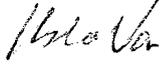




UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Fisheries Science Center
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SEATTLE, WASHINGTON 98112-2097

July 20, 2004

MEMORANDUM FOR: D. Robert Lohn
NW Regional Administrator

FROM: 
Usha Varanasi
Science and Research Director
NW Fisheries Science Center

SUBJECT: Review of additional information related to a "Petition to list the Cherry Point population of Pacific herring, *Clupea pallasii*, as "threatened" or "endangered" under the Endangered Species Act, 16 U.S.C. § 1531 *et seq.* (1973 as amended)"

On March 12, 2004, you requested the Center's review of a petition to list Cherry Point herring as a distinct population segment (DPS) under the ESA. Specifically, you asked us to consider five questions:

- 1) Does the petition present substantial information regarding the discreteness of the Cherry Point Pacific herring stock?
- 2) Does the petition present substantial information regarding the significance of the Cherry Point Pacific herring stock?
- 3) If the answers to questions (1) and (2) are "yes" (i.e., the petition presents substantial information indicating that the Cherry Point herring stock may qualify as a DPS), then does the petition present substantial information indicating that a putative Cherry Point DPS may be threatened or endangered throughout all or a significant portion of its range?
- 4) If the answers to questions (1) or (2) or both is "no" (i.e., the petition does not present substantial information indicating that the Cherry Point herring stock may qualify as a DPS), then does the petition present substantial information indicating that the Cherry Point herring stock may represent a significant portion of the range of the presently identified Georgia Basin Pacific herring DPS?
- 5) If the answer to question (4) is "yes", then does the petition present substantial information indicating that the Cherry Point herring stock may be in danger of extirpation?

Center staff reviewed the information provided by the petition, and concluded in a March 30th memo to the Region that answers to questions (1), (2), and (4) were "no", indicating that we did not believe the petition presented substantial information related to the DPS status of Cherry Point. We did not respond to questions (3) and (5), as these were contingent upon "yes" answers to the other questions.

Subsequently, the agency received some additional information from the petitioners, and the Regional staff requested that the Center review it as well (June 1st e-mail from Garth Griffin to Michael Ford). The additional information consists of

- 1) A report from the Washington Department of Fish and Wildlife on a study of genetic variation among Puget Sound herring (Small et al. 2004),
- 2) Information indicating that the 2004 spawning abundance of Cherry Point herring is "dismal",
- 3) A scientific paper (Wilson et al. 2003) on hemng sound production, and
- 4) A scientific paper (Ceballos and Ehrlich 2002) indicating that mammalian population losses are a precursor to species extinction.

In addition, Regional staff also provided a letter from Svend A. Brandt-Erichsen of HellerEhrman Attorneys, representing the owner of a refinery near Cherry Point, reviewing the petition. The letter included an attached CD containing a number of reports related in various ways to Cherry Point herring.

Below, we review this material with reference to the five questions posed by the Region's March 12th memo.

Questions 1 and 2: Does the petition present substantial information regarding the discreteness of the Cherry Point Pacific herring stock? Does the petition present substantial information regarding the significance of the Cherry Point Pacific herring stock?

The original petition cited recent genetic data from the Canadian Department of Fisheries and Oceans (Beacham et al. 2001, 2002), isotopic ratios in otoliths (Gao et al. 2001), spawn timing and location, parasites, and diet as evidence of population discreteness. In the Center's review of the petition, we concluded that this did not represent substantial information related to the question of population discreteness for reasons discussed in detail in the March 30th memo. Center staff reached the same conclusion regarding population significance. For questions of both discreteness and significance, however, we noted that additional genetic information might potentially alter the conclusions.

Based on a review by Center staff, the new WDFW report (Small et al. 2004) does present substantial information regarding the discreteness, and potentially the significance, of the Cherry Point herring stock. The report describes microsatellite DNA variation within and among 16 population samples (1511 individuals) of Pacific herring, including 12 population samples from Puget Sound, 4 of which were samples of Cherry Point spawners from different years (384 individuals). Like the Canadian studies (Beacham et al. 2001, 2002), the report generally found only low levels of genetic differentiation among samples, consistent with many other studies of marine fish species. However, the four Cherry Point samples were consistently differentiated from other Puget Sound samples, providing some evidence for population discreteness, and potentially some information related to the question of significance. We emphasize that it would be premature to conclude on the basis of this report that the Cherry Point population is either discrete or significant as defined by the agency's DPS policy. We do believe that the report, in combination with the Beacham et al. (2001, 2002) reports, presents substantial information of relevance to DPS status.

None of the other additional information provided by the petitioners is of direct relevance to either question.

Much of the information provided by Mr. Brandt-Erichsen had been previously reviewed by the BRT or was also contained in the petition. Among the reports that we had not previously reviewed were a series of five annual reports summarizing observations of the intertidal zone of the Cherry Point shoreline (Kyte 1999-2003) and three risk assessment studies focused on the Cherry Point herring stock; Landis et al. (2000), Landis et al. (2004; cited as "in press" in the Brandt-Erichsen letter); and Markiewicz et al. (2001). The Brandt-Erichsen letter highlighted the Landis et al. (2004) study as providing "solid evidence of at least periods of straying into the Cherry Point stock."

These references contain much that is of value for analysis of risks to the Cherry Point herring stock; however the only potential information that appears pertinent to questions 1 and 2 is evidence of apparent immigration into the Cherry Point stock from other sources (Markiewicz et al. 2001, Landis et al. 2004) that was interpreted in these references as evidence that Cherry Point herring may be part of a larger metapopulation. In particular, Landis et al. (2004) stated that

From 1973 until 1979 there was an apparent greater number of Age 3 fish than could be accounted for from the previous years' numbers of Age 2 fish. Although the increase may be the result of sampling error, the increases were occasionally 30-70 times the expected number. This suggests that at one time there was immigration into the Cherry Point Pacific herring population that corresponded to the periods of high population numbers. If immigration is important to the understanding of the long-term population dynamics of the Pacific herring at Cherry Point then it is critical to understand the relationships among the various spawning populations in the Strait of Georgia.

These conclusions are based on the assumption that age-at-maturity (or age of recruitment into the spawning population) has remained constant since the 1970s and that all age-2 herring were mature and part of the spawning population during the 1970s. Alternatively, it is possible that during the 1970s to the mid 1980s a large portion of the Cherry Point stock did not recruit into the spawning population until age-3 or perhaps age-4. Thus, a large percentage of the age-2 herring would not be present on the spawning grounds since they were still immature. Stout et al. (2001) recognized the above relationship of age-2 and age-3 herring at Cherry Point (their Table 12) and interpreted these data as evidence of “a reduction in the age at maturity” (Stout et al. 2001; p.131). A similar situation obtains in northern BC where herring are fully recruited into the spawning population at age-4 and there are typically more age-4 fish than age-3 fish in the catch. This has generally been interpreted as evidence that a large part of the age-3 cohort is immature and has yet to recruit into the spawning population (“age-3 immature hypothesis”); however, alternative hypotheses invoke episodic migrations of mature herring from southern to northern areas to explain the apparent discrepancies between percent at age data and observed age-at-maturity (Hay and McCarter 1999). These competing hypotheses remain unresolved, so that we do not believe that these data necessarily provide “solid evidence” of straying into the Cherry Point stock from other sources.

Question 3: If the answers to questions (1) and (2) are “yes” (i.e., the petition presents substantial information indicating that the Cherry Point herring stock may qualify as a DPS), then does the petition present substantial information indicating that a putative Cherry Point DPS may be threatened or endangered throughout all or a significant portion of its range?

NWFSC staff consider a variety of information in evaluating the level of risk faced by a DPS, including: 1) absolute numbers of fish and their spatial and temporal distributions, 2) current abundance in relation to historical abundance and carrying capacity of the habitat, 3) trends in abundance, 4) natural and human-influenced factors that cause variability in survival and abundance, 5) possible threats to genetic integrity (e.g., selective fisheries), and 6) recent events (e.g., climate change and changes in management) that have predictable short-term consequences for the abundance of a DPS. Additional risk factors, such as disease prevalence or changes in life-history traits or population structure, also may be considered in the evaluation of risk to a population. Since NMFS status reviews do not normally attempt to evaluate causal factors leading to the current status of a DPS, beyond the degree that they contribute to an evaluation of risk, much of the information in the petition detailing potential “causes of decline” (Section IX. Threats and Causes of Decline) is not directly relevant to an analysis of risk.

The petition presents relevant data on risk to the Cherry Point stock in “Section VIII. Current Status” and “Section IX. Part E. Other Natural and Manmade Factors Affecting Continued Existence.” Much of this information was available at the time of the 2001 status review. Although the 2001 Pacific Herring BRT concluded that the Georgia Basin Pacific herring DPS was neither at risk of extinction nor likely to become so, the Cherry Point stock was noted to have declined to such an extent that it may meet the

International Union for Conservation of Nature and Natural Resources (IUCN) criteria to be considered “vulnerable” (Stout et al. 2001, p. 145) and by this definition is “considered to be facing a high risk of extinction in the wild” (IUCN 2001). In addition, a quantitative analysis of trends in abundance at Cherry Point indicated that “There is greater than 50% chance that the Cherry Point population will decline to 1 ton or less in 100 years.. .,” and that “A one ton population of herring would be sufficiently small to be considered very close to extinction and difficult to detect” (Stout et al. 2001, p.129-130). Since the status review, the Cherry Point population has shown an increasing abundance trend. The current 2004 spawner biomass estimate of 1,734 tons (as of June 9, 2004) is at its highest level since 1996 (Kurt Stick, WDFW, Pers. Commun. to R. Gustafson, NWFSC). Shoreline spawning was also reported to be more extensive at Cherry Point in 2004 than it has been for a number of years (Kurt Stick, WDFW, Pers. Commun. to R. Gustafson). Despite this positive short term trend in abundance, most of the information that led the Pacific herring BRT to reach their conclusions on risk to the Cherry Point stock has not changed. The Center therefore believes that the petition does present substantial information indicating that a putative Cherry Point DPS may be threatened or endangered throughout all or a significant portion of its range.

Questions 4 and 5 were addressed in March 30th memo.

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