this take pathway, maximum broodstock removals from Umbrella Creek are expected to be no higher than 15% of the total annual adult return to Umbrella Creek, or 210 adults (100 pairs), whichever is lower. This represents the maximum number of sockeye salmon to be removed for use as broodstock and exposed to genetic effects through hatchery-influenced selection. The removal of these fish reflects the level of harm anticipated as a result of genetic effects. Therefore, the surrogate take indicator applied to quantify genetic effects take associated with hatchery-influenced selection is broodstock removals from Umbrella Creek of 15% of the total annual adult return to Umbrella Creek, or 210 adults (100 pairs), whichever is lower. This indicator can be reliably measured

and monitored, as the hatchery operator counts the number of adults removed and reports to NMFS annually on both the removal activities and the run size of the naturally-spawning population.

Another take pathway that consists of harm from genetic effects is the effect of straying by returning hatchery-origin adult sockeye salmon, leading to genetic effects on listed beach-spawning sockeye salmon through interbreeding and genetic diversity loss. Again, it is not possible to ascertain the exact amount of such take, because it is not possible to meaningfully measure the number of interactions, nor their precise effects. Therefore, NMFS will rely on a surrogate take indicator to quantify the take from this pathway. In this case NMFS will rely on the proportion of hatchery-origin fish spawning on the spawning grounds utilized by the natural-origin sockeye salmon population.

This proportion (pHOS) is rationally related to genetic effects caused by returning hatchery fish spawning within the natural-origin population, since pHOS reflects the level to which natural-origin sockeye salmon on the beaches will be exposed to genetic effects through interbreeding with hatchery-origin sockeye salmon and genetic diversity loss. In its analyses of hatchery-origin sockeye salmon straying to the two known beach-spawning sockeye areas (Section 2.2.1.1), NMFS found that the pHOS ranged from 0.5% to 0.8%. In reaching its no-jeopardy conclusion, NMFS assumed that the impacts would be of a certain magnitude. In this context, the appropriate take indicator should reflect the level of harm anticipated as a result of straying and genetic diversity loss effects. Therefore, the indicator applied to quantify genetic effects take associated with hatchery-origin fish straying to the beaches and interbreeding is maintenance of Umbrella Creek Hatchery program-origin sockeye salmon adult pHOS levels, measured as a four-year running average, at less than 1% of estimated total annual beach spawning sockeye salmon spawner abundances. This average proportion of naturally spawning hatchery sockeye salmon is a reliable and reasonably quantifiable measure of take, because pHOS is calculated annually through mark recovery sampling conducted during annual spawner abundance surveys on the spawning beaches. Using a four-year average will account for all four brood cycle lines in each measurement, as well as allow for any slight, unexpected variability.

(3) Ecological Effects (Competition)

NMFS has determined that the proposed action carries a risk of take by harm resulting from competition between hatchery and natural-origin sockeye salmon for food during the lake-rearing life phase. Again, it is not possible to ascertain the exact amount of such take, because it is not possible to meaningfully measure the number of interactions, nor their precise effects. Therefore, NMFS will rely on a surrogate take indicator consisting of the number of hatchery-origin fry and fingerlings released into Lake Ozette and its tributaries.

The release levels of hatchery sockeye salmon as fry or fingerlings is rationally related to take caused by competition for food during the lake-rearing life phase of listed sockeye salmon because the co-occurrence of hatchery- and natural-origin juvenile fish is a necessary precondition to competition taking place. Moreover, as the number of hatchery-origin juvenile fish increases, the extent of competition effects felt by the natural-origin population rises. This surrogate take indicator can be reasonably and reliably measured, because the hatchery operator

has full control of the number of juvenile sockeye salmon released into the action area, and includes these numbers in annual reporting.

In reaching the no-jeopardy conclusion, NMFS assumed that competition impacts would be of a certain magnitude. In this context, the appropriate take indicator should reflect the level of harm anticipated as a result of competition effects. Therefore, the indicator applied to quantify take resulting from competition effects is maintenance of annual juvenile sockeye salmon fry and fingerling release numbers at the same levels estimated in the 2000 RMP: 80,000 fed fry released into Umbrella Creek and 135,800 fry released into Big River. In fact, the program's practice is to use 100 spawning pairs for broodstock and release the number of progeny that result. Because NMFS' assumptions about the extent of competition expected is related to an assumption that the number of progeny released would be approximately 80,000 fry in Umbrella Creek and 135,800 in Big River, these release numbers serve as a reasonable limit on take associated with competition. Exceeding these annual release numbers may exceed the extent of competition risk heretofore assumed in this opinion.

(4) Broodstock Collection Effects

The annual collection of adult sockeye salmon returning to Umbrella Creek for use as hatchery broodstock impacts sockeye salmon spawner condition and natural spawning aggregation abundance. Up to 15% of the total annual adult return to Umbrella Creek, or 210 adults (100 pairs), whichever is lower, will be collected each year for use as broodstock for the Umbrella Creek Hatchery program. Therefore, the expected take effects on spawner condition and natural spawning aggregation abundance by capture and handling during broodstock collection is 15% of the total annual adult return to Umbrella Creek, or 210 adults (100 pairs), whichever is lower. Monitoring of take levels for broodstock collection actions will occur through hatchery operator observation and recording of daily and cumulative adult sockeye salmon capture, handling, and removal levels.

(5) Research, Monitoring, and Evaluation Effects

Listed sockeye salmon take may occur in connection with the research, monitoring, and evaluation actions included in the proposed action by harm associated with capture, handling, tagging, and release, as well as by the removal and processing of eggs and fry in associated with studies.

- At the Ozette River weir, up to 210 sockeye salmon adults from the run at large will be captured, handled, externally or internally tagged, and released for a lake migration, spawning behavior, and pre-spawning survival survey in Ozette Lake if identified as needed for recovery planning purposes. Of the total number of adult sockeye salmon handled, 20 may be injured, and 10 fish may be unintentionally killed (NMFS 2003).
- At the Umbrella Creek weir, up to 1,000 sockeye salmon adults will be captured, handled, externally tagged and released for Umbrella Creek mark-and-recapture abundance monitoring. Of the total number of adult sockeye salmon handled, 50 may be injured and 25 sockeye salmon may be unintentionally killed.
- Up to 12,000 sockeye salmon eggs will be procured from hatchery-origin and natural-origin adult returns to Umbrella Creek for beach spawning sockeye salmon survival and productivity research purposes. If Umbrella Creek sockeye salmon eggs are unavailable, then natural-origin beach spawning sockeye salmon may be collected to provide eggs for

such studies. The total take of adult beach spawning sockeye salmon collected as broodstock for each year's study will not exceed 10 beach spawning sockeye, or will remain less than 0.7% of the estimated total abundance of beach spawning sockeye salmon, whichever is lower. The eggs will be fertilized, incubated to the eyed life stage, and planted in egg baskets or incubators on Lake Ozette beaches. All surviving eggs or fry incubated on the beaches (estimated at 10% of the total planted) will be sacrificed over the course of the study to examine egg development and mortality rates.

- Up to 1,000 natural-origin sockeye salmon fry will be captured, handled and released in a sockeye fry predation assessment study in the lake directed at piscine predators. Of the total fry handled, 20 may be injured and 20 may be unintentionally killed;
- Up to 10,000 tributary-origin fry will be captured, handled, and released in a fyke net study of tributary sockeye spawner productivity in Umbrella Creek. Of the 10,000 fish captured, 400 may be injured, and 300 may be unintentionally killed (NMFS 2003); 5,000 to 10,000 (dependent on the annual total emigrating population size) lake and tributary-origin smolts will be captured, handled, biologically sampled, and released through an upper Ozette River juvenile out-migrant study. Of the total number of smolts captured over this range, 250 may be incidentally injured and 150 may be unintentionally killed. In annual reports required by NMFS, takes associated with the research, monitoring, and evaluation projects will be identified so that the effects on listed sockeye salmon can be monitored.

2.8.2 Effect of the Take

In section 2.7, NMFS determined that the level of anticipated take, coupled with other effects in the proposed action, is not likely to jeopardize the continued existence of Ozette Lake sockeye salmon, or adversely modify designated critical habitat.

2.8.3 Reasonable and Prudent Measures

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

NMFS concludes that the following reasonable and prudent measures are necessary and appropriate to minimize incidental take. The Action Agencies (NMFS and the Bureau of Indian Affairs) shall:

1. Ensure that the effects on Ozette Lake sockeye salmon genetic diversity associated with implementation of the Ozette watershed hatchery sockeye salmon program continue to be unsubstantial and below levels affecting Ozette sockeye viability.

2. Ensure that the program continues to follow standards indicating when hatchery support is no longer needed for establishing self-sustaining sockeye salmon aggregations in the Lake Ozette tributaries.

3. Ensure that the tributary hatchery programs are implemented as described in the RMP and hatchery program operations are monitored.

4. Ensure that the performance and effects of the hatchery salmon program, including compliance with the Terms and Conditions set forth in this incidental take statement, are described through completion and submittal of annual reports.

2.8.4 Terms and Conditions

The terms and conditions described below are non-discretionary, and the Action Agencies must comply with them in order to implement the reasonable and prudent measures (50 CFR 402.14). The Action Agencies have a continuing duty to monitor the impacts of incidental take and must report the progress of the action and its impact on the species as specified in this incidental take statement (50 CFR 402.14). If the following terms and conditions are not complied with, the protective coverage of section 7(o)(2) will lapse. The Action Agencies (NMFS and the Bureau of Indian Affairs) shall:

1a. Ensure that annual surveys are conducted to determine the migration timing, abundance, distribution, and origin (hatchery and natural-origin) of sockeye salmon spawning naturally and escaping to hatchery release sites in the Lake Ozette watershed. The co-managers shall submit any revisions of protocols described in the RMP for annual run-size monitoring, spawning ground surveys, and biological sampling for NMFS concurrence on or before April 1 of each year.

1b. Ensure that demographic, morphometric, mark/tag, and/or genetic data are collected, and analyses are conducted, necessary to indicate the total annual adult contribution, by origin, of Ozette Lake sockeye salmon to escapement by spawning aggregation.

1c. Ensure that estimates of natural and hatchery escapement levels and estimates of total recruit per spawner levels are reported annually for the period when the hatchery sockeye salmon program is implemented.

2a. Ensure that within 16 months of the decision date for this biological opinion, a report is submitted to NMFS clarifying criteria for determining when the Umbrella Creek hatchery program has achieved success in establishing self-sustaining tributary sockeye salmon returns that are no longer in need of hatchery support. As standards for measuring success, included in the report shall be sockeye salmon spawning escapement goals established for all brood cycle lines returning to Umbrella Creek and Big River.

2b. Upon development of the criteria and escapement goal standards described in 2a, ensure that the status of natural-origin and hatchery-origin adult sockeye salmon returns to Umbrella Creek and Big River relative to those criteria and goals are reported annually.

3. Ensure that the hatchery program, including proposed adult broodstock removal levels, juvenile sockeye salmon release numbers, and associated research, monitoring, and evaluation actions, is implemented as described in the RMP. NMFS's Sustainable Fisheries Division (SFD) must be notified in advance of any change in the hatchery program.

4. Provide one comprehensive annual report to NMFS SFD on or before April 1st of each year that includes research, monitoring, and evaluation actions described in Term and Conditions 1c and 2b. Annual broodstock removal levels, and the numbers of hatchery-origin sockeye released, release dates and locations, individual release sizes, and tag/mark information, shall be included in the annual report. All reports, as well as all other notifications required in the permit, shall be submitted electronically to the SFD point of contact for this program:

   Tim Tynan, (360) 753-9579, tim.tynan@noaa.gov

   Annual reports may also be submitted in written form to:

   NMFS – Sustainable Fisheries Division
   Anadromous Production and Inland Fisheries Program
   1201 N.E. Lloyd Boulevard, Suite 1100
   Portland, Oregon 97232

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 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 (50 CFR 402.02). NMFS has identified two conservation recommendations appropriate to the proposed action:

1. Complete studies comparing upper Ozette River weir and ARIS[4]-based estimates of the abundance of adult sockeye salmon entering Lake Ozette by summer 2015, with the goal of use of only the ARIS system to census the inbound sockeye salmon population by spring 2016.
2. Given the continued low abundance status of the beach-spawning sockeye salmon aggregation, extreme caution is warranted for any beach spawning ground egg survival studies proposed for implementation to determine beach spawning sockeye salmon limiting factors, consistent with research needs identified in the Recovery Plan for Lake Ozette sockeye salmon (NMFS 2009). At current abundance levels, Umbrella Creek-origin sockeye should be used for any egg survival studies on the beaches in lieu of using natural-origin beach spawning sockeye salmon. As proposed in the 2000 RMP, any future use of natural-origin beach spawning sockeye salmon for egg survival studies should be limited to maintain very low take levels (e.g., to not exceed 0.7% of the estimated beach spawning aggregation abundance).

[4] **A**dvanced **R**esolution **I**maging **S**onar

2.10 Re-initiation of Consultation

This concludes formal consultation for the NMFS determination on, and BIA funding of, the Lake Ozette sockeye salmon RMP.

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

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

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

This analysis is based, in part, on descriptions of EFH for Pacific coast salmon (PFMC 2014) contained in the fishery management plans developed by the Pacific Fishery Management Council (PFMC) and approved by the Secretary of Commerce.

3.1 Essential Fish Habitat Affected by the Project

Essential fish habitat is unchanged from that analyzed in the 2003 RMP biological opinion and is hereby incorporated in its entirety to this biological opinion. There is no pink salmon population in the Lake Ozette watershed, so EFH for Chinook and coho salmon, described in PFMC (2014), would only potentially be affected at levels described in the 2003 RMP biological opinion.

3.2 Adverse Effects on Essential Fish Habitat

Adverse effects on EFH are generally unchanged from those analyzed in the 2003 RMP biological opinion and are hereby incorporated in its entirety to this biological opinion. Generally, the proposed action generally does not have substantial effects on the major components of EFH. Salmon spawning and rearing locations and adult holding habitat are not expected to be affected by the operation of the hatchery program, as no modifications to these areas would occur.

3.3 Essential Fish Habitat Conservation Recommendations

The Reasonable and Prudent Measures and Terms and Conditions included in the ITS constitute NMFS recommendations to address potential EFH effects. NMFS and the BIA shall ensure that the ITS, including Reasonable and Prudent Measures and implementing Terms and Conditions, are carried out. To address the potential effects on EFH of hatchery fish on natural fish in natural spawning and rearing areas, the PFMC (2014) provided an overarching recommendation that hatchery programs:

"[c]omply with current policies for release of hatchery fish to minimize impacts on native fish populations and their ecosystems and to minimize the percentage of nonlocal hatchery fish spawning in streams containing native stocks of salmonids."

The biological opinion explicitly discusses the potential risks of hatchery fish to fish from natural populations and their ecosystems, and describes operation and monitoring appropriate to minimize these risks on sockeye salmon, and, by extension, all potential risks to Chinook and coho salmon in the Lake Ozette watershed. By ensuring that the proposed action is implemented as described in the RMP, and complying with the terms of the ITS, NMFS and the BIA will, therefore, be fulfilling the recommendation by PFMC (2014). NMFS does not have additional EFH conservation recommendations to provide at this time.

3.4 Statutory Response Requirement

As required by section 305(b)(4)(B) of the MSA, the Federal agency must provide a detailed response in writing to NMFS within 30 days after receiving an EFH Conservation Recommendation from NMFS. Such a response must be provided at least 10 days prior to final approval of the action if the response is inconsistent with any of NMFS' EFH Conservation Recommendations, unless NMFS and the Federal agency have agreed to use alternative time frames for the Federal agency response. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH.

In the case of a response that is inconsistent with NMFS Conservation Recommendations, the Federal agency must explain its reasons for not following the recommendations, including the scientific justification for any disagreements with NMFS over the anticipated effects of the action and the measures needed to avoid, minimize, mitigate, or offset such effects [50 CFR 600.920(k)(1)].

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

3.5 Supplemental Consultation

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

4 DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

Section 515 of the Treasury and General Government Appropriations Act of 2001 (Public Law 106-554) ("Data Quality Act") specifies three components contributing to the quality of a document. They are utility, integrity, and objectivity. This section of the biological opinion

addresses these DQA components, document compliance with the Data Quality Act, and certifies that this biological opinion has undergone pre-dissemination review.

4.1 Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. NMFS has determined, through this ESA section 7 consultation that operation of the Ozette Lake sockeye salmon hatchery program as proposed will not jeopardize ESA-listed species and will not destroy or adversely modify designated critical habitat. Therefore, NMFS can issue an ITS. The intended users of this biological opinion are the Makah Tribe (operators, with WDFW, as *U.S. v. Washington* (1974) co-managers), NMFS (regulatory agency), and other Treaty Tribes within the *U.S. v. Washington* Case Area. The scientific community, resource managers, and stakeholders benefit from the consultation through adult returns of program-origin salmon to the Ozette watershed, and through the collection of data indicating the potential effects of the hatchery program on the viability of natural spawning aggregations of Ozette Lake sockeye salmon. This information will improve scientific understanding of hatchery-origin sockeye salmon effects on natural populations that may be applied broadly within the Pacific Northwest area for managing benefits and risks associated with hatchery operations. This biological opinion will be posted on the NMFS West Coast Region web site (http://www.westcoast.fisheries.noaa.gov/). The format and naming adheres to conventional standards for style.

4.2 Integrity

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

4.3 Objectivity

Information Product Category: Natural Resource Plan

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

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

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

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

5 REFERENCES

The references listed in the 2003 RMP biological opinion are hereby incorporated in their entirety to this biological opinion. In addition, NMFS lists the following additional references:

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Appendix I. Estimate annual listed sockeye salmon take levels for the Ozette Lake sockeye salmon Recource Management Plan.

Listed species affected: Ozette Lake Sockeye Salmon		**Activity: Broodstock collection, and research, monitoring, and evaluation**		
Location of Hatchery Activity: Ozette Lake, Ozette River, Ozette Lake Tributaries		**Dates of activity: Year Round**		
Type of Take	**Annual Take of Listed Fish By Life Stage *(Number of Fish)***			
	Egg/Fry	**Juvenile/Smolt**	**Adult**	**Carcass**
Observe or harass a)	**0**	**0**	**0**	**0**
Collect for transport b)	**0**	**0**	**0**	**0**
Capture, handle, and release c)	**23,000**	**0**	**0**	**0**
Capture, handle, tag/mark/tissue sample, and release d)	**0**	**10,000**	**1,000**	**500**
Removal (e.g. broodstock) e)	**0**	**0**	**210**	**0**
Intentional lethal take f)	**0**	**0**	**0**	**0**
Unintentional lethal take g)	**320**	**150**	**35**	**0**
Other Take (any not identified above)	**0**	**0**	**0**	**0**

a) Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
b) Take associated with weir or trapping operations where listed fish are captured and transported for release.
c) Take associated with weir or trapping operations where listed fish are captured handled and released upstream or downstream. Figure includes 10,000 naturally produced tributary-origin fry, up to 12,000 eyed eggs produced from 10 adult sockeye collected on beaches for beach spawning survival research, and 1,000 fry captured in predation research.
d) Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs. Figure includes 10,000 juvenile sockeye salmon captured through operation of the Ozette River inclined plane trap. Note: new take not previously evaluated includes up to 1,000 adults captured, handled, and tagged at the Umbrella Creek weir; in addition up to 500 carcasses can be sampled (as compared to 210 in the 2003 RMP biological opinion).
e) Listed and unlisted fish removed from the wild and collected for use as broodstock. Figure includes 10 listed sockeye removed from beach-spawning areas and 210 hatchery (unlisted) or natural-origin (listed) tributary-origin sockeye salmon adults.
f) Intentional mortality of listed fish, usually as a result of spawning as broodstock. Broodstock spawning level included in above row reporting "Removal".
g) Unintentional mortality of listed and unlisted fish. Figure includes 10 adult sockeye killed during capture and tagging for predation and lake survival research, 25 adult sockeye killed during Umbrella Creek broodstock collection and mark and recapture monitoring, 20 fry killed during lake predation research, 300 tributary-origin fry killed during tributary productivity research, and 150 smolts killed during Ozette River out-migrant trapping.

Appendix 2- 2003 RMP BiOp.