

<i>NATIONAL MARINE FISHERIES SERVICE PROCEDURE 02-110-18</i> Effective on: February 15, 2023	
To be reviewed on: February 15, 2028	
Protected Resources Management Conservation of Threatened and Endangered Species 02-110	
Guidance for Treatment of climate Change in NMFS Endangered Species Act Decisions	
NOTICE: This publication is available at: https://www.fisheries.noaa.gov/national/laws-and-policies/policy-directive-system	
Author name: Angela Somma Office: Protected Resources	Certified by: Kim Damon-Randall Office: Protected Resources
Type of Issuance: Renewal	
<i>SUMMARY OF REVISIONS:</i> This procedure supersedes the 2016 <i>Guidance for Treatment of Climate Changes in NMFS Endangered Species Act Decisions</i> .	
Signed _____ Name _____ Date _____ Title _____	

I. Introduction

When the Endangered Species Act (ESA) became law in 1973, climate change was not a widely recognized issue. Since that time, it has become a key lens through which resource management decisions must be evaluated and addressed. The courts have affirmed the importance of considering climate change in determinations and decisions under the ESA, despite the uncertainty that makes predicting specific impacts from climate change challenging. To address this need, in 2015, NMFS adopted national ESA climate guidance to provide greater consistency, efficiency, and effectiveness in ESA decisions and help the agency make more scientifically defensible ESA-related management decisions in light of climate change. The guidance was revised in 2016 (NMFS 2016).

Since the guidance was last revised, there have been advances in our understanding of climate change and its effects to our trust resources. In 2021, the Intergovernmental Panel on Climate Change (IPCC) released the first part of its Sixth Assessment Report, followed by the second and third parts in 2022. Also in 2021, Executive Order 14008, “Tackling the Climate Crisis at Home and Abroad” was issued. The Executive Order emphasizes the importance of addressing climate-

related risks and increasing resilience to the impacts of climate change. NMFS has also conducted climate vulnerability assessments for many of its protected species. The 2016 guidance is hereby updated and revised to reflect this new information and advances.

Resource managers are frequently called upon to make decisions in the face of uncertainty, and NMFS is adept at doing so. A changing climate further complicates the conservation of protected resources, due in large part to the uncertainty of the rate and magnitude of climate-related changes and the response of various organisms to those changes. The question of how much risk is acceptable to listed species is raised in most ESA decisions, even without climate change considerations. Due to the nature, magnitude, and uncertainty of the risk added by potential climate change effects, it is useful for NMFS to have policy guidance to manage this risk consistently and explain the basis for the choices the agency makes.

The ESA requires use of the best available science¹ in reaching many types of particular decisions, but courts have given deference to the exercise of informed agency discretion where scientific uncertainty exists if the agency provides a well-reasoned explanation that is based on consideration of all relevant factors; accounts for all relevant available information; and explains the relative weight assigned to competing sources of information. While it requires that decisions not be based on mere generalizations or speculation, the best available science standard does not require that information be free from uncertainty. Nor does it require a higher degree of specificity, or fineness of scale in projections, than existing climate studies provide. For example, to support listing a species on the basis of climate change-related impacts, we must have information particular to that species to demonstrate that it will be impacted by climate change, such as through a reduction of suitable habitat within its known range. It is not necessary, however, to have projections at a particular geographic scale or to have a complete understanding of the biological reasons for and extent of the species' vulnerability to climate change.

Our experience with ESA listing decisions such as ice seals and corals has reinforced the importance of agency climate change policy guidance to better support our ESA resource managers in agency analyses and decision-making. This guidance identifies six key climate change considerations:

1. Selecting a climate change scenario.
2. Selecting a climate change projection timeframe.
3. Evaluating the adequacy of existing regulatory mechanisms to reduce greenhouse gas (GHG) emissions.
4. Consideration of future beneficial and adverse effects.
5. Responsiveness and effectiveness of management actions in a changing climate.
6. Incorporating climate change into project design and operational requirements.

NMFS developed its original guidance in 2015 and revised it in 2016 to address these needs. In formulating the first policy consideration of the guidance, NMFS took into account information

¹ For ESA listing decisions [Section 4(b)(1)(A)] and biological opinions [Section 7(a)(2)], the complete standard is “best scientific and commercial data available” and for critical habitat determinations [Section 4(b)(2)], the “best scientific data available”. NMFS is using “best available science” as a shorthand in these instances. The best available science requirement does not apply to all ESA decisions, such as 90-day findings on petitions to list species or to revise a critical habitat designation.

from the IPCC Fifth Assessment Report (AR5). The guidance has provided consistency, efficiency and effectiveness in making ESA management decisions. As noted above, in 2021, the IPCC released the first part of its Sixth Assessment Report (AR6). It released the second and third portions of AR6 in 2022, and work on the Synthesis Report continues. AR6 represents the latest set of IPCC reports that assess the scientific knowledge on climate change, including past, present, and future climate impacts and risks and options for adaptation and mitigation.

In February 2022, NMFS established an ESA Climate Guidance Working Group to update the NMFS ESA Climate Guidance based on the new IPCC assessment and other new climate science. The Working Group consisted of representatives from the Office of Protected Resources, NMFS Regional Offices and Science Centers, and the Office of Oceanic and Atmospheric Research. The Working Group assessed new information in the IPCC's AR6 available since the 2016 guidance, and updated the guidance based on this new information.

Much of the 2016 guidance remains relevant and has not changed. However, the 2016 guidance policy consideration addressing the designation of unoccupied areas as critical habitat is not included in this version of the guidance. In 2019, NMFS and the U.S. Fish and Wildlife Service revised their joint regulations governing the designation of critical habitat. Those revisions constrained our ability to proactively designate unoccupied areas as critical habitat. The 2019 regulations have been challenged in litigation. On July 5, 2022, the U.S. District Court for the Northern District of California issued an order vacating these ESA implementing regulations. On September 21, 2022, the U.S. Court of Appeals for the Ninth Circuit granted a temporary stay of the district court's July 5 order. On November 14, 2022, the U.S. District Court for the Northern District of California granted the motion filed by the U.S. Fish and Wildlife Service and National Marine Fisheries Service to remand the 2019 ESA regulations while leaving the 2019 regulations in effect. The District Court issued a slightly amended order two days later on November 16, 2022. As a result of the District Court's orders and absent any appeals, the 2019 regulations will remain in effect until amended through a future anticipated rulemaking by the Services.

NMFS continues to consider climate-change related issues in the development of critical habitat designations, consistent with the best available scientific information for a particular species. Due to the litigation and the uncertainty surrounding this provision of NMFS regulations, we find that more specific policy direction cannot be provided on this point at this time, and as such, this policy consideration has been removed from the guidance. Once the litigation is resolved and there is greater certainty regarding the regulatory requirements for designating unoccupied areas as critical habitat, NMFS may update this portion of the guidance and reissue it. As other new information becomes available, NMFS will continue to revisit and consider adjusting this guidance as needed.

II. Objective

This procedure is supported by the analysis conducted by the NMFS Endangered Species Act and Climate Working Group Policy Subgroup and direct Regional Administrators with respect to the six key climate change issues described above. This guidance will reduce confusion and duplication of effort, support greater consistency, efficiency, and effectiveness, and ultimately help the agency make better and more defensible ESA management decisions. As new information becomes available, NMFS will revisit and consider adjusting this guidance as needed. Regional Administrators should implement this guidance in coordination and

consultation with the Office of Protected Resources (OPR).

III. Guidance

Six Policy Considerations

1. Selecting a climate change scenario

For ESA decisions involving species impacted by climate change, NMFS will use climate indicator values projected under the IPCC's Shared Socioeconomic Pathway (SSP) 3-7.0 when data are available. When data specific to that pathway are not available, we will use the best available science that is as consistent as possible with SSP3-7.0.

IPCC's AR6 uses output from the latest generation of climate models, coordinated by the World Climate Research Programme's Coupled Model Intercomparison Project, version 6 (CMIP6). The CMIP6 climate models were run using updated emissions pathways. In the previous (CMIP5) set of models, Representative Concentration Pathways (RCPs) were used to specify trajectories of radiative forcing that relate to the greenhouse gas effect and trapping of heat in the Earth's atmosphere, ultimately resulting in global temperature increases. While useful for understanding a range of climate impacts under different emission pathways, the RCPs were not fully integrated with a consistent set of socioeconomic assumptions. In AR6, the new IPCC climate models use RCPs coupled with internally consistent Shared Socioeconomic Pathways (SSP-RCPs). SSPs describe five possible futures of population growth, energy use, technological change, and environmental conditions projected to 2100. They are intended to enable climate change research and policy analysis and are designed to span a wide range of combinations of global challenges to mitigation and adaptation to climate change.

AR6 selected five core future scenarios for development in the report: SSP1-1.9, SSP1-2.6, SSP2-4.5, SSP3-7.0, and SSP5-8.5 – where the numerical values after the dashes represent the amount of modeled radiative forcing at the end of this century. Similar to the AR5, the five pathways cover a wide spectrum of future emissions including very low and low (SSP1-1.9 and SSP1-2.6, respectively), intermediate (SSP2-4.5) and high and very high (SSP3-7.0 and SSP5-8.5, respectively).

Like AR5, AR6 did not identify any scenario as being more likely to occur than any other. However, as with any technical issue regarding resource management that involves uncertainties, we must choose a reasonable management approach that takes into account current knowledge and allows for revisiting the approach as new information emerges. In cases of significant uncertainty, it is appropriate to assume conditions similar to the status quo until new information suggests a change is appropriate. Based on this, the 2016 Guidance directed NMFS to evaluate conditions as projected under RCP8.5. RCP8.5 was often referred to as the "business as usual" scenario. In CMIP6, RCP8.5 is combined with SSP5 to create the SSP5-8.5 scenario, where baseline carbon dioxide emissions are even higher than in the AR5 RCP8.5 pathway (see Figure 3 of O'Neill et al. 2016). SSP5-8.5 envisions a future with very intensive fossil fuel consumption accompanied by rapid global economic growth, driven by optimistic scenarios for technological innovation; integration of global markets; heavy investment in health and education; and successful management of environmental problems

stemming from intensive energy and resource use around the world. Its baseline emissions pathway, RCP8.5, has been criticized as unrealistic or unlikely by some prominent climate scientists (e.g., Hausfather and Peters 2020a, 2020b), but defended as a plausible scenario by others because it comes closer than RCP4.5 and RCP6.0 to tracking 2005-2020 actual emissions, and it is closest at mid- and late 21st century to the International Energy Association’s “business as usual” and “business as intended” policies scenarios (Schwalm et al. 2020a). Still, the socioeconomic narrative of SSP5—the only SSP that readily generates emissions pathways that rise to the level of RCP8.5—bears little resemblance to the status quo for socioeconomic and geopolitical drivers of energy use and greenhouse gas emissions (e.g., National Intelligence Council 2021).

RCP 7.0, a new pathway in CMIP6 associated with SSP3, represents the medium-to-high end of the range of future forcing pathways (O’Neill et al. 2016). SSP3-7.0 assumes no additional mitigation from national climate policies beyond those in place in the Paris Agreement. It is one of the required scenarios for modeling teams to participate in CMIP6, ensuring that the standard climate model outputs are available for NMFS scientists to use in ESA decision support. The socioeconomic storyline underlying SSP3-7.0 is one characterized by high global challenges to both mitigation and adaptation to climate change (Riahi et al. 2017). The National Intelligence Council’s (NIC) strategic outlook for the next two decades—based on input from a broad and diverse list of contributors, including think tanks, universities, consultants, business leaders, individual scholars and experts, students, and colleagues inside and outside government—describes a future very consistent with the SSP3-7.0 (National Intelligence Council 2021, Riahi et al. 2017). Both the NIC outlook and the SSP3 storyline envision a global future in which the effects of climate change and environmental degradation are likely to exacerbate food and water insecurity, increase migration, create new health challenges, and contribute to biodiversity losses. Technological innovation will continue, but it will further disrupt employment, industries, and communities. This will lead to increasing fragmentation, greater focus on domestic national security rather than international issues, and highlight the inability of existing systems and organizations to address these global challenges. SSP3-7.0 is, therefore, a rational choice to represent the status quo and near future of greenhouse gas emissions and human forcing of climate change. It is a high emissions scenario that comports with a reasonable view of global socioeconomic and geopolitical conditions, currently and over the next several decades.

Other science teams and agencies have adopted or recommended SSP3-7.0 as their default or baseline scenario, as well. The Great Lakes Integrated Sciences and Assessments (a collaboration between the University of Michigan and Michigan State University and supported by NOAA) recommends using the SSP3-7.0 scenario as an alternative ‘business as usual’ scenario when less extreme assumptions about the future than those in SSP5-8.5 are determined appropriate (A Practitioners Guide to Climate Model Scenarios, 2021). The NASA Applied Remote Sensing Training Program (ARSET 2022) also notes that because the SSP5-8.5 is becoming less plausible, most researchers now use SSP3-7.0 as their high baseline scenario.

Therefore, we will evaluate conditions as projected under SSP3-7.0 when data are available to allow such evaluation. When specific data are not available, we will use information that is most consistent with the underlying direction of SSP3-7.0.

2. Selecting a climate change projection timeframe

A. When predicting the future status of species in decisions under ESA Sections 4, 7, and 10, NMFS will project climate change effects for the longest time period over which we can

reasonably foresee the effects of climate change on the species' status.

B. When evaluating effects of the action in Sections 7 and 10 decisions, NMFS will use the time period corresponding to the duration of all effects of the action.

Current climate change information indicates that both uncertainty of climate projections and the degree of risk to many species from climate change increase over time. 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 project the directionality of climate change and overall extent of effects to the species or its habitat. For decisions after the initial listing decision, NMFS is mindful in applying the principle of institutionalized caution that originates in the legislative history of Section 7; however, it would be inappropriate to apply that principle, or the related concept of “benefit of the doubt,” in the context of making a listing determination, because a species must first be determined to qualify for listing on the basis of the best available scientific and commercial information before the protections of the Act may be applied.

When dealing with Section 4 decisions (e.g., listing and recovery), NMFS’s policy guidance is to project effects over the longest possible period for which credible projections are available² in order to ensure the best available science is fully considered. For Sections 7 and 10 decisions, NMFS’s policy guidance is to project climate effects over the timeframe of all of the action’s effects. Usually consideration is not limited to only the duration of the specified activity, but also to its continuing effects for the foreseeable future. For example, when a construction activity is the subject of consultation, we must consider not only the effects caused from the construction itself, but also the effects of the resulting structure once completed. Similarly, in the case of consultations on permits or other authorizations that are likely to be renewed or that include operations, it can be appropriate to analyze the project over some period of time beyond the initial authorization period to the fullest extent possible (based on the information available and the ability to predict effects with an acceptable degree of accuracy).

3. Evaluating the adequacy of existing regulatory mechanisms to reduce GHG emissions

When addressing the adequacy of existing regulatory mechanisms in status reviews, listing decisions, and recovery plan analyses, NMFS will cite to or draw from previous NMFS findings, updated as appropriate in light of developments in this area, to describe the adequacy of existing global and national climate change regulatory mechanisms.

The “adequacy of existing regulatory mechanisms” is a factor for consideration in evaluating a species’ status under section 4(a)(1)(D) of the ESA. The scientific consensus is that the main cause of climate change is increasing anthropogenic GHG emissions. Reducing GHG emissions will require national and global efforts; therefore, any consideration of the adequacy of existing regulatory mechanisms for species impacted by climate change must include consideration of the effectiveness of national and international regulatory mechanisms. NMFS is required to consider only existing mechanisms and whether those mechanisms are sufficient to counter the threat; we should not speculate about what kinds of regulation may be implemented in the future. Further, because information on developments in the area of national and international efforts to address climate

² NMFS has used periods as long as 100 years for particular determinations. However, the appropriate time period will vary based on a particular species and threat.

change will not vary across NMFS regions or as relevant to specific NMFS decisions, it would not be efficient or informative to develop new analyses for each decision. Where the agency has already completed a thorough analysis that was based on a review of the then-current literature on climate change and this has not been overtaken by significant new information, it is reasonable and efficient to cite to or draw from the existing analysis, updating it as appropriate.

4. Consideration of future beneficial and adverse effects

When NMFS is confident of the relative magnitude of both beneficial and adverse effects, the agency will treat them like any other effects; and when less confident of the relative magnitude of effects, will give more weight to the negative effects to account for the consequences to the species of making a detrimental decision.

For certain species, climate change may result in some potentially beneficial effects such as, for example, new suitable habitat being created in northern, deeper, or higher elevation areas. Listing decisions, recovery plans, interagency consultations and other ESA decisions all must evaluate potentially beneficial or offsetting effects of climate change as part of the decision-making process. When the best available information is fairly certain as to the relative magnitude of beneficial to adverse effects, NMFS will treat them as either predominantly beneficial or adverse in accordance with that information; when uncertain of the relative magnitude of effects, more weight will be given to the detrimental effects in decisions made after the initial listing determination. This is consistent with the principle of institutionalized caution that applies to decisions after the initial listing determination, as discussed above.

5. Responsiveness and effectiveness of management actions in a changing climate

Where appropriate, NMFS section 7 consultations and section 10 permits covering a long time period during which climate change is likely to exacerbate the adverse effects of an action should incorporate an adaptive management approach that includes:

- **adequate monitoring of climate and biological variables;**
- **identification of appropriate triggers related to those variables; and**
- **identification of protective measures that can be implemented without reinitiating when triggers are reached or, alternatively, identification of triggers that inform the decision to reinitiate.**

We are most certain of our treatment of climate change and the efficacy of responsive conservation actions in the near-term. However, ESA decisions often require NMFS to make determinations regarding actions of long durations. Adaptive management approaches should be implemented, where appropriate, to allow NMFS to better respond to climate change effects over time.

6. Incorporating climate change into project design and operation

NMFS will analyze how effects on listed species from project design and operation may change over the life of the project, considering reasonably foreseeable climate change effects. NMFS will consider how climate change can affect the degree to which projects NMFS evaluates under its statutory authorities may accommodate future as well as current needs of ESA-listed

species. When structural criteria applied by other agencies are not sufficient, NMFS will engage with those agencies to attempt to find solutions.

Commonly in the context of section 7 consultations, NMFS must evaluate the effects of projects for which the action agency's proposed construction design has been based on historical environmental conditions. Projects constructed according to designs that do not anticipate future climate conditions may fail or the functionality may change, causing adverse effects to listed species. Designs for structures as simple as a dock or as complex as a fish passage facility or a levee system vary significantly and can have important consequences for species conservation. In evaluating the soundness of design criteria, NMFS will consider whether the project, once constructed, is likely to continue to serve its purposes relative to the conservation of listed species in light of changing climatic conditions into the foreseeable future.

The 2016 ESA Climate Guidance stated that NMFS would review its internal guidance and structural design criteria (e.g., West Coast Region Anadromous Salmonid Passage Facility Design Criteria) to ensure that the criteria are adequate for ESA-listed species in light of anticipated future climate conditions. Since the guidance was issued in 2016, NMFS West Coast Region (WCR) has been working to include methods to incorporate future climate change into engineering designs of fish passage facilities and stream crossings. In 2022, NMFS WCR issued NOAA Fisheries West Coast Region Guidance to Improve the Resilience of Fish Passage Facilities to Climate Change. The guidance serves as an example of how to incorporate climate change considerations into the design of fish passage facilities and identifies a process for designers of those facilities to follow to incorporate climate resiliency. The process describes how to account for climate change both in projects with a short life expectancy (less than 10 years) and for projects with a long-life expectancy (greater than 10 years).

Communication among NMFS regions and with action agencies on project design, as with many other issues relating to ESA implementation, can lead to adoption of more effective designs for numerous structures that would otherwise present challenges in light of the likely effects of climate change. As a relatively new factor to consider in project design for species conservation, climate change provides an impetus for more efficient communication within NMFS and with action agencies. NMFS will place a high priority on collaboration regarding project design and operation in the face of climate change.