Test Report

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# 1 Configuration

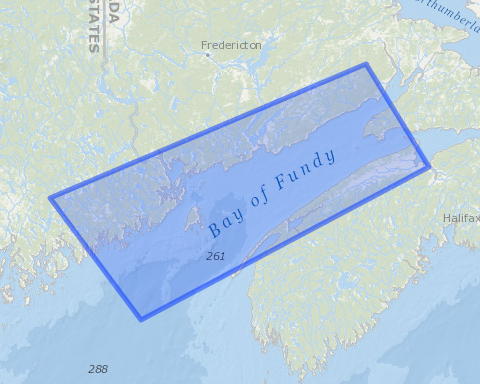
## 1.1 Technology: Ocean Current



## 1.2 Stressors & Receptors

* Stressors
  + Noise
* Receptors
  + Cetaceans
  + Pinnipeds
* Stressor-Receptors
  + Cetaceans AND Noise
  + Pinnipeds AND Noise

## 1.3 Location



# 2 Literature

## 2.1 Stressors

Stressors are potentially harmful environmental effects from technology for marine renewable energy.

### 2.1.1 Noise

Literature from [Tethys Knowledge Base](https://tethys.pnnl.gov/knowledge-base-all)}.:

1. [A three-dimensional underwater sound propagation model for offshore wind farm noise prediction](https://tethys.pnnl.gov/node/1005)
2. [Low-frequency acoustic pressure, velocity, and intensity thresholds in a bottlenose dolphin (Tursiops truncatus) and white whale (Delphinapterus leucas)](https://tethys.pnnl.gov/node/1019)
3. [Development of an air bubble curtain to reduce underwater noise of percussive piling](https://tethys.pnnl.gov/node/1021)
4. [Effects of underwater noise on auditory sensitivity of a cyprinid fish](https://tethys.pnnl.gov/node/1022)
5. [Whale-call response to masking boat noise](https://tethys.pnnl.gov/node/1026)
6. [AdBm Demonstration at Butendiek Offshore Wind Farm with Ballast Nedam](https://tethys.pnnl.gov/node/1028)
7. [Acoustic characterization of sensors used for marine environmental monitoring](https://tethys.pnnl.gov/node/1042)
8. [Evidence that ship noise increases stress in right whales](https://tethys.pnnl.gov/node/105487)
9. [Widely used marine seismic survey air gun operations negatively impact zooplankton](https://tethys.pnnl.gov/node/1063)
10. [Underwater Acoustic Modeling Report - Virginia Offshore Wind Technology Advancement Project (VOWTAP)](https://tethys.pnnl.gov/node/1105)
11. [Environmental Effects Monitoring Report 2011-2013](https://tethys.pnnl.gov/node/1141)
12. [Environmental Effects Monitoring Program Annual Report 2017](https://tethys.pnnl.gov/node/1142)
13. [Basin-wide contributions to the underwater soundscape by multiple seismic surveys with implications for marine mammals in Baffin Bay, Greenland](https://tethys.pnnl.gov/node/1153)
14. [The Behavioural and Physiological Effects of Pile-driving Noise on Marine Species](https://tethys.pnnl.gov/node/1155)
15. [Noise mitigation during pile-driving efficiently reduces disturbance of marine mammals](https://tethys.pnnl.gov/node/1157)
16. [Characterization of impact pile driving signals during installation of offshore wind turbine foundations](https://tethys.pnnl.gov/node/115830)
17. [Evaluating Statistical Models for Baseline Characterization and Measuring Change in Environmental Monitoring Data](https://tethys.pnnl.gov/node/1167)
18. [Vessel noise cuts down communication space for vocalizing fish and marine mammals](https://tethys.pnnl.gov/node/1180)
19. [Lost listening area assessment of anthropogenic sounds in the Chukchi Sea](https://tethys.pnnl.gov/node/1181)
20. [Startle response of captive North Sea fish species to underwater tones between 0.1 and 64 kHz](https://tethys.pnnl.gov/node/1209)
21. [Characterisation of underwater operational sound of a tidal stream turbine](https://tethys.pnnl.gov/node/121649)
22. [Swimming behavior of roach (rutilus rutilus) and three-spined stickleback (gasterosteus aculeatus) in response to wind power noise and single-tone frequencies](https://tethys.pnnl.gov/node/1237)
23. [Effects of hydrokinetic turbine sound on the behavior of four species of fish within an experimental mesocosm](https://tethys.pnnl.gov/node/1261)
24. [Testing the Effectiveness of an Acoustic Deterrent for Grey Whales Along the Oregon Coast](https://tethys.pnnl.gov/node/1277)
25. [Obtaining Baseline Measurements of Ocean Ambient Sound at a Mobile Test Berth Site for Wave Energy Conversion Off the Central Oregon Coast](https://tethys.pnnl.gov/node/1279)
26. [Noise mitigation systems and low-noise installation technologies](https://tethys.pnnl.gov/node/1300)
27. [Underwater construction and operational noise at alpha ventus](https://tethys.pnnl.gov/node/1301)
28. [Marine mammals and windfarms: Effects of alpha ventus on harbour porpoises](https://tethys.pnnl.gov/node/1303)
29. [Investigations of the Bird Collision Risk and the Responses of Harbour Porpoises in the Offshore Wind Farms Horns Rev, North Sea, and Nysted, Baltic Sea, in Denmark - Part II: Harbour porpoises](https://tethys.pnnl.gov/node/1310)
30. [Underwater noise levels of pile-driving in a New Zealand harbour, and the potential impacts on endangered Hector’’s dolphins](https://tethys.pnnl.gov/node/1323)
31. [Request for advice about the displacement of marine mammals around operational offshore windfarms](https://tethys.pnnl.gov/node/1329)
32. [Wind turbines cause chronic stress in badgers (Meles meles) in Great Britain](https://tethys.pnnl.gov/node/1335)
33. [Providing ecological context to anthropogenic subsea noise: Assessing listening space reductions of marine mammals from tidal energy devices](https://tethys.pnnl.gov/node/1351)
34. [The Effect of Simulated Seal Scarer Sounds on Harbour Porpoises](https://tethys.pnnl.gov/node/1422)
35. [Interdisciplinary study into the effect of a marine renewable energy testing facility on the underwater sound in Falmouth Bay](https://tethys.pnnl.gov/node/145423)
36. [Effects of larger turbines for the offshore wind farm at Krieger’’s Flak, Sweden. Assessment of impact on marine mammals](https://tethys.pnnl.gov/node/1455)
37. [Investigations into the effects of pile driving at the offshore wind farm Horns Rev II and the FINO III research platform](https://tethys.pnnl.gov/node/1506)
38. [Takes of Marine Mammals Incidental to Specified Activities; Pile Placement for ORPC Maine’s Cobscook Bay Tidal Energy Pilot Project](https://tethys.pnnl.gov/node/151991)
39. [Underwater Anthropogenic Sound: Understanding the potential impacts on the marine environment and the influence on crab larval behaviour](https://tethys.pnnl.gov/node/151992)
40. [Grassland bird community and acoustic complexity appear unaffected by proximity to a wind energy facility in the Nebraska Sandhills](https://tethys.pnnl.gov/node/1520)
41. [Cobscook Bay Tidal Energy Project: 2016 Environmental Monitoring Report](https://tethys.pnnl.gov/node/1560)
42. [Exposure-response relationship of wind turbine noise with self-reported symptoms of sleep and health problems: A nationwide socioacoustic survey in Japan](https://tethys.pnnl.gov/node/1610)
43. [Noise characterization of a subsea tidal kite](https://tethys.pnnl.gov/node/1640)
44. [The song of Skylarks Alauda arvensis indicates the deterioration of an acoustic environment resulting from wind farm start‐up](https://tethys.pnnl.gov/node/1775)
45. [Final Underwater Noise Analysis of Cape Wind Energy Project](https://tethys.pnnl.gov/node/1828)
46. [Male Greater Prairie-Chickens Adjust their Vocalizations in the Presence of Wind Turbine Noise](https://tethys.pnnl.gov/node/2016)
47. [Broad-Scale Acoustic Monitoring for Cetaceans and Underwater Noise in Relation to Offshore Wind Farm Construction in Scotland](https://tethys.pnnl.gov/node/2098)
48. [Acoustic Life Cycle Assessment of Offshore Renewables - Implications from a Wave-Energy Converter Deployment in Falmouth Bay, UK](https://tethys.pnnl.gov/node/2142)
49. [Semi-Active Control of Sound Radiated From an Elastic Circular Plate Integrated With Adaptive Tuned Vibration Absorbers](https://tethys.pnnl.gov/node/2252)
50. [Sensitivity of the Mussel Mytilus edulis to Substrate-Borne Vibration in Relation to Anthropogenically Generated Noise](https://tethys.pnnl.gov/node/2270)
51. [Good or Bad Vibrations? Impacts of Anthropogenic Vibration on the Marine Epibenthos](https://tethys.pnnl.gov/node/2271)
52. [Acoustic characterization of submarine cable installation in the Biscay Marine Energy Platform (bimep)](https://tethys.pnnl.gov/node/2279)
53. [Low-cost acoustic design of a bat test room](https://tethys.pnnl.gov/node/2347)
54. [Underwater Noise Propagation Models and its Application in Renewable Energy Parks: WaveRoller Case Study](https://tethys.pnnl.gov/node/2405)
55. [Monitoring the Condition of Marine Renewable Energy Devices through Underwater Acoustic Emissions: Case study of a Wave Energy Converter in Falmouth Bay, UK](https://tethys.pnnl.gov/node/2472)
56. [Massachusetts Study on Wind Turbine Acoustics](https://tethys.pnnl.gov/node/2479)
57. [Changes in Fish Catch Rates in the Presence of Air Gun Sounds in Prudhoe Bay, Alaska](https://tethys.pnnl.gov/node/2481)
58. [Noise Propagation Calculations of a Wind Turbine in Complex Terrain](https://tethys.pnnl.gov/node/24892)
59. [Wind turbine noise assessment in a small and quiet community in Finland](https://tethys.pnnl.gov/node/249423)
60. [Perception and annoyance due to wind turbine noise-a dose–response relationship](https://tethys.pnnl.gov/node/249425)
61. [A Review of the Potential Impacts of Wind Turbine Noise in the Australian Context](https://tethys.pnnl.gov/node/249906)
62. [Windmill Noise Annoyance, Visual Aesthetics, and Attitudes towards Renewable Energy Sources](https://tethys.pnnl.gov/node/249913)
63. [Social survey on wind turbine noise in Japan](https://tethys.pnnl.gov/node/251607)
64. [Nationwide field measurements of wind turbine noise in Japan](https://tethys.pnnl.gov/node/251608)
65. [Continuation Implementation Masterplan Wind at Sea](https://tethys.pnnl.gov/node/2540)
66. [Monitoring and Research Shortlist Offshore Wind - Knowledge advancements and follow up](https://tethys.pnnl.gov/node/2543)
67. [Effects of Offshore Pile Driving on Harbour Porpoise Abundance in the German Bight: Assessment of Noise Effects](https://tethys.pnnl.gov/node/2594)
68. [Assessing Auditory Evoked Potentials of Wild Harbor Porpoises (Phocoena phocoena)](https://tethys.pnnl.gov/node/2597)
69. [Marine Wind Farms and Cetaceans](https://tethys.pnnl.gov/node/2653)
70. [Effects of Offshore Wind Farms on the Early Life Stages of Dicentrarchus labrax](https://tethys.pnnl.gov/node/2673)
71. [Soundscape and Noise Exposure Monitoring in a Marine Protected Area Using Shipping Data and Time-Lapse Footage](https://tethys.pnnl.gov/node/2674)
72. [Fulfilling EU Laws to Ensure Marine Mammal Protection During Marine Renewable Construction Operations in Scotland](https://tethys.pnnl.gov/node/2680)
73. [Multiple-Pulse Sounds and Seals: Results of a Harbor Seal (Phoca vitulina) Telemetry Study During Wind Farm Construction](https://tethys.pnnl.gov/node/2686)
74. [Understanding the Population Consequences of Acoustic Disturbance for Marine Mammals](https://tethys.pnnl.gov/node/2687)
75. [Expert Elicitation Methods in Quantifying the Consequences of Acoustic Disturbance from Offshore Renewable Energy Developments](https://tethys.pnnl.gov/node/2688)
76. [Underwater Sound Levels at a Wave Energy Device Testing Facility in Falmouth Bay, UK](https://tethys.pnnl.gov/node/2691)
77. [Predicting Anthropogenic Noise Contributions to US Waters](https://tethys.pnnl.gov/node/2694)
78. [Mapping Underwater Sound in the Dutch Part of the North Sea](https://tethys.pnnl.gov/node/2703)
79. [A Portable, Real-Time Passive Acoustic System and Autonomous Hydrophone Array for Noise Monitoring of Offshore Wave Energy Projects](https://tethys.pnnl.gov/node/2748)
80. [Seasonal and Diel Variability of the Underwater Noise in the Baltic Sea](https://tethys.pnnl.gov/node/2788)
81. [Environmental Monitoring of the Paimpol-Brehat Tidal Project](https://tethys.pnnl.gov/node/2826)
82. [Human Perception of Sound from Wind Turbines](https://tethys.pnnl.gov/node/2838)
83. [The Effects of Noise on Aquatic Life II](https://tethys.pnnl.gov/node/2870)
84. [Characterizing Large River Sounds: Providing Context for Understanding the Environmental Effects of Noise Produced by Hydrokinetic Turbines](https://tethys.pnnl.gov/node/2871)
85. [Classification of Three-Dimensional Ocean Features using Three-Dimensional Empirical Orthogonal Functions](https://tethys.pnnl.gov/node/2876)
86. [Field Calibration a Tool for Acoustic Noise Prediction: The CALCOM’’10 Data Set](https://tethys.pnnl.gov/node/2877)
87. [Auditory and Behavioral Responses of California Sea Lions (Zalophus californianus) to Single Underwater Impulses from an Arc-Gap Transducer](https://tethys.pnnl.gov/node/2887)
88. [Hermosa West Wind Energy Project Draft EIS - Appendix F: Bat Acoustical Studies](https://tethys.pnnl.gov/node/3082)
89. [A GIS-Multicriteria Approach to Analyzing Noise and Visual Impacts of Wind Farms](https://tethys.pnnl.gov/node/3103)
90. [Effects of Acoustic Deterrents on Foraging Bats](https://tethys.pnnl.gov/node/3127)
91. [Effects of marine noise pollution on Mediterranean fishes and invertebrates: A review](https://tethys.pnnl.gov/node/316267)
92. [The role of ambient sound levels, signal-to-noise ratio, and stimulus pulse rate on behavioural disturbance of seabass in a net pen](https://tethys.pnnl.gov/node/316464)
93. [Behavioural responses in a congested sea: an observational study on a coastal nest-guarding fish](https://tethys.pnnl.gov/node/316466)
94. [Auditory Recognition of Familiar and Unfamiliar Subjects with Wind Turbine Noise](https://tethys.pnnl.gov/node/3192)
95. [Acoustic Noise Associated with the MOD-1 Wind Turbine: Its Source, Impact, and Control](https://tethys.pnnl.gov/node/3224)
96. [Fairhead Tidal Environmental Impact Assessment Scoping Document](https://tethys.pnnl.gov/node/3255)
97. [A Survey of Acoustic Harassment Device (AHD) Use in the Bay of Fundy, NB, Canada](https://tethys.pnnl.gov/node/3261)
98. [Underwater Noise Modelling for Environmental Impact Assessment](https://tethys.pnnl.gov/node/3294)
99. [An Italian Proposal on the Monitoring of Underwater Noise: Relationship Between the EU Marine Strategy Framework Directive (MSFD) and Marine Spatial Planning Directive (MSP)](https://tethys.pnnl.gov/node/3295)
100. [Acoustic Characterization of a Hydrokinetic Turbine](https://tethys.pnnl.gov/node/3313)
101. [Discussion of the Effects of the Underwater Noise Radiated by a Wave Energy Device - Portugal](https://tethys.pnnl.gov/node/3314)
102. [Impacts of Anthropogenic Noise on Marine Life: Publication Patterns, New Discoveries, and Future Directions in Research and Management](https://tethys.pnnl.gov/node/3373)
103. [Validation of Finite Element Computations for the Quantitative Prediction of Underwater Noise from Impact Pile Driving](https://tethys.pnnl.gov/node/3404)
104. [Baseline Measurement of Underwater Noise Under the SURGE Project](https://tethys.pnnl.gov/node/3406)
105. [Underwater Mach Wave Radiation from Impact Pile Driving: Theory and Observation](https://tethys.pnnl.gov/node/3407)
106. [MeyGen Tidal Energy Project Phase 1: Environmental Statement](https://tethys.pnnl.gov/node/3408)
107. [Measurement of Long-Term Ambient Noise and Tidal Turbine Levels in the Bay of Fundy](https://tethys.pnnl.gov/node/3409)
108. [Hydroacoustic Measurements of the Noise Radiated from Wave Energy Converters in the Lysekil Project and Project WESA](https://tethys.pnnl.gov/node/3413)
109. [Comparison of Underwater Background Noise during Spring and Neap Tide in a High Tidal Current Site: Ramsey Sound](https://tethys.pnnl.gov/node/3420)
110. [Assessment of Underwater Noise Generated by Wave Energy Devices](https://tethys.pnnl.gov/node/3422)
111. [Environmental Monitoring Report - 2011 Installation of Monopile at Voith Hydro Test Berth, Fall of Warness, Orkney](https://tethys.pnnl.gov/node/3424)
112. [Scoping Study: Review of Current Knowledge of Underwater Noise Emissions from Wave and Tidal Stream Energy Devices](https://tethys.pnnl.gov/node/3429)
113. [A Computational Method to Predict and Study Underwater Noise due to Pile Driving](https://tethys.pnnl.gov/node/3433)
114. [Cod and Sole Behaviour in an Offshore Wind Farm](https://tethys.pnnl.gov/node/3446)
115. [Underwater Noise from a Wave Energy Converter Is Unlikely to Affect Marine Mammals](https://tethys.pnnl.gov/node/3478)
116. [Hearing Thresholds of a Harbor Porpoise (Phocoena phocoena) for Playbacks of Seal Scarer Signals, and Effects of the Signals on Behavior](https://tethys.pnnl.gov/node/3486)
117. [The Effects of Noise on Aquatic Life](https://tethys.pnnl.gov/node/3487)
118. [Sound Exposure in Harbour Seals During the Installation of an Offshore Wind Farm: Predictions of Auditory Damage](https://tethys.pnnl.gov/node/3549)
119. [Estimation of Acoustic Particle Motion and Source Bearing Using a Drifting Hydrophone Array Near a River Current Turbine to Assess Disturbances to Fish](https://tethys.pnnl.gov/node/3552)
120. [Noise Mitigation Measures and Low-noise Foundation Concepts - State of the Art](https://tethys.pnnl.gov/node/3634)
121. [Underwater Noise Produced by the Piling Activities During the Construction of the Belwind Offshore Wind Farm (Bligh Bank, Belgian Marine Waters)](https://tethys.pnnl.gov/node/3640)
122. [Airborne Sound Propagation Over Sea During Offshore Wind Farm Piling](https://tethys.pnnl.gov/node/3656)
123. [Eco-Hydro-Acoustic Modeling and its Use as an EIA Tool](https://tethys.pnnl.gov/node/3676)
124. [Effects of Noise and By-Catch on a Danish Harbour Porpoise Population](https://tethys.pnnl.gov/node/3685)
125. [The Cumulative Effect on Sound Levels from Multiple Underwater Anthropogenic Sound Sources in Shallow Coastal Waters](https://tethys.pnnl.gov/node/3693)
126. [Did the Pile Driving during the Construction of the Offshore Wind Farm Egmond aan Zee, the Netherlands, Impact Porpoises?](https://tethys.pnnl.gov/node/3703)
127. [Did the Pile Driving during the Construction of the Offshore Wind Farm Egmond aan Zee, the Netherlands, Impact Local Seabirds?](https://tethys.pnnl.gov/node/3704)
128. [Effects of Pile-Driving on Harbour Porpoises (Phocoena phocoena) at the First Offshore Wind Farm in Germany](https://tethys.pnnl.gov/node/3750)
129. [Acoustic Deterrent Workshop National Wind Technology Center, Louisville, CO](https://tethys.pnnl.gov/node/3763)
130. [Underwater Radiated Noise from Point Absorbing Wave Energy Converters: Noise Characteristics and Possible Environmental Effects](https://tethys.pnnl.gov/node/3819)
131. [On Certain Problems Concerning Environmental Impact Assessment of Wind Turbines in Scope of Acoustic Effects](https://tethys.pnnl.gov/node/3935)
132. [The Effects of Wind Turbines on Antipredator Behavior in California Ground Squirrels (Spermophilus beecheyi)](https://tethys.pnnl.gov/node/4000)
133. [The Remote Environmental Assessment Laboratory’’s Acoustic Library: An Archive for Studying Soundscape Ecology](https://tethys.pnnl.gov/node/4111)
134. [Ambient noise in an urbanized tidal channel](https://tethys.pnnl.gov/node/41184)
135. [Long Term Monitoring of Underwater Noise at a Proposed Deployment Site of a Tidal Stream Device](https://tethys.pnnl.gov/node/41187)
136. [Experimental Evidence for the Effects of Chronic Anthropogenic Noise on Abundance of Greater Sage-Grouse at Leks](https://tethys.pnnl.gov/node/4170)
137. [Experimental Chronic Noise Is Related to Elevated Fecal Corticosteroid Metabolites in Lekking Male Greater Sage-Grouse (Centrocercus urophasianus)](https://tethys.pnnl.gov/node/4171)
138. [Stakeholders or Subject Matter Experts, who Should be consulted?](https://tethys.pnnl.gov/node/4231)
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140. [Evaluations of Wind Potential in Dobrogea Plateau](https://tethys.pnnl.gov/node/4251)
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143. [Towards a Numerical Model to Simulate the Observed Displacement of Harbour Porpoises Phocoena phocoena Due to Pile Driving in Belgian Waters](https://tethys.pnnl.gov/node/4264)
144. [Hydro Sound Measurements during the Installation of Large Diameter Offshore Piles using Combinations of Independent Noise Mitigation Systems](https://tethys.pnnl.gov/node/4266)
145. [Dynamic Measurements of Pile Deflections as a Source of Underwater Sound Emissions during Impact Driving of Offshore Pile Foundations](https://tethys.pnnl.gov/node/4267)
146. [New Achievements in Underwater Noise Modelling for Offshore Pile Driving](https://tethys.pnnl.gov/node/4269)
147. [Lake Michigan Offshore Wind Feasibility Assessment](https://tethys.pnnl.gov/node/4274)
148. [Assessing Environmental Impacts of Offshore Wind Farms: Lessons Learned and Recommendations for the Future](https://tethys.pnnl.gov/node/4281)
149. [Grey Seals use Anthropogenic Signals from Acoustic Tags to Locate Fish: Evidence from a Simulated Foraging Task](https://tethys.pnnl.gov/node/4297)
150. [Assessing the Underwater Acoustics of the World’’s Largest Vibration Hammer (OCTA-KONG) and Its Potential Effects on the Indo-Pacific Humpbacked Dolphin (Sousa chinensis)](https://tethys.pnnl.gov/node/4313)
151. [The Significance of Parameter Uncertainties for the Prediction of Offshore Pile Driving Noise](https://tethys.pnnl.gov/node/4326)
152. [Amplitude modulation of wind turbine sound in cold climates](https://tethys.pnnl.gov/node/43345)
153. [Development of Noise Mitigation Measures in Offshore Wind Farm Construction](https://tethys.pnnl.gov/node/4335)
154. [Source Levels of the Underwater Calls of a Male Leopard Seal](https://tethys.pnnl.gov/node/4340)
155. [In Situ Mortality Experiments with Juvenile Sea Bass (Dicentrarchus labrax) in Relation to Impulsive Sound Levels Caused by Pile Driving of Windmill Foundations](https://tethys.pnnl.gov/node/4343)
156. [Habitat Preferences of Harbour Seals in the Dutch Coastal Area: Analysis and Estimate of Effects of Offshore Wind Farms](https://tethys.pnnl.gov/node/4363)
157. [Marine Mammals and Ocean Noise: Future Directions and Information Needs with Respect to Science, Policy and Law in Canada](https://tethys.pnnl.gov/node/4379)
158. [Long-range Effects of Airgun Noise on Marine Mammals: Responses as a Function of Received Sound Level and Distance](https://tethys.pnnl.gov/node/4397)
159. [Aversiveness of Sounds in Phocid Seals: Psycho-Physiological Factors, Learning Processes and Motivation](https://tethys.pnnl.gov/node/4407)
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175. [Underwater Noise from Construction and Operation of Offshore Wind Farms](https://tethys.pnnl.gov/node/4779)
176. [Underwater Noise of Whale Watching Boats and Potential Effects on Killer Whales (Orcinus orca), Based on an Acoustic Impact Model](https://tethys.pnnl.gov/node/4780)
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180. [Threshold for Onset of Injury in Chinook Salmon from Exposure to Impulsive Pile Driving Sounds](https://tethys.pnnl.gov/node/4816)
181. [Turbine Sound May Influence the Metamorphosis Behaviour of Estuarine Crab Megalopae](https://tethys.pnnl.gov/node/4829)
182. [Underwater Ambient Noise at a Proposed Tidal Energy Site in Puget Sound](https://tethys.pnnl.gov/node/4836)
183. [Underwater Noise From Three Types Of Offshore Wind Turbines: Estimation Of Impact Zones For Harbor Porpoises And Harbor Seals](https://tethys.pnnl.gov/node/4837)
184. [Temporal Patterns In Ambient Noise Of Biological Origin From A Shallow Water Temperate Reef](https://tethys.pnnl.gov/node/4882)
185. [The Acoustics And Acoustic Behavior Of The California Spiny Lobster (Panulirus Interruptus)](https://tethys.pnnl.gov/node/4889)
186. [The Effect of Acoustic Harassment Devices on Harbour Porpoises (Phocoena phocoena) in the Bay of Fundy, Canada](https://tethys.pnnl.gov/node/4901)
187. [Summary on Harbour Porpoise Monitoring 1999-2006 around Nysted and Horns Rev Offshore Wind Farms](https://tethys.pnnl.gov/node/4948)
188. [Baseline assessment of underwater noise in the Ria Formosa](https://tethys.pnnl.gov/node/501)
189. [Responses of Harbour Porpoises to Pile Driving at the Horns Rev II Offshore Wind Farm in the Danish North Sea](https://tethys.pnnl.gov/node/5058)
190. [Particle Motion Measured at an Operational Wind Turbine in Relation to Hearing Sensitivity in Fish](https://tethys.pnnl.gov/node/5062)
191. [Perception of Low-Frequency Acoustic Signals by a Harbour Porpoise (Phocoena phocoena) in the Presence of Simulated Offshore Wind Turbine Noise](https://tethys.pnnl.gov/node/5065)
192. [Pile Driving Zone of Responsiveness Extends Beyond 20 km for Harbour Porpoises (Phocoena phocoena (L.))](https://tethys.pnnl.gov/node/5072)
193. [Predicting Underwater Radiated Noise Levels due to the First Offshore Wind Turbine Installation in the U.S.](https://tethys.pnnl.gov/node/5090)
194. [Noise Measurements Of A Prototype Tidal Energy Turbine](https://tethys.pnnl.gov/node/5150)
195. [Noise Negatively Affects Foraging and Antipredator Behaviour in Shore Crabs](https://tethys.pnnl.gov/node/5153)
196. [Modelling the Vertical Directivity of Noise from Underwater Drilling](https://tethys.pnnl.gov/node/5195)
197. [Measurement of Underwater Noise During Piling at the Red Funnel Terminal, Southampton, and Observation of its Affect on Caged Fish](https://tethys.pnnl.gov/node/5227)
198. [Listening In](https://tethys.pnnl.gov/node/5256)
199. [Making the Case for the Sound Management of Marine Protected Areas](https://tethys.pnnl.gov/node/5272)
200. [Is a German Harbour Porpoise Much More Sensitive than a British One? Comparative Analyses of Mandatory Measures for the Protection of Harbour Porposes (Phocoena phocoena) During Offshore Wind Farm Ramming in Germany, Denmark and the UK](https://tethys.pnnl.gov/node/5306)
201. [Impact Assessment of an Off-shore Wind Park on Sea Ducks](https://tethys.pnnl.gov/node/5346)
202. [Framework for Assessing Impacts of Pile-Driving Noise from Offshore Wind Farm Construction on a Harbour Seal Population](https://tethys.pnnl.gov/node/5372)
203. [Gray Whales, Eschrichtius robustus, Avoid the Underwater Sounds of Killer Whales, Orcinus orca](https://tethys.pnnl.gov/node/5378)
204. [Estimates of Water Turbine Noise Levels](https://tethys.pnnl.gov/node/5404)
205. [Exposure to Seismic Survey Alters Blue Whale Acoustic Communication](https://tethys.pnnl.gov/node/5423)
206. [Effects of the Construction of Scroby Sands Offshore Wind Farm on the Prey Base of Little Tern Sternula albifons at its Most Important UK Colony](https://tethys.pnnl.gov/node/5433)
207. [Environmental Assessment of Offshore Wind Power Generation near Rhode Island: Acoustic and Electromagnetic Effects on Marine Animals [Presentation]](https://tethys.pnnl.gov/node/5445)
208. [Effect of the Sound Generated by an Acoustic Harassment Device on the Relative Abundance and Distribution of Harbor Porpoises (Phocoena phocoena) in Retreat Passage, British Columbia](https://tethys.pnnl.gov/node/5474)
209. [Effects Of Ambient And Boat Noise On Hearing And Communication In Three Fish Species Living In A Marine Protected Area (Miramare, Italy)](https://tethys.pnnl.gov/node/5476)
210. [Effects Of Tidal Turbine Noise On Fish Hearing And Tissues](https://tethys.pnnl.gov/node/5477)
211. [Effects of Marine Windfarms on the Distribution of Fish, Shellfish and Marine Mammals in the Horns Rev Area](https://tethys.pnnl.gov/node/5486)
212. [Effects of Pile-Driving Noise on the Behaviour of Marine Fish](https://tethys.pnnl.gov/node/5489)
213. [Differentiating Between Underwater Construction Noise of Monopile and Jacket Foundations for Offshore Windmills: A Case Study from the Belgian Part of the North Sea](https://tethys.pnnl.gov/node/5515)
214. [Context-Dependent Impacts of Anthropogenic Noise on Individual and Social Behaviour in a Cooperatively Breeding Fish](https://tethys.pnnl.gov/node/5545)
215. [Broadband Acoustic Environment at a Tidal Energy Site in Puget Sound](https://tethys.pnnl.gov/node/5564)
216. [Changes in Humpback Whale Song Occurrence in Response to an Acoustic Source 200 km Away](https://tethys.pnnl.gov/node/5574)
217. [Characterizing the Relative Contributions of Large Vessels to Total Ocean Noise Fields: A Case Study Using the Gerry E. Studds Stellwagen Bank National Marine Sanctuary](https://tethys.pnnl.gov/node/5577)
218. [Assessment of Basic Audiometric Functions in Killer Whales (Orcinus orca) at Loro Parque, Tenerife, Spain](https://tethys.pnnl.gov/node/5588)
219. [Averaging Underwater Noise Levels for Environmental Assessment of Shipping](https://tethys.pnnl.gov/node/5598)
220. [Barging Effects On Sensory Systems Of Chinook Salmon Smolts](https://tethys.pnnl.gov/node/5604)
221. [Behavioural Reactions of Free-Ranging Porpoises and Seals to the Noise of a Simulated 2 MW Windpower Generator](https://tethys.pnnl.gov/node/5619)
222. [An Investigation into the Effects of Underwater Piling Noise on Salmonids](https://tethys.pnnl.gov/node/5627)
223. [Assessing the Responses of Coastal Cetaceans to the Construction of Offshore Wind Turbines](https://tethys.pnnl.gov/node/5652)
224. [Assessing Underwater Noise Levels during Pile-Driving at an Offshore Windfarm and its Potential Effects on Marine Mammals](https://tethys.pnnl.gov/node/5657)
225. [Assessment Method for Sound Radiated by Cyclically Operating Wells Turbines](https://tethys.pnnl.gov/node/5660)
226. [Acoustic Masking In Marine Ecosystems: Intuitions, Analysis, And Implication](https://tethys.pnnl.gov/node/5666)
227. [An Analysis of the Potential Acoustic Effects of Cape Wind’’s Offshore Wind Farm on Marine Mammal Populations](https://tethys.pnnl.gov/node/5683)
228. [A Case Study on the Effects of Underwater Noise During the Construction of Large Offshore Wind Farms](https://tethys.pnnl.gov/node/5690)
229. [A Digital Acoustic Recording Tag for Measuring the Response of Wild Marine Mammals to Sound](https://tethys.pnnl.gov/node/5695)
230. [A Review of Offshore Windfarm Related Underwater Noise Sources](https://tethys.pnnl.gov/node/5724)
231. [A Vessel Noise Budget for Admiralty Inlet, Puget Sound, Washington (USA)](https://tethys.pnnl.gov/node/5726)
232. [Use of Static Passive Acoustic Monitoring (PAM) for monitoring cetaceans at Marine Renewable Energy Installations (MREIs) for Marine Scotland](https://tethys.pnnl.gov/node/574)
233. [The effect of vessel noise on the vocal behavior of belugas in the St. Lawrence River estuary, Canada](https://tethys.pnnl.gov/node/59076)
234. [Harbour porpoise responses to pile-driving diminish over time](https://tethys.pnnl.gov/node/608)
235. [School is out on noisy reefs: the effect of boat noise on predator learning and survival of juvenile coral reef fishes](https://tethys.pnnl.gov/node/638)
236. [Acoustic Characteristics of the Lifesaver Wave Energy Converter](https://tethys.pnnl.gov/node/6536)
237. [Anthropogenic noise increases fish mortality by predation](https://tethys.pnnl.gov/node/654)
238. [Effect of boat noise on the behaviour of bluefin tuna Thunnus thynnus in the Mediterranean Sea](https://tethys.pnnl.gov/node/656)
239. [Aquamarine Power Marine Mammal Observation Report](https://tethys.pnnl.gov/node/6851)
240. [Exposure of benthic invertebrates to sediment vibration: From laboratory experiments to outdoor simulated pile-driving](https://tethys.pnnl.gov/node/712)
241. [Soundscape characterization in a dynamic acoustic environment: Grand Passage, Nova Scotia, a planned in-stream tidal energy site](https://tethys.pnnl.gov/node/715)
242. [Impulsive noise pollution in the Northeast Atlantic: Reported activity during 2015–2017](https://tethys.pnnl.gov/node/7179)
243. [Determining the dependence of marine pile driving sound levels on strike energy, pile penetration, and propagation effects using a linear mixed model based on damped cylindrical spreading](https://tethys.pnnl.gov/node/749)
244. [Measuring responses of harbour seals to potential aversive acoustic mitigation signals using controlled exposure behavioural response studies](https://tethys.pnnl.gov/node/750)
245. [Noise impact assessment on the basis of onsite acoustic noise immission measurements for a representative wind farm](https://tethys.pnnl.gov/node/775)
246. [Social structure and abundance of coastal bottlenose dolphins, Tursiops truncatus, in the Normano-Breton Gulf, English Channel](https://tethys.pnnl.gov/node/797)
247. [A review of crustacean sensitivity to high amplitude underwater noise: Data needs for effective risk assessment in relation to UK commercial species](https://tethys.pnnl.gov/node/799)
248. [Characteristics of the soundscape before and after the construction of the Block Island Wind Farm](https://tethys.pnnl.gov/node/809)
249. [Assessment of impacts on tropical marine environment for off-shore clean energy development](https://tethys.pnnl.gov/node/825)
250. [Effects of noise-mitigated offshore pile driving on harbour porpoise abundance in the German Bight 2014-2016 (Gescha 2)](https://tethys.pnnl.gov/node/881)
251. [Effect of Pile-Driving Playback Sound Level on Fish-Catching Efficiency in Harbor Porpoises (Phocoena phocoena)](https://tethys.pnnl.gov/node/882)
252. [Effects of impulsive noise on marine mammals: investigating range‐dependent risk](https://tethys.pnnl.gov/node/919)
253. [Acoustic impact of a wave energy converter in Mediterranean shallow waters](https://tethys.pnnl.gov/node/921)
254. [Evaluating Changes in the Marine Soundscape of an Offshore Wind Farm via the Machine Learning-Based Source Separation](https://tethys.pnnl.gov/node/925)
255. [Effects of wind turbine noise on the surrounding soundscape in the context of greater-prairie chicken courtship vocalizations](https://tethys.pnnl.gov/node/929)
256. [Potential Benefits of Vessel Slowdowns on Endangered Southern Resident Killer Whales](https://tethys.pnnl.gov/node/933)

## 2.2 Receptors

Receptors are species, habitats and human activities of environmental concern.

### 2.2.1 Cetaceans

Literature from [Tethys Knowledge Base](https://tethys.pnnl.gov/knowledge-base-all)}.:

1. [Comparing the Performance of Bottom-Moored and Unmanned Surface Vehicle Towed Passive Acoustic Monitoring Platforms for Marine Mammal Detections](https://tethys.pnnl.gov/node/151989)

### 2.2.2 Pinnipeds

Literature from [Tethys Knowledge Base](https://tethys.pnnl.gov/knowledge-base-all)}.:

1. [Assessment of Risk to Marine Mammals from Underwater Marine Renewable Devices in Welsh Waters: Phase 2 - Studies of Marine Mammals in Welsh High Tidal Waters](https://tethys.pnnl.gov/node/1345)
2. [Empirical measures of harbor seal behavior and avoidance of an operational tidal turbine](https://tethys.pnnl.gov/node/1349)
3. [The Effect of Simulated Seal Scarer Sounds on Harbour Porpoises](https://tethys.pnnl.gov/node/1422)
4. [Effects of larger turbines for the offshore wind farm at Krieger’’s Flak, Sweden. Assessment of impact on marine mammals](https://tethys.pnnl.gov/node/1455)
5. [Harbour seals (Phoca vitulina) around an operational tidal turbine in Strangford Narrows: No barrier effect but small changes in transit behaviour](https://tethys.pnnl.gov/node/2047)
6. [The Number and Distribution of Marine Mammals in the Fall of Warness, Orkney July 2006 - July 2007](https://tethys.pnnl.gov/node/2490)
7. [Movements of Seals from Rødsand Seal Sanctuary Monitored by Satellite Telemetry](https://tethys.pnnl.gov/node/2662)
8. [The Number and Distribution of Marine Mammals in the Fall of Warness, Orkney July 2005 - July 2006](https://tethys.pnnl.gov/node/2759)
9. [Auditory and Behavioral Responses of California Sea Lions (Zalophus californianus) to Single Underwater Impulses from an Arc-Gap Transducer](https://tethys.pnnl.gov/node/2887)
10. [Assessment of Collision Risk for Seals and Tidal Stream Turbines](https://tethys.pnnl.gov/node/2904)
11. [Geographical Variation in Temporal and Spatial Vocalization Patterns of Male Harbour Seals in the Mating Season](https://tethys.pnnl.gov/node/2905)
12. [Estimating Harbour Seal Abundance and Status in an Estuarine Habitat in North-East Scotland](https://tethys.pnnl.gov/node/2907)
13. [Numerical Modeling of the Impact Response of Tidal Devices and Marine Mammals](https://tethys.pnnl.gov/node/3306)
14. [Sound Exposure in Harbour Seals During the Installation of an Offshore Wind Farm: Predictions of Auditory Damage](https://tethys.pnnl.gov/node/3549)
15. [Modelling Harbour Seal Habitat by Combining Data from Multiple Tracking](https://tethys.pnnl.gov/node/3777)
16. [EMEC Fall of Warness Tidal Test Site: Wildlife Observations Project Annual Report](https://tethys.pnnl.gov/node/4315)
17. [EMEC Billia Croo Wave Test Site: Wildlife Observations Project Annual Report](https://tethys.pnnl.gov/node/4321)
18. [Source Levels of the Underwater Calls of a Male Leopard Seal](https://tethys.pnnl.gov/node/4340)
19. [Habitat Preferences of Harbour Seals in the Dutch Coastal Area: Analysis and Estimate of Effects of Offshore Wind Farms](https://tethys.pnnl.gov/node/4363)
20. [Behavioural Responses of Harbour Seals to Human-Induced Disturbances](https://tethys.pnnl.gov/node/4414)
21. [Distribution of Harbour Seals in the German Bight in Relation to Offshore Wind Power Plants](https://tethys.pnnl.gov/node/4437)
22. [Marine Mammals Trace Anthropogenic Structures at Sea](https://tethys.pnnl.gov/node/4480)
23. [Marine Megavertebrates of Cornwall and the Isles of Scilly: Relative Abundance and Distribution](https://tethys.pnnl.gov/node/4611)
24. [Summary on Seal Monitoring 1999-2005 around Nysted and Horns Rev Offshore Wind Farms](https://tethys.pnnl.gov/node/4949)
25. [Offshore Wind Farms and Marine Mammals: Impacts and Methodologies for Assessing Impacts](https://tethys.pnnl.gov/node/5106)
26. [Olympic Coast National Marine Sanctuary: Marine Mammals List](https://tethys.pnnl.gov/node/5121)
27. [Effects of Marine Windfarms on the Distribution of Fish, Shellfish and Marine Mammals in the Horns Rev Area](https://tethys.pnnl.gov/node/5486)
28. [Non‐lethal management of carnivore predation: long‐term tests with a startle reflex‐based deterrence system on a fish farm](https://tethys.pnnl.gov/node/6116)
29. [Haul-Out Behavior of Harbor Seals (Phoca vitulina) in Hood Canal, Washington](https://tethys.pnnl.gov/node/6118)
30. [Automated detection and tracking of marine mammals: A novel sonar tool for monitoring effects of marine industry](https://tethys.pnnl.gov/node/614)
31. [Effects of noise-mitigated offshore pile driving on harbour porpoise abundance in the German Bight 2014-2016 (Gescha 2)](https://tethys.pnnl.gov/node/881)
32. [Effect of Pile-Driving Playback Sound Level on Fish-Catching Efficiency in Harbor Porpoises (Phocoena phocoena)](https://tethys.pnnl.gov/node/882)
33. [Three‐dimensional movements of harbour seals in a tidally energetic channel: Application of a novel sonar tracking system](https://tethys.pnnl.gov/node/936)

## 2.3 Stressor-Receptors

### 2.3.1 Cetaceans AND Noise

Literature from [Tethys Knowledge Base](https://tethys.pnnl.gov/knowledge-base-all)}.:

### 2.3.2 Pinnipeds AND Noise

Literature from [Tethys Knowledge Base](https://tethys.pnnl.gov/knowledge-base-all)}.:

1. [Effects of Marine Windfarms on the Distribution of Fish, Shellfish and Marine Mammals in the Horns Rev Area](https://tethys.pnnl.gov/node/5486)
2. [Effects of larger turbines for the offshore wind farm at Krieger’’s Flak, Sweden. Assessment of impact on marine mammals](https://tethys.pnnl.gov/node/1455)
3. [Source Levels of the Underwater Calls of a Male Leopard Seal](https://tethys.pnnl.gov/node/4340)
4. [Habitat Preferences of Harbour Seals in the Dutch Coastal Area: Analysis and Estimate of Effects of Offshore Wind Farms](https://tethys.pnnl.gov/node/4363)
5. [The Effect of Simulated Seal Scarer Sounds on Harbour Porpoises](https://tethys.pnnl.gov/node/1422)
6. [Sound Exposure in Harbour Seals During the Installation of an Offshore Wind Farm: Predictions of Auditory Damage](https://tethys.pnnl.gov/node/3549)
7. [Effect of Pile-Driving Playback Sound Level on Fish-Catching Efficiency in Harbor Porpoises (Phocoena phocoena)](https://tethys.pnnl.gov/node/882)
8. [Effects of noise-mitigated offshore pile driving on harbour porpoise abundance in the German Bight 2014-2016 (Gescha 2)](https://tethys.pnnl.gov/node/881)
9. [Auditory and Behavioral Responses of California Sea Lions (Zalophus californianus) to Single Underwater Impulses from an Arc-Gap Transducer](https://tethys.pnnl.gov/node/2887)

# 3 Spatial

Spatial data of Receptors are extracted for the Location from datasets harvested predominantly from [MarineCadastre.gov](https://MarineCadastre.gov).

## 3.1 Cetaceans: Biologically Important Areas for Cetaceans

Table: Source: [NOAA CetSound](https://cetsound.noaa.gov/important)

Spatial: within 10 nautical miles of site

|  |  |  |  |
| --- | --- | --- | --- |
| Species | Behavior | Time | Place |
| Humpback whale (Megaptera novaeangliae) | Feeding | March - December | Gulf of Maine; Stellwagen Bank; Great South Channel |
| Harbor porpoise (Phocoena phocoena) | Small and resident | July - September | Gulf of Maine |
| Fin whale (Balaenoptera physalus) | Feeding | June - October | Northern Gulf of Maine |