Enclosure 1: National Marine Fisheries Service Comments on Environmental Protection Agency's Draft Aquatic Life Ambient Water Quality Criteria for Cadmium

January 26, 2016

Enclosed are comments for the National Marine Fisheries Service (NMFS) on the Environmental Protection Agency's (EPA) Draft Aquatic Life Ambient Water Quality Criteria for Cadmium for species listed as threatened or endangered under the Endangered Species Act (ESA). Our comments take into account that we apply a threshold for insignificant effect under §9(a)(1) of the act, which states: *"...no one, public or private, can "take" an endangered species of fish or wildlife."* This is necessary because effects to individuals of an ESA-listed species can have significant implications for the persistence of the population they belong to. Thus the threshold that must be applied when evaluating effects to ESA-listed species is that "take" of an individual should not occur. Regardless of whether an ESA-listed species is more or less sensitive to a toxicant than common laboratory species in standards tests, the critical consideration for the protection of an ESA-listed species is the implication of losing the reproductive contribution of an individual for the persistence of the population.

PRIOR ESA SECTION 7 CONSULTATIONS

Our West Coast Region Office have previously issues ESA Section 7 consultations with EPA on cadmium criteria proposed by the states of Oregon and Idaho. We refer EPA to these prior consultations and reference portions of these signed decisional documents with these comments. In particular, we include sections from both consultation documents that evaluate the suitability of EPA's national criteria methodology in arriving at guidelines that are protective of ESA-listed species (see NMFS Attachments 1 and 2).

NMFS evaluation of Oregon's proposed water quality criteria for cadmium

At 2.1micrograms/liter (µg/L), EPA's freshwater acute guideline is slightly above Oregon's proposed criterion of 2.0 µg/L. NMFS determined that the Oregon criterion would jeopardize the continued existence of ESA-listed species occurring in that state. We understand that EPA Region 10 is currently working on a response to the reasonable and prudent alternative (RPA) proposed by NMFS to address this issue. The RPA requires EPA to disapprove the State of Oregon's acute criterion and recommend the state adopt an acute criterion derived using a more suitable approach, promulgating that criterion if necessary (see NMFS Attachment 3).

Specifically, several of the 96 hour LC50 data for ESA-listed species used in the derivation of the Oregon standard are below the criterion, so NMFS used these data to evaluate the implications on population growth rates. These analyses identified cases where population growth rates would be significantly altered on exposure to 2.0 µg/L cadmium (see NMFS Attachment 4).

EPA's chronic freshwater guideline for cadmium is also higher than the chronic criterion proposed by Oregon (0.73 µg/L vs 0.25 µg/L). NMFS analyses indicated exposure to 0.25 µg/L cadmium would result in sublethal effects, but the effects did not rise to the level of jeopardy. EPA's 0.73µg/L guideline is nearly three-fold Oregon's criterion and would be expected to result in more severe effects. However, the degree of severity cannot be inferred from the analyses in this consultation.

EPA's salt water acute and chronic cadmium guidelines are lower than those proposed by Oregon, and NMFS determined the Oregon-proposed values to not be a concern for Oregon's ESA-listed fish under NMFS jurisdiction. The NMFS determined the criteria were not likely to adversely affect ESA-listed sea turtles or large whales because their occurrence in waters affected by the criteria would be rare, infrequent, and transitory in nature and they would be unlikely to accumulate a significant amount of persistent pollutants such as cadmium because they primarily consume lower trophic-level prey.

NMFS evaluation of Idaho's proposed water quality criteria for cadmium

In 2006 Idaho proposed acute and chronic freshwater criteria of 1.3 and 0.6 µg/L, respectively. NMFS performed an independent analysis and, based on this analysis, concurred with EPA's assessment that these criteria were not likely to adversely affect Idaho's ESA-listed salmonids under NMFS jurisdiction (see NMFS Attachment 5). The application of the "take of an individual should not occur" threshold for effects in NMFS' independent analyses suggests that the Idaho criteria are protective of ESA-listed salmonids in other states. However, application of the criteria elsewhere would still require an analysis incorporating location-specific considerations.

SPECIES NOT EVALUATED IN PRIOR CONSULTATIONS

Sea Turtles

The Oregon consultation concluded that ESA-listed sea turtles would be unlikely to accumulate a significant amount of cadmium specifically from state waters. However EPA's cadmium guidelines apply to all waters of the US, so exposures would occur throughout the US portion of sea turtle ranges. Further, cadmium accumulates in tissue with age, and sea turtles are understood to be very long lived species. For example, green turtles reach sexual maturity between 20 and 50 years of age. For such long lived species we would need to consider whether cadmium accumulation from US waters over a lifespan would reach tissue concentrations directly resulting in or contributing to adverse effects. Dietary exposure of the more omnivorous sea turtle species (i.e., leatherback, loggerhead) was a particular concern voiced by staff at the NMFS Southeast Regional Office

Sturgeon and Smalltooth Sawfish

Data on the effects of cadmium on smalltooth sawfish and Atlantic, Gulf, or shortnose sturgeon species are not available. In the absence of species-specific data, data for surrogate laboratory species are typically applied. For example, rainbow trout are commonly used in laboratory toxicity tests and, because they are cold water fish that are taxonomically closely related to ESA-listed salmonid species, they are considered suitable surrogate species for ESA-listed salmonids. Similarly, the fathead minnow is considered a suitable surrogate species for warm water fish. While there are some data for aquatic exposures of white surgeon to cadmium, an evaluation of ambient aquatic exposures alone would be inadequate to assess effects to ESA-listed sturgeon and smalltooth sawfish under NMFS jurisdiction. Like sea turtles, these species are long lived and dietary accumulation is likely a significant exposure pathway. For example, the lifespan of Atlantic sturgeon is 60 years and the lifespans of smalltooth sawfish and other sturgeon averages between 20-30 years, with Gulf and shortnose sturgeon maximum reported lifespans at 60 and 67 years, respectively. Further, sturgeon species use US fresh and marine waters exclusively and are known to ingest sediment (which may include particulate-bound cadmium originating from the

water column) with their benthic prey.

Corals

Data on the effects of cadmium on ESA-listed coral species were not applied in the derivation of the cadmium water quality guidelines. A fertilization success study reported that success rate declined to 52% at cadmium concentrations of 5000 µg /L over a control rate of 78% success.[1] In another study, 14 day long cadmium exposures of coral resulted to increased antioxidant response at 5 µg/L after 4 days and mortality at 50 µg /L after 2-3 days.[2] A study evaluating the zooxanthellate sea anemone, *Aiptasia pulchellaas,* as a surrogate test species for corals reported 6 hour EC50s and 96 hour LC50s effects thresholds ranging from 249 to 2250 µg /L cadmium.[3] While these data suggest that the EPA guidelines for cadmium in marine waters are protective of coral species, this body of evidence is severely limited by the absence of data on colonization and recruitment, wound recovery, and predation activity.

CONCLUSION

In light of the substantial data gaps and the concerns expressed in prior consultations regarding EPA's guideline development methodology, EPA needs to work with NMFS to conduct a more thoughtful evaluation of the implications of their guidelines for ESA-listed species and apply a more suitable analysis in guideline derivation, taking existing assessments of state-proposed criteria into consideration. New data are needed, but its generation needs to strategically target issues identified in prior consultations and those stated above.

Remarks on EPA's approach to addressing its obligations under the ESA

NMFS understands that EPA considers its development of water quality guidelines to not be subject to ESA consultation. EPA's reliance on ESA section 7 consultation only when the agency approves state-proposed water quality criteria results in a piecemeal approach when considering implications of such guidelines for broadly ranging species. The segmentation of an action under ESA section 7 leads to an incomplete consideration of the effects of the action that is legally vulnerable. Both agencies need to agree on and implement an assessment strategy that takes into account the aggregate effects of EPA's authorizations of state-proposed water quality criteria such that EPA can ensure that these authorizations, taken together, do not jeopardize the continued existence of ESA-listed species or adversely modify designated critical habitat. Given the scope of the guidelines, the conclusions of such an assessment and any associated implementation guidance would need to have the same authority/regulatory implications of a section 7 consultation.

[1] Reichelt-Brushett and Harrison, Coral Reefs (2005) 24: 524–534
[2] Mitchelmore et al., Aquatic Toxicology 85 (2007) 48–56
[3] Howe et al, Marine and Freshwater Research (2014) 65, 551–561