

**UNDERWATER ACOUSTIC MODELING REPORT**  
**Virginia Offshore Wind Technology**  
**Advancement Project**  
**(VOWTAP)**

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**Table 3. Interim Fisheries Cause and Effect Guidelines**

|   | Criteria Level                       | Type   |
|---|--------------------------------------|--|
| Physiological Effects   | 206 dBL re 1 $\mu$ Pa                | Absolute Peak SPL  |
|   | 187 dBL re 1 $\mu$ Pa <sup>2</sup> s | SEL <sub>cum</sub> , For fishes above 2 grams<br>(0.07 ounces) |
|   | 183 dBL re 1 $\mu$ Pa <sup>2</sup> s | SEL <sub>cum</sub> , For fishes below 2 grams<br>(0.07 ounces) |
| Behavioral Effects  | 150 dBL re 1 $\mu$ Pa (RMS)          | Absolute   |
| Reference: U.S. Department of the Interior, Bureau of Ocean Energy Management (BOEM). Effects of Noise on Fish, Fisheries, and Invertebrates in the U.S. Atlantic and Arctic from Energy Industry Sound-Generating Activities, Literature Synthesis, 2012 |                                      |  |

An interagency work group, including the U.S. Fish and Wildlife Service (USFWS) and the NMFS, has reviewed the best available scientific information and developed criteria for assessing the potential of pile driving activities to cause injury to fish (FHWG 2008). The workgroup established dual sound criteria for injury, measured 33 feet away from the pile, of 206 dB re 1 $\mu$ Pa Peak and 187 dB accumulated sound exposure level (dB cSEL; re: 1 $\mu$ Pa<sup>2</sup> sec) (183 dB accumulated SEL for fish less than 2 grams).

The NOAA Fisheries also currently recognizes a 150 dB<sub>RMS</sub> re 1 $\mu$ Pa level as the threshold for disturbance to salmon and bull trout. Based on their assessment, sound pressure levels in excess of 150 dB re 1  $\mu$ Pa are expected to cause temporary behavioral changes, such as elicitation of a startle response or avoidance of an area. Those levels are not expected to cause direct permanent injury. That is not to say that exposure to noise levels of 150 dB<sub>RMS</sub> re 1 $\mu$ Pa will always result in behavioral modifications, but that there is the potential, upon exposure to noise at this level, to experience some behavioral response (e.g., temporary startle to avoidance of an insonified area).