UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
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MEMORANDUM FOR: Robert Turner, Commissioner and Chair, U.S. Section
Pacific Salmon Commission

FROM: Peter Dygert, NOAA Fisheries, Sustainable Fisheries Division
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SUBJECT: Hatchery Production Initiative for Increasing Prey Abundance of Southern Resident Killer Whales

The U.S. Section of the Pacific Salmon Commission has been discussing a funding package for new hatchery production to increase the prey abundance for Southern Resident killer whales (SRKW) in recent weeks. In response to the Section's request, NOAA Fisheries provided some initial estimates of the cost and benefits of such program and promised to provide a more specific proposal for its consideration. The following report fulfills that commitment.

The status of SRKW has declined significantly to a current low of just 75 animals. The key limiting factors for SRKWs include noise and disturbance from boat traffic, high contaminant levels, and low abundance of the SRKW's preferred prey including, in particular, Chinook salmon. There is consensus in the region that aggressive action is required on all fronts to forestall further decline and initiate a positive trend toward recovery. While it is understood that no single action will be sufficient to achieve recovery, it is also true that increasing prey abundance is a high priority for stabilizing the population. Beyond the fishery reductions that are likely to occur as part of the renewed Pacific Salmon Treaty (PST) agreement, another action that could quickly increase prey abundance is to increase the production of hatchery fish. NOAA Fisheries, in cooperation with other partners in the region, have been developing information necessary to inform what we refer to as the Hatchery Production Initiative. We believe that it is possible for additional hatchery production of Chinook salmon to make a significant difference in prey abundance in the near term. A summary of our conclusions is provided below.

The goal of the hatchery production initiative is to provide a "meaningful" increase in the abundance of age 3-5 Chinook salmon in the times and areas most important to SRKWs. We seek to increase abundance in inside areas (Puget Sound) in the summer and outside areas (coastal) during the winter where we believe prey abundance is most limiting. In a recent paper Lacy et al. (2017) concluded that a 15% increase in prey abundance, coupled with essential actions to address other limiting factors, would allow the population to achieve a growth rate of 2.3% that is consistent with current recommendations for recovery. Although there is no bright

line that defines what we seek to achieve through the Hatchery Production Initiative, the Lacy et al. (2017) reference provides a benchmark for evaluating success.

The key questions going into the Hatchery Production Initiative are how much of an increase in hatchery production is required to make a meaningful difference, how much will it cost and can we find "safe" places for the new hatchery production that will not compromise efforts to recover ESA-listed Chinook salmon.

Several sources of information were necessary to address these questions. First, NOAA and Washington Department of Fish and Wildlife (WDFW) developed a framework to identify the priority Chinook salmon stocks that are most likely to contribute to the prey abundance in the times and areas of concern (NOAA Fisheries and WDFW 2018). Second, WDFW and others worked to identify hatchery production facilities with available capacity that could be used to increase the production of Chinook, and other facilities that could be brought online with some investment in infrastructure improvements. The objective of this review was to find places to increase production as quickly as possible and with minimum cost. Finally, we needed a way to estimate the increase in prey abundance that would result from an increase in hatchery production. To accomplish this we used the Fishery Regulation Assessment Model (FRAM), which is used by fishery managers to design and evaluate fisheries, and has been used in the past to assess fishery effects on SRKW prey abundance. These tools in combination allowed NOAA to evaluate a scenario for increasing the production of Chinook smolts, from several of the priority stocks, by specific amounts, and from several facilities identified as having available capacity. The facility specifics were necessary to estimate cost. The stock specifics were necessary as input to the FRAM model to estimate the effect on prey abundance. Additional considerations that went into developing the scenario were to find facilities that were "safe" and that were as diverse as possible in terms of location, stock, and life history type. Developing a diverse portfolio for the production increases is intended to help mitigate the uncertainties about which stocks will contribute most to the needs of the SRKWs.

Although NOAA developed a preliminary scenario to do the analysis, (numbers of additional smolts at specific facilities), it is important to emphasize that we are not suggesting that the particulars of this scenario should be used going forward. Instead, we appreciate that the co-managers have knowledge and expertise, and great interest in where new production may be located and will have to be directly involved in a decision making process about where the new production should go. However, the approach used in developing the scenario is important if we are going to be successful in increasing prey abundance in the key times and areas at least cost and with the least impact to ESA-listed salmon.

Results of the analysis suggest the following. For $5 million per year we can produce an additional 20 million Chinook smolts. Five or six million smolts should come from facilities in Puget Sound with the remainder from the Washington coast and Columbia River. This disproportionate distribution results from the fact that the abundance of Chinook in the ocean is about three times higher than it is in the Puget Sound. We estimate that increasing production by 20 million smolts with the above described distribution will increase prey abundance with existing fisheries by 4-5% in inside areas in the summer and coastal areas in the winter.

NOAA also considered what more could be done for $10 million per year – would an additional $5 million per year allow us to double production to 40 million and prey abundance in the key areas to 8-10%? Although we did not develop an additional site specific scenario as we did in the first instance, we did continue to focus on the assessment of available hatchery production capacity to develop a more qualitative proposal for how an additional $5 million could be spent.

In our second assessment we remained focused on priority stocks from Puget Sound and the Washington coast and Columbia River and in areas that minimize the impacts to ESA-listed salmon. With those constraints we believe that some of the additional funding would have to be used initially for improvements in existing facility infrastructure designed to increase capacity. For example, for 10-year initiative funded at a total of $10 million per year, we expect that $7 million could be used in the first year to increase hatchery production, while $3 million is used for infrastructure development. Once the infrastructure improvements are completed, this money would be redirected to increasing production. How long the infrastructure work takes will depend on the underlying details, but we expect the all the work could be completed by no later than year five so that by year six and possibly sooner, the full $10 million could be directed toward increased hatchery production, and for the second half of the 10-year term, we can reasonably expect to roughly double the benefit that was estimated in the first proposal. For $10 million we believe it would be possible to increase Chinook salmon production by 40 million smolts per year and achieve an estimated 8-10% increase in prey abundance with existing fisheries.

References

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