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**From:** Cathy Marcinkevage - NOAA Federal <cathy.marcinkevage@noaa.gov>  
**Sent:** Thursday, May 9, 2019 11:41 PM  
**To:** Garwin Yip - NOAA Federal  
**Subject:** Re: ROC LTO Climate Change Text

Here's your revisions to the V2 and the excerpted text from analytical approach that uses this.

From P. 6-7 of analytical approach:

Recent court cases have reinforced the requirements provided in the ESA section 7 implementing regulations that NMFS must evaluate the effects of a PA within the context of the current condition of the species and critical habitat, including other climate change on the species and critical habitat and our analysis of the future impacts of a proposed action. NMFS acknowledges that the effects of climate change could have notable impacts on listed species while also recognizing the challenge in quantifying those effects. Conservation of protected resources becomes more difficult when considering a changing climate, especially when accounting for the relative uncertainty of the rate and magnitude of climate-related changes and the response of organisms to those changes. Accordingly, NMFS issued general policy guidance for treatment of climate change in ESA decisions (Sobeck 2016). This guidance aligns with case law, noting the need to consider climate change in determinations and decisions despite the challenges of climate change uncertainty, and it provides policy considerations related to climate change that NMFS should use in ESA decision making, including ESA section 7 consultations.

In addition to Sobeck (2016), NMFS regional guidance (Thom 2016) further recommends use of the Representative Concentration Pathway (RCP) 8.5 scenario from the Fifth Assessment Report (AR5). Sobeck (2016) notes that “when data specific to (the RCP 8.5) pathway are not available, (NMFS) will use the best available science that is as consistent as possible with RCP 8.5.” Climate change is incorporated into this analysis implicitly to an extent by the modeling results provided in the BA and additionally by qualitative evaluations that reflect more recent climate predictions applied in the biological opinion. The modeling of the PA as provided in the biological assessment characterizes a 2030 scenario of climate conditions, water demands, and build-out. In doing so, the PA uses a multi-model ensemble-informed approach to identify a best estimate of the consensus of climate projections from the third phase of the Coupled Model Intercomparison Project (CMIP3), which informed the Intergovernmental Panel on Climate Change’s (IPCC) Fourth Assessment Report (AR4). These results are downscaled to a spatial resolution of approximately 12 km. This assessment report and approach results in an anticipated temperature change of +0.7 to +1.4 °C (representing the 25<sup>th</sup> to 75<sup>th</sup> quartile) and a precipitation change of -6% to +6%. Additionally, the approach used in for the PA characterizes 2030 sea level rise an 15 cm. However, based on results from the application of RCP 4.5 and RCP 8.5 in California’s Fourth Climate Change Assessment (He et al. 2018, Pierce et al. 2018), NMFS expects that climate conditions will follow a more extreme trajectory of higher temperatures and shifted precipitation into 2030 and beyond. As provided by the assessment, NMFS assumes that temperatures would increase up to 1.9 °C between 2020-2059 and precipitation changes would range from -6% to +24% in the same period (He et al. 2018). Sea level rise is expected to range up to 15 cm in 2030 and 10-38 cm in 2050 (Pierce et al. 2018).

The October 29, 2018, Presidential Memorandum on Promoting the Reliable Supply and Delivery of Water in the West directed NMFS to complete this biological opinion within 135 days of receiving the biological assessment, and NMFS does not possess the expertise required to independently generate equivalent project modeling that uses data specific to RCP 8.5. Therefore this consultation assumes that the provided modeling represents a best-case scenario regarding climate conditions for 2030 and, to account for the differential in

increased temperature, shifted precipitation, and projected sea level rise between the CMIP3 and California's Fourth Climate Change Assessment, NMFS will layer qualitative evaluations of increased climate effects onto the provided modeled data. This is consistent with guidance that "NMFS does not need to know with precision the magnitude of change over the relevant time period if the best available information allows NMFS to reasonably predict the directionality of climate change and overall extent of effects to species or its habitat" (Sobeck 2016).

Longer-term responses to climate uncertainty can be incorporated into a reinitiation trigger focused on regular assessments of adherence to the climate assumptions used in the analysis of this opinion. To address shorter-term deviation from the current predictions, NMFS expects to be able to incorporate climate uncertainty into science plans by including monitoring of climate change effects and projections; taking management actions; and adjusting water operations, research, and monitoring in response as needed. Such responses may include, for instance, identifying alternative locations for implementing restoration or habitat protection actions to increase habitat availability and suitability, increasing productivity of the food web, better managing predators and invasive species, or allowing species movement across environmental gradients. Adjustments to water operations associated with inflow, outflow, and exports are another example of potential responses to approaching reinitiation triggers.

On Fri, Apr 12, 2019 at 10:09 AM Garwin Yip - NOAA Federal <[garwin.yip@noaa.gov](mailto:garwin.yip@noaa.gov)> wrote:  
See attached for my track changes.

I agree with how the document lays out our consideration of the best available climate change assessment, and how we would qualitatively consider those effects on top of those in our analyses.

Seems like we could add a general summary of climate change in the "key consultation considerations" section, then paste the attached into the BiOp (I forget whether it's environmental baseline, cumulative effects, or both), and insert a qualitative summary in each of the division effects sections (and in turn, the I&S section).

-Garwin-

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On Thu, Apr 11, 2019 at 11:43 PM Cathy Marcinkevage - NOAA Federal <[cathy.marcinkevage@noaa.gov](mailto:cathy.marcinkevage@noaa.gov)> wrote:

All --

Attached is a first draft of text to insert (in the effects analysis?). This mirrors some language already inserted into the latest draft of the analytical approach, but with some more detail. I'd like to use this to help identify how we thread a qualitative assessment of the updated climate change projections into our document -- recognizing that we simply DO NOT have something that quantitatively translates the differences between the BA projections and the latest projections into a readily usable metric or change in result.

I'm happy to hear thoughts on this and ideas on incorporating it into our document. Let's shoot for COB Tuesday, 4/16.

Feel free to let me know if anyone else should contribute to this.

Thanks,  
Cathy