
Purpose and Overview
This document is designed to aid BOEM and lessees/project proponents when preparing Biological Assessments for Endangered Species Act (ESA) section 7 consultations and other documents that consider effects of offshore wind energy related activities on listed species and designated critical habitat in NOAA Fisheries Greater Atlantic Region (GAR) (Maine - Virginia) and Southeast Region (SER) (North Carolina - Texas).

This document provides an outline of the information and analysis expected to be necessary to support a robust assessment of the effects of a proposed offshore wind project on ESA-listed species and designated critical habitat. This list is not project specific and may not capture all information needs for all projects. We expect that all descriptions and analyses will be comprehensive and based on the best available scientific information. We understand that site-specific information may not always be available; in those instances, the best reasonable substitute should be provided with an explanation for why any necessary assumptions are reasonable. We also recognize that quantitative analyses are not always possible; in those cases, qualitative assessments should be provided with a robust explanation of any underlying assumptions or data gaps.

Authority
General guidance on carrying out ESA Section 7 consultation in the GAR is available at: https://www.fisheries.noaa.gov/new-england-mid-Atlantic/consultations/section-7-consultation-technical-guidance-greater-atlantic.

General guidance on carrying out ESA Section 7 consultation in the SER is available at: https://www.fisheries.noaa.gov/southeast/endangered-species-conservation/esa-section-7-interagency-consultation-southeast-united-states.

The regulatory requirements for Biological Assessments and requests for consultation are described at 50 CFR Part 402. See also 84 FR 44976 (August 27, 2019).

Contact Information
For information related to NOAA Fisheries (NMFS) trust resources or the ESA contact:
Greater Atlantic Regional Fisheries Office, Protected Resources Division,
nmfs.gar.esa.section7@noaa.gov

Southeast Regional Fisheries Office, Protected Resources Division,
nmfs.ser.esa.consultations@noaa.gov
ESA Information Needs

For each specific information need/stressor listed, we have included sub-topics with specific aspects to include/consider/analyze. Some information needs/stressors repeat themselves and thus we have only included new text in the sub-topic if the main topic repeats itself (note that initial sub-topics still pertain).

1. Description of the proposed action
   a. Under the ESA, “action” means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by federal agencies (see 50 CFR 402.02).
   b. The regulations for ESA section 7 consultations define the effects of the action as “all consequences that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action.” Additionally, “(a) consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action.” (see 50 § 402.02)
   c. Include all proposed federal actions (e.g., BOEM COP approval, USACE permits, EPA Clean Air Act permit, EPA NPDES permit, MMPA take authorizations)
   d. Describe all activities and identify those that may affect ESA-listed species/designated critical habitat/habitat, with sufficient detail to allow for identification of consequences to individuals. This detailed description should include activity levels, frequency, duration, location, and intensity of all activities and should reflect the best available information on the activities and how the activities are likely to be carried out (see Appendix A for more detail).
   e. Identify all proposed conservation measures (e.g., best management practices) to avoid and minimize the effects that are to be considered part of the proposed action, including specific information about when and how these would apply and the anticipated reduction in exposure or intensity of exposure. This should also include identification of proposed monitoring or reporting measures.

2. Identification of action area
   a. Note that for ESA section 7 consultation, the action area is defined as: “all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action” [50 CFR Section 402.02].
   b. The action area may include the lease area, vessel transit routes during all phases of the project (including international ports), cable routes, etc. and is not limited to the project footprint.
3. **Description of the natural and anthropogenic characteristics** (atmospheric and oceanographic environment, habitat features, shipping lanes, fishing grounds, etc.) of the action area
   a. Include relevant seasonal, geographic, etc. information for each characteristic.

4. **Description of critical habitat in the action area (if any)**
   a. Identify any designated critical habitat that overlaps with the action area.
   b. Identify the physical and biological features of the critical habitat that occurs in the action area.

5. **Abundance and distribution of ESA-listed species in the action area**
   a. Identify the ESA-listed species that occur within the action area.
   b. Use the best available information to describe listed species distribution and abundance in the entire action area:
      i. Describe how listed species habitat use varies across the action area (e.g., some species may occur in the lease area but not along the entirety of the cable corridor, include considerations of seasonality of use, if it is variable).
      ii. Examples of data sources or relevant research that may be used to identify ESA-listed species and critical habitat presence in the action area include, but are not limited to the following:
         1. Developer/Lessee site characterization surveys
         4. NOAA Northeast Fisheries Science Center Right Whale Aerial Surveys, [https://apps-nefsc.fisheries.noaa.gov/psb/surveys/MapperiframeWithText.html](https://apps-nefsc.fisheries.noaa.gov/psb/surveys/MapperiframeWithText.html)
         5. Provincetown Center for Coastal Studies Right Whale Aerial Survey, [https://coastalstudies.org/right-whale-research/](https://coastalstudies.org/right-whale-research/)
         8. DOE Mid-Atlantic Baseline Studies, [https://briwildlife.org/mabs/](https://briwildlife.org/mabs/)
   https://remote.normandeau.com/nys_aer_overview.php

6. Information needed to support evaluation of project effects and anticipated affects to ESA-listed species and designated critical habitat/habitat. For each potential stressor listed in Appendix A, the following should be analyzed:

   a. Determine which ESA-listed species may be exposed to the effect/stressors of the action, including a description of the life-stage (e.g., life stage, species).
   b. When possible, include a quantitative assessment of the number of individuals likely to be exposed to a particular stressor. When a quantitative assessment is not possible, a qualitative approach may be substituted (e.g., identification of the species and life stages likely to be exposed and the duration and intensity of that exposure).
   c. Establish if the stressor may result in any impacts to designated critical habitat in the action area, include which Physical and Biological Features may be exposed.
   d. Describe what the response to the exposure is for each ESA-listed species.
   e. Describe the effects of the response on ESA-listed species.
   f. Describe what the response to the exposure is for each specific designated critical habitat (i.e., how will the physical and biological features of the critical habitat be affected by the proposed activity).
   g. Describe the effects of the response on critical habitat (i.e., how will the effects to the physical and biological features affect the function of the habitat).
h. Make a determination\(^1\) regarding the effects of the action on listed species and/or critical habitat when added to existing conditions in the action area if the action did not occur\(^2\):

i. Evaluate the effects when added to baseline conditions (i.e., adding project vessel traffic to exiting baseline vessel traffic);

ii. For each stressor/activity, determine if effects are expected to be: (a) discountable (extremely unlikely to occur), (b) insignificant (unable to meaningfully measure, detect or evaluate), (c) wholly beneficial (positive effects without \textit{any} negative effects), or (d) adverse (the appropriate conclusion if the effects are not discountable, insignificant or wholly beneficial). If the effects to a species are likely to be adverse, identify the type of take that you anticipate will occur (e.g., harm, harass, capture, kill, injure, collect);

iii. At the project level, for each species and critical habitat in the action area, determine if the action:

1. May Affect, Not Likely to Adversely Affect (NLAA), if effects are: (a) extremely unlikely to occur, (b) insignificant (unable to meaningfully measure, detect or evaluate), and/or (c) wholly beneficial (positive effects without \textit{any} negative effects); or

2. May affect, Likely to Adversely Affect (LAA), if effects are likely to adversely affect the listed species and/or critical habitat.

Appendix A.
For all activity/stressor descriptions, include as much detail as possible including relevant project details, avoidance and minimization measures, proposal of mitigation, reporting measures, and pre-and-post biological monitoring that are part of the proposed action.

Construction
a. Noise

i. Include sound source levels and distance to isopleths of concern (see thresholds below) for all noise sources including, but not limited to: vessels, aircraft, cable installation, dredging, site assessment or other surveys, foundation installation.

   1. Information on source levels and the size of the area where noise will be above thresholds of concern (see below) should be quantified.

---

\(^1\) Note that you may reach different effects conclusions for the same activity/stressor for different species or species groups.

\(^2\) In other words, present the analysis in the context of what else is going on in the action area. We would be happy to discuss this concept to assist in the analysis.
2. Information on pile/foundation installation should include foundation type, pile diameter, number of strikes/pile, number of piles/day, hammer energy, type of pile driver (impact or vibratory), maximum number of hours per pile driving event, daily and seasonal timing, etc.

ii. Describe the species anticipated to be exposed to noise sources and anticipated responses (e.g., mortality, injury, behavioral disturbance) in consideration of baseline conditions. Clearly describe any avoidance, minimization, and monitoring measures included as part of the proposed action and identify which ones are anticipated to reduce exposure (either the number of individuals or the duration of exposure) or the response/consequences to the exposed individuals.
   1. Where possible, a quantitative assessment of the number of individuals likely to be exposed to underwater noise that could result in mortality, injury, and/or behavioral disturbance/response should be provided. However, when that is not possible, a qualitative approach is acceptable.

iii. Include a complete description of any acoustic thresholds to be used in the analysis (see below for NMFS requirements).

iv. Describe and assess consequences of behavioral disruption (e.g., disruption of foraging) including impacts to individuals that are displaced from an impacted area due to project noise (e.g., consider how displacement may affect interactions with fisheries, shipping lanes, etc.).

b. Vessels

i. Describe baseline vessel traffic in the area where project vessels will occur (i.e., vessel traffic in the area without the proposed project).
   1. Where available, include three years of unique transits for all vessels transiting the entire action area. Unique transits are considered an individual entry-exit of a vessel that overlaps the action area.
   2. Description should include vessel types, activity, size (length, beam, draft, deadweight tons), and operational speed (maximum and average).

ii. Include details of number and types of vessels to be used during construction, including size (length, beam, draft, deadweight tons) speed, and operational speed (maximum and average).

iii. Include details on ports planned for use and number of expected trips by vessel type to each port per month over the life of the project.

iv. Evaluate the risk of vessel strikes to listed species from project vessels during all project phases.
c. Habitat Disturbance and Modifications
   i. For pre-cable lay grapnel run (if conducted), evaluate effects to habitat (i.e., increased sedimentation/turbidity, loss or displacement of benthic resources) and assessment of any entanglement risk.
   ii. For dredging operations, address risk of capture, impingement, entrainment of listed species, turbidity, evaluate effects on prey, and provide information on dredge type, volume and type of material removed.
   iii. For cable installation, evaluate potential loss of benthic resources, turbidity, effects on prey, amount of habitat disturbed, and any use of concrete mats or other protection.
   iv. For wind turbine foundations and scour protection, evaluate potential loss of benthic resources, turbidity, effects on prey, amount of habitat disturbed, and volume and type of material added.
   v. For any vessel anchoring or deployment of spuds, evaluate effects to habitat (i.e., increased sedimentation/turbidity, loss or displacement of benthic resources) and assessment of any entanglement risk.

d. Displacement/Shifts of other Activities
   i. Describe potential changes (if any) in use of the project area (lease area and cable route) by non-wind related activities/users and how those changes may affect listed species/habitat/critical habitat (i.e., assess interaction risk due to displacement/shifts of vessel traffic and fishing activity). Describe and evaluate:
      1. Potential displacement or shifts of commercial and/or recreational fishing effort and/or vessel transit to/from the project area, details on which fisheries exist in the project area can be accessed via GARFO data request email: nmfs.gar.data.requests@noaa.gov
      2. Potential displacement or shifts of other activities (e.g., commercial shipping, recreational boaters, ferry services) to/from the project area
      3. Potential impact to listed species/habitat/critical habitat if commercial and/or recreational fisheries or other activities are displaced or shift to/from the project area.

e. Pollutant and Debris Discharge
   i. Describe risk of oil spills, and evaluate risk to listed species/habitat/critical habitat.
   ii. Describe risk of chemical releases, and evaluate risk to listed species/habitat/critical habitat.

f. Air Emissions
   i. Describe air emissions from Project equipment (e.g. vessels, wind turbine generator (WTG) installation equipment).
g. **Unexpected/Unanticipated Events**
   i. Describe any unexpected/unanticipated events (e.g. vessel collision/allision, oil spill, tower collapse), and evaluate any risk to listed species, their habitat, and any critical habitat, and explain whether such events are “reasonably certain to occur.” This assessment should include consideration of extreme weather events.

h. **Unexploded Ordinances (UXOs)/Hazards**
   i. Describe methods to be used if UXOs or other hazards are encountered during any construction activities, and evaluate any risk to listed species/habitat/critical habitat - explain whether such events are “reasonably certain to occur.”
   ii. If detonation or discharge of UXO/hazardous materials is proposed, evaluate effects of these activities on listed species/habitat/critical habitat including consideration of exposure to noise/pressure, shrapnel, and pollutants/toxins.

i. **Surveys/Monitoring**
   i. Describe any geophysical and geotechnical surveys that may occur during construction, providing information on equipment to be used, sound source levels, distances to isopleths of interest. Address impacts on listed species/habitat/critical habitat due to noise and vessel traffic from surveys, see a. and b. above, respectively.
   ii. Describe any survey/monitoring activities for fisheries, habitat, protected species, or other biological resources that are planned over the life of the project that may affect (inclusive of capture or collect even if released unharmed) protected species. Identify any permits or authorizations that are associated with these surveys. Please note that additional information and/or coordination may be necessary to ensure appropriate consideration of protected species issues in such surveys.

j. **Project Lighting**
   i. Evaluate project lighting as a potential attractant for listed species and prey and address anticipated effects.

k. **Port Modification**
   i. Describe any Project-related port modifications (e.g. dredging, shoreside construction) and evaluate any risk to listed species/habitat/critical habitat.

**Operation**

a. **Noise**
   i. See a. above
   ii. Describe the anticipated operational noise from WTGs and the addition of that noise to the current oceanic soundscape, and evaluate effects to listed species/habitat/critical habitat (i.e., exposure and response to operational noise).
b. Vessels
   i. See b. above

c. Habitat Disturbance and Modification
   i. Evaluate the potential for displacement/disruption of listed species use of the project area and the consequences of any such displacement or disruption of use of the area.
   ii. Evaluate the habitat conversion (e.g. scour, mats) and loss or addition of benthic resources, including potential reef effect and increase in fishing activity around structures.
   iii. Evaluate the effects of the physical presence of WTGs to regional and local oceanographic (e.g. wakes) and atmospheric conditions (e.g. reduced wind stress) and how that will impact listed species/habitat/critical habitat, including impacts on prey species.
   iv. For any converter stations/substations, evaluate any water withdrawal and risk of impingement and/or entrainment on listed species and prey.
   v. For any vessel anchoring or deployment of spuds, evaluate effects to habitat (i.e., increased sedimentation/turbidity, loss or displacement of benthic resources) and assessment of any entanglement risk.
   vi. Describe effects (if any) from electromagnetic fields and heat from inter-array and export cable to listed species/habitat/critical habitat and their prey (i.e. ability to forage, attraction...etc.).

d. Displacement and Shifts of other Activities
   i. See d. above

e. Pollutant and Debris Discharge
   i. See e. above
   ii. For any converter stations/substations, evaluate any risk of pollutant discharge.

f. Air Emissions
   i. See f. above

g. Unexpected/Unanticipated Events
   i. See g. above
   ii. Describe any unexpected/unanticipated events (e.g. failure of WTGs due to weather), and evaluate any risk to listed species, their habitat, and any critical habitat, and explain whether such events are “reasonably certain to occur.” This assessment should include consideration of extreme weather events.

h. Surveys/Monitoring
   i. See i. above
   ii. Describe impacts of wind farm presence to NMFS and other protected species surveys (e.g. aerial, shipboard) and evaluate anticipated effects to listed species

i. Project Lighting
   i. See j. above
j. Repair and Maintenance Activities
   i. Describe repair and maintenance activities that may directly or indirectly affect
      listed species/habitat/critical habitat and analyze those effects.

Decommissioning
   a. Noise
      i. See a. (Construction) above
      ii. Describe noise levels associated with decommissioning activities (i.e.
          foundation, cable, pile, or scour removal), and evaluate effects to listed
          species/habitat/critical habitat.

   b. Vessels
      i. See b. (Construction) above

   c. Habitat Disturbance and Modifications
      i. Describe how the environment will be altered due to decommissioning of the
         wind farm:
         1. Evaluate the habitat conversion (e.g. loss of foundations, scour, mats)
            and how that will impact listed species/habitat/critical habitat.
         2. For removal of structures, evaluate impacts to benthic resources,
            turbidity, effects on prey, and amount of habitat disturbed and how
            that will impact listed species/habitat/critical habitat. Describe if piles
            will be cut below the mudline or removed otherwise. Describe if
            scour protection will be removed.
         3. For dredging operations, address risk of capture, impingement,
            entrainment of listed species, turbidity evaluate effects on prey, and
            provide information on dredge type, volume and type of material
            removed.
         4. Describe if inter-array and export cable will be removed. For cable
            removal, evaluate impacts to benthic resources, turbidity, effects on
            prey, amount of habitat disturbed, and how that will impact listed
            species/habitat/critical habitat.

   d. Pollutant and Debris Discharge
      i. See e. (Construction) above

   e. Air Emissions
      i. See f. (Construction) above

   f. Unexpected/Unanticipated Events
      i. See g. (Construction) above

   g. Surveys/Monitoring
      i. See i. (Construction) above

   h. Project Lighting
      i. See j. (Construction) above
Acoustic Thresholds

The noise levels noted here are considered by NMFS as the best available for consideration of effects to ESA-listed species at this time.

a. ESA-listed Fish
   i. NMFS considers the potential for behavioral response from exposure to noise greater than 150 dB re 1 uPa rms.
   ii. FHWG (2008) interim criteria for injury:
       1. Peak SPL: 206 dB re 1 µPa
       2. SELcum: 187 B re 1 µPa²·s for fishes 2 grams or larger (0.07 ounces)
       3. SELcum: 183 dB re 1 µPa²·s for fishes less than 2 grams (0.07 ounces)

b. Sea Turtles

<table>
<thead>
<tr>
<th>Hearing Group</th>
<th>Generalized Hearing Range</th>
<th>Permanent Threshold Shift Onset</th>
<th>Temporary Threshold Shift Onset</th>
<th>Behavioral Threshold</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sea Turtles</td>
<td>30 Hz to 2 kHz</td>
<td>204 dB re: 1 Pa²·s SELcum</td>
<td>189 dB re: 1 µPa²·s SELcum</td>
<td>175 re 1uPa rms</td>
</tr>
<tr>
<td></td>
<td></td>
<td>232 dB re: 1 µPa SPL (0-pk)</td>
<td>226 dB re: 1 µPa SPL (0-pk)</td>
<td></td>
</tr>
</tbody>
</table>


c. ESA-listed Whales
   i. Impulsive acoustic thresholds identifying the onset of permanent threshold shift, temporary threshold shift, and behavioral threshold for the marine mammal species groups (NMFS 2018).

---

3 BOEM finds the criteria in that agreement FHWG 2008 no longer represent the best available science (BoS). Internationally, Popper et al. 2014 ANSI guidelines are widely utilized and recognized as the BoS. Including both sets of criteria have been agreed to in the acoustic modeling recommendations commented on by NMFS.
## Hearing Group

<table>
<thead>
<tr>
<th>Hearing Group</th>
<th>Generalized Hearing Range(^{[1]})</th>
<th>Permanent Threshold Shift Onset(^{[2]})</th>
<th>Temporary Threshold Shift Onset</th>
<th>Behavioral Threshold</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-Frequency Cetaceans (LF: baleen whales)</td>
<td>7 Hz to 35 kHz</td>
<td>(L_{pk, flat}: 219 \text{ dB})</td>
<td>(L_{pk, flat}: 213 \text{ dB})</td>
<td>Continuous noise source: 120 dB re 1µPa rms</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(L_{E, LF, 24h}: 183 \text{ dB})</td>
<td>(L_{E, LF, 24h}: 168 \text{ dB})</td>
<td>Impulsive/Intermittent noise source: 160 dB re 1µPa rms</td>
</tr>
<tr>
<td>Mid-Frequency Cetaceans (MF: sperm whales)</td>
<td>150 Hz to 160 kHz</td>
<td>(L_{pk, flat}: 230 \text{ dB})</td>
<td>(L_{pk, flat}: 224 \text{ dB})</td>
<td>Continuous noise source: 120 dB re 1µPa rms</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(L_{E, MF, 24h}: 185 \text{ dB})</td>
<td>(L_{E, MF, 24h}: 170 \text{ dB})</td>
<td>Impulsive/Intermittent noise source: 160 dB re 1µPa rms</td>
</tr>
</tbody>
</table>

\(^{[1]}\) Represents the generalized hearing range for the entire group as a composite (i.e., all species within the group), where individual species’ hearing ranges are typically not as broad. Generalized hearing range chosen based on approximately 65 dB threshold from normalized composite audiogram, with the exception for lower limits for LF cetaceans (Southall et al. 2007).

\(^{[2]}\) \(L_{pk, flat}\): unweighted (\(flat\)) peak sound pressure level (\(L_{pk}\)) with a reference value of 1 µPa; \(L_{E, XF, 24h}\): weighted (by species group; LF: Low Frequency, or MF: Mid-Frequency) cumulative sound exposure level (\(L_{E}\)) with a reference value of 1 µPa^2-s and a recommended accumulation period of 24 hours (\(24h\)).
References


