Supplemental Information Report of
Updated Dungeness River Basin Chinook Salmon Hatchery Program

June 08, 2022

1. INTRODUCTION

On June 3, 2016, the National Marine Fisheries Service (NMFS) issued a final environmental assessment (2016 EA) and finding of no significant impact (FONSI) in connection with its determination that the Dungeness River Basin Chinook salmon, coho salmon, and pink salmon hatchery programs satisfy the requirements under Limit 6 of the Endangered Species Act (ESA) Section 4(d) Rule. NMFS is now proposing to make a new determination under Limit 6 of the 4(d) Rule for all three programs, as a result of an update to the Chinook hatchery program described in the 2016 EA. Because the chum and pink salmon programs will remain the same as that analyzed in the 2016 EA and updated through the supplemental information report, Updated Dungeness River Basin Coho Salmon Hatchery Program, added to the file on August 12, 2020, our analysis below will focus on the changes associated with the Chinook salmon program.

The purpose of this supplemental information report is to determine whether the update to the Chinook salmon hatchery program is substantial enough to require a supplemental National Environmental Policy Act (NEPA) analysis. This occurs when there are changes to the proposed action that are relevant to environmental concerns evaluated in the original NEPA document or when there are new circumstances or any new information that are relevant to environmental concerns and could meaningfully alter the prior analysis of the proposed action and its impacts.

2. BACKGROUND

On January 18, 2013, NMFS received three hatchery and genetic management plans (HGMPs) for salmon propagation through Dungeness River hatchery programs from the Washington Department of Fish and Wildlife (WDFW). For each of these HGMPs, the Jamestown S'Klallam Tribe served as the *U.S. v. Washington* fish resource co-manager (WDFW 2013a; WDFW 2013b; WDFW 2013c). WDFW and the Jamestown S'Klallam Tribe submitted these HGMPs seeking NMFS' determination of whether the plans achieve the conservation standards of the ESA, as set forth in Limit 6 of the 4(d) Rule. This determination by NMFS is a Federal action requiring NEPA compliance.

Using information obtained from the ESA applications, NMFS prepared a draft EA with the cooperation of the Bureau of Indian Affairs for public review pursuant to NEPA. The draft EA, *Environmental Assessment to Analyze Impacts of NOAA's National Marine Fisheries Service Determination that Three Hatchery Programs for Dungeness River Basin Salmon as Described in Joint State-Tribal Hatchery and Genetic Management Plans Satisfy the Endangered Species Act Section 4(d) Rule* was released for public comment on February 20, 2015 (80 Federal Register [FR] 9260). NMFS received comments from two commenters during the 30-day public comment period.

After considering public comments, on June 3, 2016, NMFS issued a 2016 EA and FONSI determining that the proposed hatchery programs would meet the criteria under Limit 6 of the ESA Section 4(d) would not significantly adversely impact the quality of the human environment, and preparation of an environmental impact statement (EIS) under NEPA was not necessary (NMFS 2016).

The final 2016 EA analyzed four alternatives: 1) a "no action" alternative of not making a determination under Limit 6 of the ESA 4(d) Rule; 2) the proposed action alternative of making a determination that the HGMPs meet the requirements under Limit 6 of the ESA 4(d) Rule; 3) making a determination that the

HGMPs do not meet the requirements under Limit 6 of the ESA 4(d) Rule, resulting in termination of the hatchery salmon programs in the Dungeness River Basin; and 4) reduction of hatchery salmon release levels from programs in the Dungeness River Basin. The no action and proposed action alternatives are most similar to the action as proposed here with increased Chinook production.

On February 4, 2022, NMFS received a request from WDFW and the Jamestown S'Klallam Tribe to increase releases of Chinook salmon yearlings and sub-yearlings from its Dungeness River Chinook salmon hatchery program. The existing program releases up to 150,000 sub-yearlings and up to 50,000 yearlings (total of 200,000 Chinook). The Chinook salmon program, under the revised HGMPs, includes increased production to 600,000 juvenile Chinook, a captive brood program, updated weir placement, and modifications of release locations within the Dungeness Basin. Up to 100,000 of the juveniles would be released as yearlings instead of sub-yearlings at the co-managers discretion in March through April or a late August through October release; the remaining Chinook would be sub-yearlings. The increased production is proposed to increase adult returns to the Dungeness Basin in an effort to preserve genetic variability and increase spatial diversity of spawners throughout the Basin.

The co-managers seek NMFS' determination than an increased annual release of 400,000 juveniles (mainly sub-yearlings with potential for up to 100,000 of those to be yearlings) for a total of 600,000 Chinook (up to 100,000 of which may be yearlings) would meet all the requirements specified in Limit 6 of the ESA 4(d) Rule. In March 2020, NMFS published in the Federal Register notification of the availability of its ESA 4(d) Rule proposed evaluation and pending determination (PEPD) for the three joint HGMPs for public review and comment (85 FR 13632, March 9, 2020). The public comment period was open for 30 days, closing on April 8, 2020. During the public comment period, NMFS received no comments, therefore, there was no need for revisions to the documents to clarify, correct, or refine the proposed action description or effects evaluation sections as a result of public input.

In reviewing the updated hatchery program specific to Chinook salmon sub-yearling and yearling releases, a captive brood program, updated weir placement, and modifications of release locations within the Dungeness Basin, NMFS must consider whether the action "is not likely to appreciably reduce the likelihood of survival and recovery" (65 FR 42422, July 10, 2000) of listed salmon and steelhead under the ESA.

3. CHANGES TO THE PROPOSED ACTION

The updated proposed action would provide an exemption from section 9 of the ESA for the funding and operation of the Dungeness River Chinook salmon hatchery program specific to an annual increase of 400,000 juvenile Chinook (mainly sub-yearlings with up to 100,000 total yearlings) to its existing program release of 150,000 sub-yearlings and 50,000 yearlings, a captive brood program, updated weir placement, and modifications of release locations within the Dungeness Basin. The captive broodstock and increased production will be limited to a period of eight years, equal to two generations of Chinook salmon. This proposed update differs from the alternative considered but not analyzed in the EA to increase hatchery salmon release levels beyond using raceways that were not previously used (Section 2.5.5). This increase of Chinook salmon yearlings and sub-yearlings is within the capacity of the Dungeness River Hatchery, which is unlike the increased production alternative that was eliminated in the 2016 EA. The 2016 EA included increases in Chinook salmon, coho salmon, and pink salmon, and was beyond the hatchery capacity. The following summarizes the proposed changes from the 2016 proposed action. We, then, analyze whether these changes require a supplement to the 2016 EA.

The Dungeness River chinook salmon hatchery program is ongoing and is intended to function as a segregated program that provides conservation benefits. The current Dungeness River Basin Chinook salmon hatchery program has targeted annual juvenile release levels of 150,000 sub-yearlings released in equal lots of 50,000 fish from Dungeness Hatchery, Upper Dungeness Acclimation Pond, and Gray Wolf Acclimation Pond in May or June, and up to 50,000 yearlings may be released at the co-managers' discretion each year. There is no captive broodstock program, and Chinook are collected for broodstock at the Mainstem Dungeness River weir (River Mile [RM] 2.5) on the Dungeness River as well as from adults volunteering to the hatchery and adults netted from the River. The applicants request to change this program to increase the release numbers to an annual release of 600,000 juvenile Chinook (mainly sub-yearlings with a total of up to 100,000 yearlings released at the co-managers' discretion in March through April or late August through October) at 50 fish per pound with an estimated 400,000 of these juveniles originating from a new captive broodstock program. Up to 130 natural- and hatchery-origin Chinook salmon will be collected as volunteers to the Dungeness River Hatchery ladder and trap as well as at the mainstream weir and trap located in the lower Dungeness River below RM 5 and by opportunistic gillnetting and gaffing in the lower Dungeness River. Dungeness River Hatchery will operate its fish ladder and trap from mid-May through February to collect Chinook salmon as broodstock. Collection of Chinook salmon broodstock in the lower river and the mainstem weir currently occurs from May through September.

For the proposed action, fish may be released volitionally from the Dungeness River Hatchery, Hurd Creek Hatchery, Gray Wolf Acclimation Pond, and Upper Dungeness Acclimation Pond. Chinook salmon may also be trucked to the lower Dungeness River for release to avoid predation during release. The co-managers will take an adaptive management approach to release locations and may select alternative release locations from RM 0.9 to RM 15.8 in the Dungeness watershed to maximize survival. However, no more than 100,000 hatchery juvenile Chinook salmon will be released above RM 15.3. Data will be collected to allow analysis of release locations which promote survival and reduce exposure to predators. Dungeness spring Chinook salmon have experienced high levels of predation during marine emigration so co-managers may release Chinook salmon at different locations each year to deter predators.

There would be no other changes to the overall program schedule or to its water source (Dungeness River); adult collection (Dungeness River Hatchery off-channel adult pond); incubation, rearing, and acclimation (Dungeness River Hatchery). All Chinook salmon will be marked with a CWT and the adipose fin of juveniles produced from in-river broodstock collections will remain intact. Progeny of captive brood adults will also receive a vent clip, adipose fin clip, or some other co-manager agreed to mark to distinguish them from the offspring of adults collected in the river. Co-managers may release 10% of juveniles with an adipose fin clip to determine rates of encounter in mixed-stock marine fisheries. Facilities are sufficiently maintained and operated to accommodate the increase in production. Therefore, no analysis will be performed on those aspects of the program that will not change.

3.1. Consideration of New Circumstances and Information

The 2016 EA analyses of cultural resources, human health and safety, and environmental justice remain applicable because under the updated HGMP, increased hatchery production would have no effect on these resource areas. Of note are the following resource areas where the increased number of Chinook salmon sub-yearling releases and other proposed changes may result in direct and indirect effects.

Direct and Indirect Effects on Water Quantity and Water Quality

The 2016 EA analyzed water quantity effects from the hatchery programs at the Dungeness Hatchery (Chinook salmon, winter-run steelhead, coho salmon, and fall-run pink salmon). The hatchery has a surface water withdrawal permit, and the hatchery will be required to meet the same permit conditions

with the increased production to up to 600,000 Chinook salmon juveniles. Likewise, the hatchery must also comply with its National Pollutant Discharge Elimination System (NPDES) permit conditions with the additional Chinook salmon juvenile production. Thus, the impact of the increased Chinook salmon production would not be different than that analyzed in the 2016 EA because the hatchery will continue to comply with its applicable Washington State water withdrawal permit (which limits the amount of water allowed to be withdrawn for hatchery operations) and its NPDES permit (which limits the amount of pollutants that can be discharged into receiving waters), which is the same extent of potential impacts as was previously reviewed.

Cumulative Impacts on Water Quantity and Quality

There are no other past, present, and foreseeable future actions that would be different for water quantity and water quality from those analyzed in the 2016 EA. Because the water quantity and quality limits would not change with the proposed increase of production, there would be no change to the contribution to cumulative impacts from those analyzed in the 2016 EA.

Direct and Indirect Effects on Salmon and Steelhead

Salmon and steelhead that occur in the Dungeness River include listed Chinook salmon, summer-run chum salmon, and steelhead. Their listing status is unchanged from that described in the 2016 EA. Other non-listed salmon present in the Dungeness River include coho salmon, fall-run chum salmon, summer-run and fall-run pink salmon, and sockeye salmon. Effects to salmon and steelhead from release of hatchery production of an additional 400,000 Chinook juveniles are described in this section.

The general effects of increasing the number of Chinook salmon juveniles released from the Dungeness Hatchery on listed salmon and steelhead via hatchery facility impacts, genetics, masking, incidental fishing effects, population viability, and disease transfer essentially remain the same as those analyzed under the Proposed Action alternative in the 2016 EA. A hatchery production increase of up to 400,000 Chinook salmon juveniles, in addition to the current releases of up to 200,000 Chinook juveniles, would not result in a meaningful increase or change in these general hatchery effects described in the 2016 EA. This is because the Chinook production increase would not alter hatchery operations, alter the marking of juvenile salmon, change fishing regulations, nor result in changes to potential disease transfer between hatchery-origin and natural-origin fish. Regarding effects to population viability of Chinook salmon, the Dungeness Chinook salmon hatchery program will have a beneficial effect on Chinook salmon genetics and demographics because the program uses natural-origin Chinook salmon as broodstock to maintain the genetic diversity of the native population, while limiting the removal levels of returning natural-origin adults consistent with population needs. To further lower the genetic risks of captive rearing and increased numbers of hatchery spawners, the co-managers are limiting the increased production to a period of eight years, equal to two generations of Chinook salmon based on the age structure of the Dungeness River population. This will allow the numbers of spawners to be increased and then, when the captive broodstock component is terminated, allow for natural spawners to populate the watershed

The Dungeness River is not believed to support a summer-run chum salmon population, although these fish have been periodically observed in the Dungeness River during September and October as described in the 2016 EA. Thus, the proposed increase in Chinook juvenile releases would not result in an effect to summer-run chum salmon for either competition or predation, and effects would be the same as described under the Proposed Action alternative in the 2016 EA. Low numbers of spawning sockeye salmon are also periodically observed in the watershed. However, the status of sockeye salmon in the river is unknown, and the effect of increased hatchery production updated on sockeye salmon in freshwater would be the same as described in the 2016 EA.

Broodstock Collection

As described in the 2016 EA, Chinook salmon produced in the Dungeness River Hatchery are included as part of the Puget Sound Chinook salmon Evolutionarily Significant Unit, and listed with natural-origin fish as threatened. Hatchery-origin Chinook salmon make up a sizeable fraction of the annual naturally spawning adult abundance, averaging 77% for the basin from 2000 to 2011, and ranging from 39% to 96% (WDFW 2013a). The highest observed hatchery-origin escapements (2001-2006) reflect years when adult fish progeny of captive broodstock program Chinook salmon returned to spawn (PSIT and WDFW 2010). The captive broodstock program by design, was terminated after the 2003 brood (2006 return year), and escapements correspondingly decreased in return years 2007 through 2009. A reinitiated supplementation hatchery program based on sub-yearling and yearling fish releases is increasing adult returns and natural spawning levels (WDFW 2020).

The Dungeness Chinook salmon hatchery program will have a beneficial effect on Chinook salmon genetics and demographics because the program uses natural-origin Chinook salmon as broodstock to maintain the genetic diversity of the native population, while limiting the removal levels of returning natural-origin adults consistent with population needs. The number of natural- and hatchery origin adults collected from the Dungeness River to use as broodstock will increase from 112 to 130. Using more spawners will increase the genetic effective population size and act to maintain genetic variation (Barton et al. 2018). We expect that natural-origin Chinook salmon will make up 20-30% of the broodstock as is consistent with the proportion of natural-origin Chinook salmon in the adult escapement. Integrating natural-origin Chinook will ensure genetic drift and domestication do not lead to genetic differences between the natural and hatchery components of the population (Waters et al. 2015). The release of salmon produced as part of captive broodstock programs can provide a demographic benefit to a population experiencing low numbers (Kalinowski et al. 2012). For a period of eight years, the estimated duration of two Chinook salmon generations, release numbers will be increased to up to 600,000 using a captive rearing program to produce the increase of up to 400,000 juvenile Chinook salmon. While there can be genetics effects related to captive brood programs due to domestication and loss of genetic variation, with appropriate rearing standards captive rearing programs are also successful in increasing the number of spawners as well as lowering the loss of genetic variation due to genetic drift in small populations (Berejikian and Doornik 2018; Johnson et al. 2020). Limiting the captive brood program to an eight year time period will allow for a demographic boost without long term genetic effects associated with adaptation to the captive rearing environment (Kalinowski et al. 2012). Thus, the effect from broodstock collection and the new captive broodstock program would not change the impact findings described in the 2016 EA and is designed to lead to a demographic boost for the Chinook population.

Returning hatchery-origin Chinook salmon that are in excess of broodstock requirements have been used by the Dungeness Hatchery for nutrient enhancement through deposition of carcasses along streams. However, the release of an additional 400,000 juveniles would not result in a meaningful change to the amount of excess Chinook salmon used for nutrient enhancement, which would result in a similar effect as described in the 2016 EA. This is because nutrient enhancement from the Chinook salmon carcasses would occur in the same areas as previously analyzed in a similar manner (i.e., depending on adult return levels and the amount decided by applicants to use), and this benefit would not alter the ecological benefits of nutrient enhancement already occurring from marine-derived nutrients as the increase in adult carcasses available for nutrient enhancement will not rise to a measurable effect.

Competition and Predation

Ecological interactions between hatchery-origin and natural-origin fish may occur during both juvenile and adult life-history stages. Hatchery-origin fish released into freshwater habitats where natural-origin salmon and steelhead juveniles rear may compete with or prey on natural-origin fish. Returning hatchery-origin adults may also compete with natural-origin salmon and steelhead for spawning sites.

Competition from Hatchery-origin Chinook Salmon juveniles. When the Dungeness Hatchery releases Chinook salmon juveniles, other natural-origin salmon and steelhead juveniles that are out-migrating in the Dungeness River include natural-origin Chinook salmon, steelhead, coho salmon, and pink salmon as described in the 2016 EA. These salmon species would be susceptible to negative effects from competition. The proposed changes would likely result in a slight increase in those effects. None of the hatchery-origin species produced in the action area are likely to compete with natural-origin Chinook salmon and steelhead at substantial levels for food or space. All of the hatchery salmon and steelhead are released as smolts that will quickly emigrate seaward, and are only released in the lower portion of the watershed. For these reasons, the duration of, and opportunities for, interactions that would lead to competition with listed juvenile fish have been limited.

The majority of Chinook salmon juveniles released from the Dungeness Hatchery out-migrate rapidly due to the short distance from the hatchery to marine water (10.5 miles). Because these juveniles are released as smolts with an expected brief freshwater residence, as described in Tatara et al. (2016), they have a limited temporal overlap with natural-origin fish. As described in the 2016 EA, hatchery-origin Chinook salmon juvenile competition with other salmon and steelhead species in the Dungeness River is limited because the hatchery-origin fish are released as smolts close to marine waters and they are volitionally released as smolts that are physiologically ready to quickly move downstream. As a result, we expect that no more than 10 percent of the migrants in the Dungeness River would be comprised of hatchery-origin Chinook salmon 10 days after the release. Chinook salmon produced through the Dungeness River Hatchery program have been released in May or June, after the majority of natural-origin Chinook salmon have emigrated seaward. No predation effects have likely occurred as a result of hatchery Chinook salmon releases (NMFS 2022). We anticipate that this will not have a measurable increase in competition beyond the extent analyzed in the 2016 EA because other natural-origin fish (salmon and non-salmon) and hatchery-origin Chinook salmon are also present to contribute to the competition effect.

However, some natural-origin salmon and steelhead juveniles are currently lost to competition with the release of hatchery-origin Chinook salmon juveniles, particularly when there is overlap in time and space. Chinook salmon will have already left the system or will be at the end of their emigration while the age 1+ steelhead will remain for another year. There will be potential for competition, but this will be minimized as the Chinook sub-yearlings will be rapidly migrating out and will not remain in the system for a long time after they are released from the hatchery. The number of steelhead spawning naturally in the Dungeness River Basin is low and distributed over 18 miles of the Dungeness River as well as ~8 miles of the Gray Wolf River and other tributaries, thereby limiting the extent of competition.

Competition from Hatchery-origin Chinook Salmon Adults. Spawning and holding site competition and redd superimposition may occur between hatchery-origin fish and natural-origin fish that return to rivers and streams as adults and spawn during the same time of year. The proposed changes would result in a slight increase in those effects.

Adult hatchery-origin Chinook salmon could superimpose their eggs on top of redds from natural-origin Chinook, but the habitat is highly underutilized, making superimposition unlikely (SPSS 2005). The pink salmon program and the coho salmon program have a potential to result in negative ecological effects from returning hatchery-origin adults. Returning hatchery-origin pink salmon can compete for spawning ground with up to 17% of the spawning Chinook salmon in the Dungeness population and potentially superimposing redds on Chinook salmon redds during those years with returning hatchery-origin pink salmon. For the coho salmon program, redd superimposition may affect up to 190 sub-yearling Chinook smolts, which would be lost due to coho redd superimposition with the proposed release level, which equates to the loss of 1.1 returning adults each year.

A total release of 600,000 hatchery-origin Chinook is expected to result in an increase to 1800 to 2040 adult naturally spawning hatchery-origin Chinook above that analyzed in the 2016 EA. The risk of redd superimposition from the release of an additional 400,000 Chinook salmon juveniles would be minimally more than before, and result in impacts that are not meaningfully different from those previously analyzed in the 2016 EA.

Predation

The same situation that results in competition between hatchery-origin and natural-origin juveniles can also cause predation risk. The hatchery-origin Chinook salmon could prey on smaller fish, including salmon, as they out-migrate from the Dungeness River, but based on the smaller size of Chinook, this predation is unlikely. However, although predation in freshwater may slightly increase with the additional release of 400,000 Chinook salmon juveniles, effects from this increase are not expected to be different from effects described in the 2016 EA because of the short outmigration distance and the Chinook salmon juveniles would out-migrate rapidly (mostly within 10 days) from the Dungeness River as smolts.

Natural-origin juvenile steelhead of sizes vulnerable to predation by the hatchery yearlings emerge from upper-river redds later in the season, and are unlikely to be encountered or preyed upon. Sub-yearling Chinook salmon produced through the Dungeness River Hatchery program have been released in May or June, after the majority of natural-origin Chinook salmon have emigrated seaward. No predation effects have likely occurred as a result of sub-yearling hatchery Chinook salmon releases.

Releases of large numbers of hatchery-origin fish affect natural-origin juvenile salmon and steelhead by attracting other predators, such as birds and non-salmonid fish predators (Steward and Bjornn 1990). On the other hand, ongoing releases of hatchery-origin fish may protect natural-origin fish by providing prey to predators that may have otherwise preyed on natural-origin fish. However, as described above, the hatchery-origin Chinook salmon juvenile release would occur over a short period of time and, as smolts, the juveniles would rapidly out-migrate from the Dungeness River. Thus, effects would be similar to those described in the 2016 EA.

Cumulative Impacts on Salmon and Steelhead

As discussed above, increasing hatchery releases by 400,000 Chinook salmon juveniles would primarily result in effects on salmon and steelhead within the Dungeness River Basin and adjacent marine areas. Effects from these increased release levels in the Dungeness River Basin would be localized and are expected to have a very minor increment of cumulative impact, taken together with hatchery production elsewhere in Puget Sound, given over 167 million hatchery fish are released annually (NMFS 2019), and the total of 600,000 Chinook salmon juveniles released from the Dungeness Hatchery would represents less than 1 percent of total Puget Sound hatchery releases. There are no past, present, and foreseeable future effects that would be different from those analyzed in the 2016 EA. Currently, the primary factor that has limited salmon and steelhead populations in the Dungeness River Basin is degraded habitat, rather than effects from releases of hatchery-origin fish. Thus, the increased hatchery production under the updated proposed action would not have substantially different cumulative impacts on salmon and steelhead than that analyzed in the 2016 EA.

Direct and Indirect Impacts on Other Fish

Other fish, outside of salmon and steelhead, may prey on, be a predator of, or compete with Chinook salmon for food and cover. The production increase of 400,000 Chinook salmon juveniles from the Dungeness Hatchery would not affect their relationship with other fish because hatchery-origin Chinook salmon juveniles represent a small portion of the diet of other fish. Hatchery-origin Chinook salmon juveniles prey on a diversity of invertebrates and small fish, and competition between other fish and hatchery-origin Chinook salmon for cover and space is limited since hatchery-origin Chinook salmon

juveniles move rapidly into marine waters. Thus, the effects described for other fish remain unchanged from those described in the 2016 EA.

Since publication of the 2016 EA, there have been no new additions to listings of federally threatened and endangered fish, although the listing status of some species has changed (i.e., rockfish species). One federally threatened fish species, bull trout, occurs in the Dungeness River Basin, and effects from an increase in hatchery-origin Chinook salmon juveniles would provide additional prey for bull trout, which is a benefit. However, bull trout feed on a variety of fish, and the prey benefit of an additional 400,000 Chinook salmon juveniles would not be different than described in the 2016 EA. Adult bull trout accidentally caught in the Dungeness hatchery trap are immediately removed and returned to the river, and these impacts are not expected to be different because the broodstock collection duration and intensity will remain the same. Other effects include the potential of redd superimposition at bull trout spawning sites from Chinook salmon adults; however, the increased production is not anticipated to have a detectable additional impact on redd superimposition (USFWS 2018) because the redd superimposition effect of the original 200,000 Chinook juvenile release level was minimal (USFWS 2016), and bull trout tend to spawn in different habitats than Chinook.

Cumulative Impacts on Other Fish

The cumulative effects of increasing hatchery releases by 400,000 Chinook salmon juveniles on fish other than salmon and steelhead, when considered along with existing hatchery production across Puget Sound and other human activities in the Dungeness Basin and elsewhere in the Salish Sea, would be undetectable when considering the minimal additional effects discussed above in the context of the large number of other fish within the Dungeness River Basin and adjacent marine area. This finding takes into account the number of fish species, overall abundance, and the range of Chinook salmon in marine waters. The 2016 EA did not find significant cumulative impacts from the existing Chinook program, when added to other hatcheries and human activities in the region, as the existing hatchery contributed relatively few fish to the marine water environment, limiting its impacts to the direct impacts in the basin. There are no other past, present, and foreseeable future effects on other fish that would be different from those analyzed in the 2016 EA.

Direct and Indirect Impacts on Wildlife

The increase of 400,000 hatchery-origin Chinook salmon juveniles from the Dungeness Hatchery would be a slight benefit for those wildlife species that prey on Chinook salmon; however, because these smolts out-migrate rapidly from freshwater and then intermingle with a large assortment and abundance of other fish (including other natural-origin and hatchery-origin salmon) within the Dungeness River, the hatchery-origin Chinook salmon juveniles represent a small component of the diet of wildlife species. Wildlife predators that would primarily benefit from an increase in hatchery-origin Chinook salmon juveniles in the marine environment are marine mammals and marine bird species.

Marine mammals, such as harbor seals and Stellar and California sea lions would individually benefit from the additional Dungeness Hatchery Chinook salmon production. Harbor seals are the main marine mammal species that occurs in Dungeness Bay (USFWS 2014) and feed on salmon (Jeffries et al. 2018). Their local population has been estimated at 100 to 500 individuals (Jeffries et al. 2000) at haul outs in the Dungeness Bay vicinity with observed population increases in the Strait of Juan de Fuca within the past 10 years (Jeffries et al. 2018). Harbor seals have had a stable population since the 1990's (Ashley et al. 2020). Harbor seals are considered opportunistic feeders based on diet analyses in south Puget Sound (Lance and Jeffries 2009; Jeffries et al. 2018), with Chinook salmon representing a small component of their diet that consisted of more than 50 fish species. Thus, although harbor seals may prey on Chinook salmon juveniles and adults, they would not be expected to substantially predate on the increased Chinook salmon hatchery production. Effects to marine mammals would be the same as described in the 2016 EA.

The Southern Resident killer whale prefers Chinook salmon as prey. Adult salmon from hatchery releases in Puget Sound have partially compensated for declines in natural-origin salmon and may have benefited Southern Resident killer whales (Chasco et al. 2017). Because Southern Resident killer whales are food limited, the contribution of hatchery programs in the Dungeness River Basin to the prey base for Southern Resident killer whales is small but may be biologically meaningful. The increased Chinook production would result in a slight increase in the number of Chinook salmon produced in the Dungeness River available to Southern Resident killer whales. Over the past 20 years, Southern Resident killer whales have decreased in abundance, and as of January 2019, the Southern Resident killer whale population comprised 74 individuals (Center for Whale Research 2021) with the projected trend in population growth over the next 50 years as downward (NMFS 2016b). During the spring, summer, and fall, the whales spend a substantial amount of time in inland waterways of the Strait of Georgia, Strait of Juan de Fuca, and Puget Sound (Bigg 1982; Ford et al. 2000; Krahn et al. 2002; Hauser et al. 2007; Hanson and Emmons 2010). There are a low number of whale sightings in the Strait of Juan de Fuca near the Dungeness River throughout the year (NMFS 2008; Network 2018).

The estimated adult returns for the hatchery-origin Chinook salmon from an increase of 400,000 Dungeness Hatchery Chinook salmon juveniles to a total 600,000 juveniles is 1,800 to 2,040 annually (Haggerty 2019). This anticipates the expected natural and harvest mortality of adults returning from the Pacific Ocean. The returning adult Chinook salmon are available for consumption by Southern Resident killer whales and other marine mammals, are available for harvest (though there are no directed fisheries for natural-origin or hatchery-origin Chinook in the action area), and may incur other incidental mortality. In combination with other Chinook salmon adult mortality, the increased hatchery production would result in a similar benefit to wildlife as described in the 2016 EA.

Chinook salmon prey on invertebrates (amphipods, decapods, euphausiids) and fish. The increase in Chinook salmon juveniles within the Dungeness River may slightly decrease the availability of these prey, but the rapid outmigration of Chinook salmon juveniles would result in the same conclusion as that described in the 2016 EA, which is an unsubstantial effect on Chinook salmon prey. Chinook salmon do not compete with wildlife for food.

Cumulative Impacts on Wildlife

With ongoing climate variability and resulting effects on the environment due to climate change, wildlife populations will change slightly from year to year with some wildlife populations increasing and others decreasing. The production of additional Chinook salmon juveniles over an eight year period would not cause more than a very minor increment of cumulative impact to wildlife when taken together with other impacts including expected effects to wildlife from climate change. There are no other past, present, and foreseeable future activities that change conditions within the Dungeness River Basin and adjacent marine environment or affect wildlife abundance and presence. As a result, the 400,000 additional Chinook salmon juveniles from the Dungeness Hatchery would have a very minor increment of cumulative impacts on wildlife that would not be different from that analyzed in the 2016 EA.

Direct and Indirect Impacts on Socioeconomics

There are no directed fisheries for natural-origin or hatchery-origin Chinook, chum, or summer- or fall-run pink salmon, or natural-origin steelhead in the action area. Dungeness Chinook and fall-run pink salmon are propagated through the proposed hatchery programs for conservation purposes, and contribution to fisheries harvest is not an objective. As described by NMFS (2001) and (NMFS 2021), listed Hood Canal summer chum salmon, Puget Sound Chinook salmon, and steelhead are caught incidentally in fisheries targeting coho salmon and un-listed, hatchery winter steelhead within the action area. Incidental harvest of Dungeness Chinook, Hood Canal summer chum, and Dungeness steelhead in marine areas, outside of this action area, are currently managed to reduce risk to the viability and recovery

of these populations and species through separate ESA authorizations— NMFS (2001) for summer chum and NMFS (2020) for Chinook and steelhead.

The Dungeness River Hatchery employs staff to manage and operate the hatchery. The increase in work effort for the additional 400,000 Chinook salmon juveniles would not result in changes in employment or hatchery operations that are different than those described in the 2016 EA. Thus, effects on employment and expenditures at the hatchery from the updated action of increased hatchery production are the same as described in the 2016 EA.

Cumulative Impacts on Socioeconomics

No other past, present, and foreseeable future activities have been identified that would change the increment of cumulative effect when combined with the anticipated slight increase in returns of Dungeness Hatchery chinook salmon with the updated action of increased hatchery production. As a result, there are no socioeconomic cumulative impacts that would be different from those analyzed in the 2016 EA.

4. CONCLUSION

After considering the available new information and circumstances, and the updated action, NMFS has determined that there is no need to supplement the 2016 EA because: (1) the updates to the proposed action that are relevant to environmental considerations would not result in effects which are substantial; and (2) the new circumstances or information relevant to environmental concerns and bearing on the updated proposed action or its impacts are not significant under NEPA. As discussed above, the increase in Chinook hatchery production will cause slight changes to impacts; however, none of those changes are substantially different from the impacts analyzed in the 2016 EA that would warrant a supplemental EA or reconsideration of the 2016 FONSI. Consequently, the 2016 EA and FONSI remain valid and NMFS will continue to rely on them with respect to the proposed action, including the changes discussed herein.

5. LIST OF PREPARERS

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6. REFERENCES

Ashley, E. A., J. K. Olson, T. E. Adler, S. Raverty,E. M. Anderson, S. Jeffries, and J. K. Gaydos. 2020. Causes of Mortality in a Harbor Seal (*Phoca vitulina*) Population at Equilibrium. Frontiers in Marine Science. https://doi.org/10.3389/fmars.2020.00319.

Barton, M. L., N. M. Sard, and K. T. Scribner. 2018. Evaluation of effective number of breeders and coancestry among progeny produced using common hatchery mating strategies. Transactions of the American Fisheries Society 147:185-194.

Berejikian, B. A., and D. M. V. Doornik. 2018. Increased natural reproduction and genetic diversity one generation after cessation of a steelhead trout (*Oncorhynchus mykiss*) conservation hatchery program. PLoS One 13(1):1-13.

Bigg, M. 1982. An assessment of killer whale (*Orcinus orca*) stocks off Vancouver Island, British Columbia. Report of the International Whaling Commission 32(65):655-666.Bigg, M. 1982. An assessment of killer whale (*Orcinus orca*) stocks off Vancouver

Island, British Columbia. Report of the International Whaling Commission 32(65):655-666.

Chasco, B., I. C. Kaplan, A. Thomas, A. Acevedo-Gutiérrez, D. Noren, M. J. Ford, M. B. Hanson, J. Scordino, S. Jeffries, S. Pearson, K. N. Marshall, and E. J. Ward. 2017. Estimates of Chinook salmon consumption in Washington State inland waters by four marine mammal predators from 1970 to 2015. Canadian Journal of Fisheries and Aquatic Sciences 74(8):1173–1194.

Ford, J. K. B., G. M. Ellis, and K. C. Balcomb. 2000. Killer Whales: The Natural History and Genealogy of *Orcinus orca* in British Columbia and Washington State. Vancouver, British Columbia, UBC Press, 2nd Edition.

Haggerty, M. 2019. Memorandum to Emi Kondo (NMFS) from Mike Haggerty. Dungeness River Hatchery Coho Survival Rates. January 29, 2019. 4p.

Hanson, M. B., and C. K. Emmons. 2010. Annual Residency Patterns of Southern Resident Killer Whales in the Inland Waters of Washington and British Columbia. Revised Draft - 30 October 10. 11p.

Hauser, D. D. W., M. G. Logsdon, E. E. Holmes, G. R. VanBlaricom, and R. W. Osborne. 2007. Summer distribution patterns of southern resident killer whales *Orcinus orca*: core areas and spatial segregation of social groups. Marine Ecology Process Series 351:301-310.

Jeffries, S., A. Thomas, W. Walker, M. Lance, and S. Pearson. 2018. Harbor Seal Diet in South Puget Sound. South Sound Science Symposium. October 16, 2018. 54p.

Jeffries, S. J., P. J. Gearin, H. R. Huber, D. L. Saul, and D. A. Pruett. 2000. Atlas of Seal and Sea Lion Haulout Sites in Washington. WDFW, Wildlife Science Division, Olympia Washington. 157p.

Krahn, M. M., P. R. Wade, S. T. Kalinowski, M. E. Dahlheim, B. L. Taylor, M. B. Hanson, G. M. Ylitalo, R. P. Angliss, J. E. Stein, and R. S. Waples. 2002. Status Review of Southern Resident Killer Whales (*Orcinus orca*) under the Endangered Species Act. December 2002. U.S. Dept. Commer., NOAA Tech. Memo., NMFS-NWFSC-54. 159p.

Lance, M. M., and S. J. Jeffries. 2009. Harbor seal diet in Hood Canal, South Puget Sound, and the San Juan Island archipelago. Contract Report to Pacific States Marine Fisheries Commission for Job Code 497; NOAA Award No. NA05NMF4391151. WDFW, Olympia, Washington. 39p.

Network, O. 2018. Sightings of Southern Resident killer whale and other marine mammals on a monthly basis. Available at: http://www.orcanetwork.org/Main/index.php?categories_file=Viewpoints#Speciesbymonth. Accessed on November 26, 2018. Website accessed

NMFS. 2001. Endangered Species Act Section 7 Consultation Biological Opinion and Incidental Take Statement. Programs Administered by the Bureau of Indian Affairs and Activities Authorized by the U.S. Fish and Wildlife Service Supporting Tribal Salmon Fisheries Affecting Listed Puget Sound Chinook and Hood Canal Summer-run Chum Salmon Evolutionarily Significant Units. NMFS Consultation Number: NWR-2001-1431. September 14, 2001. 29 pages.

NMFS. 2008. Endangered Species Act- Section 7 Formal Consultation Biological Opinion. Effects of the 2008 U.S. Fraser Panel Fisheries on the Southern Resident Killer Whale Distinct Population Segment (Orcinus orca). NMFS Northwest Region. July 21, 2008. NMFS Consultation No.: NWR-2008-04296. 62p.

NMFS. 2016. Final Environmental Assessment to Analyze Impacts of NOAA's National Marine Fisheries Service Determination that Three Hatchery Programs for Dungeness River Basin Salmon as Described in Joint State-Tribal Hatchery and Genetic Management Plans Satisfy the Endangered Species Act Section 4(d) Rule. April 2016. NMFS, Seattle, Washington. 175p.

NMFS. 2019. Final Environmental Impact Statement for 10 Salmon and Steelhead Hatchery Programs in the Duwamish-Green River Basin. July 28, 2019. National Marine Fisheries Service, West Coast Region. 555p.

NMFS. 2020. Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat (EFH) Response Impacts of the Role of the BIA Under its Authority to Assist with the Development of the 2020-2021 Puget Sound Chinook Harvest Plan, Salmon Fishing Activities Authorized by the U.S. Fish and Wildlife Service, and Fisheries Authorized by the U.S. Fraser Panel in 2020. May 8, 2020. NMFS Consultation No: WCR-2020-00960. 345p.

NMFS. 2021. Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat (EFH) Response. Impacts of the Role of the BIA Under its Authority to Assist with the Development of the 2021-2022 Puget Sound Chinook Harvest Plan, the Role of the U.S. Fish and Wildlife Service in Activities Carried out under the Hood Canal Salmon Management Plan and in Funding the Washington Department of Fish and Wildlife under the Sport Fish Restoration Act in 2021-2022, and the Role of the National Marine Fisheries Service in authorizing fisheries consistent with management by the Fraser Panel and Funding Provided to the Washington Department of Fish and Wildlife for Activities Related to Puget Sound Salmon Fishing in 2021-2022. NMFS Consultation Number: WCRO-2021-01008. Sustainable Fisheries Division. May 19, 2021. 405 pages.

NMFS. 2022. Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response National Marine Fisheries Service (NMFS) Re-initiation Evaluation of Three Hatchery and Genetic Management Plans for Dungeness River Basin Salmon under Limit

6 of the Endangered Species Act Section 4(d) Rule. NMFS Consultation Number: WCR-2022-00977. Lacey, WA. June 9, 2022. 190 pages.

Steward, C. R., and T. C. Bjornn. 1990. Supplementation of Salmon and Steelhead Stocks with Hatchery Fish: A Synthesis of Published Literature. Technical Report 90-1. Idaho Cooperative Fish and Wildlife Research Unit, Moscow, Idaho. 132p.

Tatara, C., P. Swanson, M. Middleton, J. Dickey, G. Young, B. Gale, M. Cooper, M. Humling, D. Larsen, J. Atkins, R. Endicott, D. V. Doornik, and B. Berejikian. 2016. Advance Hatchery Reform Research, Project number 1993-056-00. January, 2016. NMFS, Manchester, Washington. 62p.

USFWS. 2014. Dungeness National Wildlife Refuge, Watchable Wildlife. August 2014. 11p.

USFWS. 2016. Endangered Species Act Section 7 Consultation Biological Opinion NMFS 4(d) Rule Determinations for WDFW Salmon and Steelhead hatchery operations in the Dungeness River Watershed, Clallam County, Washington. April 13, 2017. USFWS Reference 01EWFW00-2014-F-0132. 176p.

USFWS. 2018. Email from Martha Jensen (USFWS) to Emi Kondo (NOAA). Consultation email, Dungeness coho production increase. November 5, 2018. 2p.