

Appendix D. Adaptive Management Framework

Newport Open Ocean Wave Energy Test Site
Northwest National Marine Renewable Energy Center

ADAPTIVE MANAGEMENT FRAMEWORK

Revised 8/7/2012

NNMREC Test Facility Adaptive Management Framework

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1 INTRODUCTION

The purpose of this Adaptive Management Framework (Framework) is two-fold. First, it provides a means for the broader regulatory and stakeholder communities to stay informed of and provide feedback on NNMREC test center monitoring and mitigation. The Adaptive Management Committee, described in Section 2, will receive an Annual Operations and Monitoring Report (Annual Report). The Annual Report will be a compilation of monitoring results, adaptive management thresholds, and mitigation actions taken during tests conducted at the NNMREC site. The Committee will meet on an annual basis to review results and provide guidance on future test center activities. Section 3 presents the Adaptive Management Thresholds that the Adaptive Management Committee will use in their review of monitoring results. This component of the Framework will be in place for the duration of NNMREC test center operations.

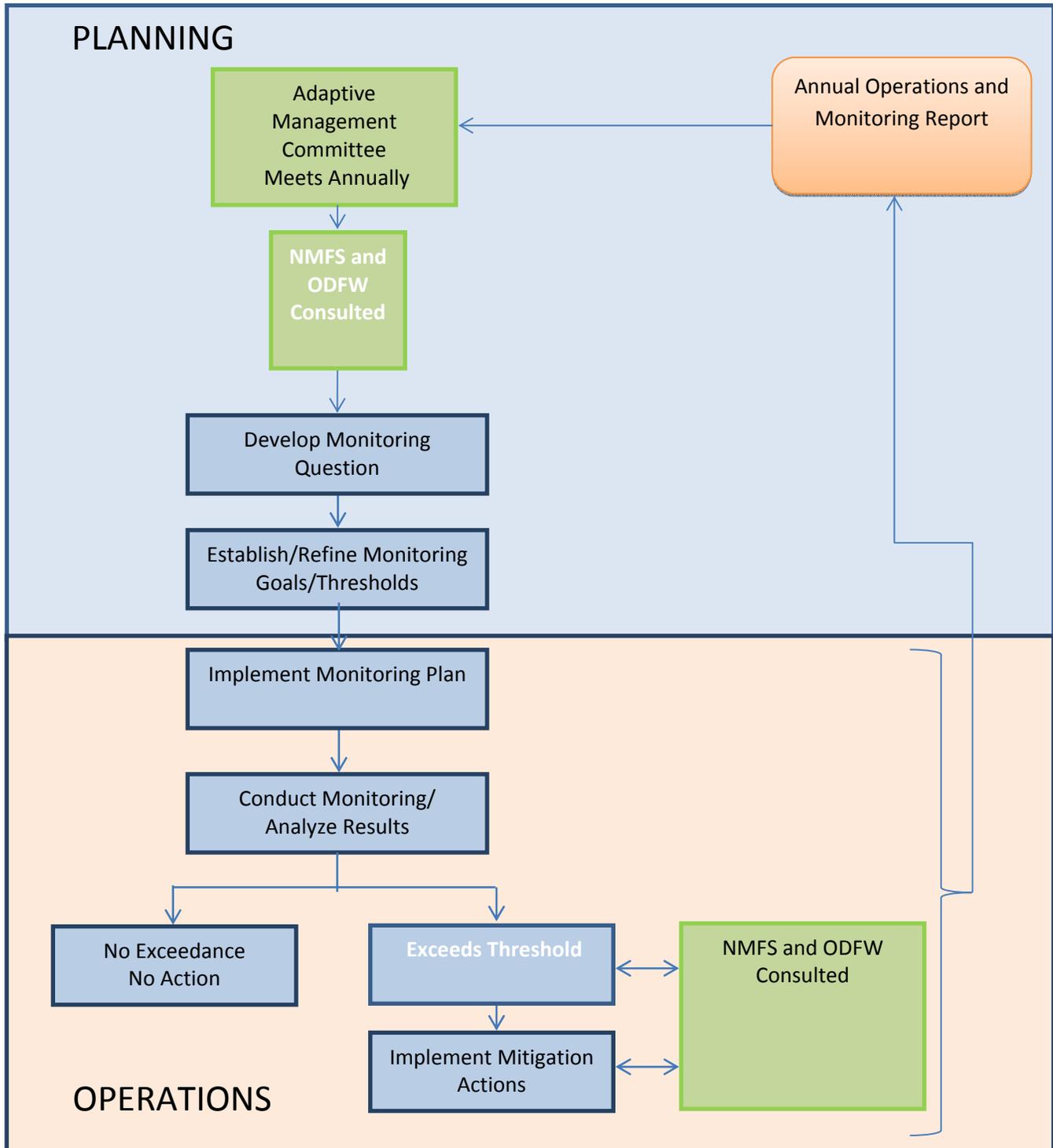
The NNMREC test center will be in operation from 2012 – 2022. Throughout this period, NNMREC will provide an opportunity for various WEC technologies to conduct short-term, non grid-connected tests within the project site, which is a 1 square-nautical-mile area in the Pacific Ocean, approximately 2 miles off the coast of Oregon near the city of Newport.

Second, this Adaptive Management Framework provides a foundation for the monitoring and adaptive management associated with individual tests at the NNMREC site. For each test performed at the NNMREC ocean site, an Adaptive Mitigation Plan will be developed that includes thresholds and mitigation actions for the particular test. The Adaptive Mitigation Plans will account for the unique attributes of that test, such as the characteristics of the technology being tested and duration of testing. In addition, results and analysis of previously completed monitoring studies will be used to inform the plans for future tests.

The Adaptive Mitigation Plan for the Ocean Sentinel/WET-NZ test (provided in Attachment 1) is included as an example of the Adaptive Mitigation Plan that will be developed for each test. Attachment 1 identifies thresholds that if exceeded may require a mitigation response. Monitoring results will be reviewed by NNMREC in real-time, whenever possible, to determine if thresholds have been exceeded. If the results show that thresholds are *not* exceeded then no action will be taken. If results show that thresholds are exceeded, NNMREC will consult with NMFS, USFWS and ODFW to develop an appropriate response. Responses may include changes to monitoring methods, project operations and/or mitigation actions, as appropriate.

The general process for this Adaptive Management Framework is depicted in the figure below.

Adaptive Management Framework Flow Chart



2 ADAPTIVE MANAGEMENT COMMITTEE

The purpose of the Adaptive Management Committee (“AMC” or Committee) is to review marine resource issues (i.e. benthic habitat, derelict gear, marine mammals, acoustics, and electromagnetic fields) related to wave energy testing activities at the NNMREC Open Ocean Test Site and to make recommendations for changes in monitoring, project operations, and/or adaptive management/mitigation thresholds for the test center.

2.1 RECOMMENDATION AND REVIEW PROCESS

The timelines outlined in this section are designed to ensure that previous year’s test information can be used to inform any permitting, adaptive management or other review processes for future year tests.

2.1.1 Annual Report

No later than December 1 of each year, an Annual Report will be provided to the Adaptive Management Committee for all tests conducted in the previous 12 months. The Annual Report will include a compilation of monitoring conducted (including a summary of the purpose for monitoring, the methods used, and monitoring results) and mitigation actions taken. In addition, plans for future tests will be summarized.

2.1.2 Adaptive Management Committee Meeting

No later than January 31 of each year, NNMREC will convene and facilitate an annual meeting of the Committee. The Committee will evaluate the information relative to the adaptive management thresholds and mitigation actions discussed in the sections that follow.

The Committee will also evaluate technical issues and data interpretation associated with the monitoring, as appropriate. Such evaluation will include the sufficiency and adequacy of the information provided by the monitoring, consideration of monitoring results, as well as possible adjustments to subsequent monitoring methods and frequencies. Key functions of the Committee are to:

- a) Review the results of studies and monitoring conducted during the previous testing period;
- b) Use study and monitoring results, as well as other sources of relevant information, if applicable, to determine whether a change to project monitoring (e.g., study design, methods, or duration) is warranted or if existing monitoring approaches continue to be appropriate;
- c) Review available information about wave energy devices proposed for testing in the following test season;

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- d) Evaluate any changes in plans made by NNMREC in response to the studies and/or monitoring, or upcoming devices; and
- e) In the event effects are identified that require modification to project operations or monitoring, provide NNMREC with recommended measures to avoid, minimize, or mitigate the effects, which may include ceasing testing and/or removal of project structures.

2.1.3 Committee Recommendations

The Annual Reports will be used by the Adaptive Management Committee to inform discussions and make recommendations to NNMREC for the monitoring, operations, and adaptive management plans associated with the NNMREC test center. The recommendations of the Adaptive Management Committee are not intended to supplant or fulfill any required permitting processes needed for future tests, but will be completed no later than February 28 of each year.

2.1.4 NNMREC and Agency Review

Upon conclusion of the Committee's review, NNMREC, in consultation with NMFS, UFWFS and ODFW, will consider the Committee's recommendations and determine the appropriate approach to the monitoring, operations, and adaptive management/mitigation thresholds to ensure the Project's compliance with the Endangered Species Act (ESA), Marine Mammal Protection Act (MMPA) and other relevant federal and state statutes. NNMREC, in consultation with NMFS, USFWS and ODFW, will also consider the Committee's recommendations in determining whether any additional mitigation measures are needed no later than March 31 of each year.

2.2 COMMITTEE MEMBERSHIP AND PARTICIPATION

Participation on the Committee by state or federal agencies does not affect their statutory responsibilities and authorities. Issues involving the exercise of agencies' specific authorities can be discussed, but agency decisions are not delegated to the Committee. Representatives of the following organizations will be invited to join the Committee:

- U.S. Department of Energy
- Northwest National Marine Renewable Energy Center
- US Army Corps of Engineers
- National Marine Fisheries Service
- U.S. Fish and Wildlife Service
- Oregon Department of Fish and Wildlife
- Oregon Department of Land Conservation and Development
- Department of State Lands
- Local Tribes
- Oregon Coastal Zone Management Agency
- Fishermen Involved in Natural Energy (or other appropriate fishing organization)

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- Surfrider Foundation
- Oregon Shores

Representatives from other organizations may be asked to join, as deemed appropriate by NNMREC.

2.3 MEETING PROVISIONS

NNMREC shall arrange, administer, and chair all meetings, unless otherwise agreed. The Committee shall establish protocols for Committee meetings such as agenda development, subcommittee involvement, and timely distribution of materials, location and scheduling.

NNMREC will convene and facilitate an annual meeting of the group to be schedule no later than January 31 of each year. The Committee will convene annually for the life of the test center operations, unless deemed otherwise by Members.

NNMREC shall send the Committee meeting schedule, agenda, and supporting materials directly to Committee members via e-mail and will also make it available on its web site.

NNMREC shall bear all costs associated with conducting meetings. Each Member shall bear its own cost of attendance. A Member's ongoing participation on the Committee is subject to that Member's budget and resource constraints.

3 ADAPTIVE MANAGEMENT THRESHOLDS¹

The Adaptive Management Thresholds outlined in this section are used by the Adaptive Management Committee, NMFS, USFWS, ODFW and NNMREC in the annual review of monitoring results and other operational information. As outlined in Section 2 above, these thresholds are used to evaluate single year data and multi-year data from the test center. These Adaptive Management Thresholds do not apply to individual testing operations. Specific adaptive mitigation thresholds developed for each test will be implemented during operations of individual tests.

In addition to conducting the monitoring referenced below, NNMREC staff will make opportunistic visual observations from the water surface during installation, maintenance, monitoring and other activities at the project site, and at least bi-weekly during project deployment. NNRMEC will record all opportunistic observations of marine mammals, seabirds, listed species, and/or derelict gear and include them in the Annual Report of monitoring results provided to the Adaptive Management Committee, NMFS, USFWS and ODFW. Additionally, NNMREC will coordinate with NMFS, USFWS, and ODFW, either through their participation in the Adaptive Management Committee or otherwise, to develop a standard form to use in recording and reporting observations.

¹ The use of the phrase "in consultation with" in this document does not relate to Section 7 ESA Consultation. Similarly, the use of the phrase 'approval by NMFS and ODFW' does not constitute issuance of an agency authorization of permit, nor does it limit NNMREC's decision making regarding the implementation of adaptive management/mitigation measures for permitted activities.

3.1 BENTHIC SPECIES AND HABITAT

Adaptive Management Threshold 1: If monitoring conducted as described in the Benthic Species and Habitat Monitoring Plan, which includes visual observation and gut analysis, shows *substantial differences or significant trends* as defined in consultation with ODFW and NMFS in benthic habitat or associated ecological communities between the Project-affected sites and reference sites, or at any one site over time, as defined by:

- a. substrate composition; for example changes in grain size proportions;
- b. species composition; for example there could be new species attracted to anchors/devices or species no longer present;
- c. species relative abundances; for example, existing species becoming more common or rare; and/or
- d. changes to feeding habits; for example a new prey item or disappearance of a species both from visual observation and from gut analysis.

NNMREC will, after consultation with the Adaptive Management Committee, in consultation with and after approval by NMFS and ODFW pursuant to their respective statutory authority, implement one or more of the following actions to ensure Project compliance with ESA, MMPA and other relevant federal and state statutes:

- Modify the monitoring plan and/or sampling frequency to determine if ecological interactions have negative effects on protected species, benthic habitat or associated ecological communities;
- Modify the Project to mitigate for Project effects;
- Conduct additional sampling or studies; and/or
- Make determination that no changes to monitoring plans or Project operations are needed.

3.2 DERELICT GEAR

Derelict gear monitoring and removal will be conducted in accordance with the procedures and adaptive management thresholds described below. In addition, NNMREC will participate in monthly FINE meetings, engage with members of the fishing community directly, and maintain ongoing communication with ODFW in regards to lost or entangled gear. Further, NNMREC will consult with NMFS and ODFW, either through their participation in the Adaptive Management Committee or otherwise, to ensure the efficacy of the derelict gear monitoring and response methods for the duration of Project activities. For instance, if derelict gear is routinely found caught on the mooring lines or anchors, monitoring and removal episodes may need to be increased.

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General Procedures for Derelict Gear

- i. **Detection:** NNMREC will perform underwater visual monitoring at least three times for each test: once prior to device deployment, once during active deployment, and once after device removal. Video lander sampling of anchors and reference locations will continue for the duration of the project (i.e., when any project related structure or equipment is in the water) weather permitting. In addition, NNMREC will make visual observations from the water surface, at least bi-weekly during project deployment, during all visits to the project site to identify any derelict gear.
- ii. **Notification:** If derelict gear is detected, NNMREC will contact NMFS, USFWS and ODFW within two days of detection.
- iii. **Removal:** Any gear entangled with project structures or moorings will be removed in spring/summer (prior to test device deployment) or in fall (immediately following test device removal). If the gear poses an entanglement risk to marine organisms, NNMREC will consult with NMFS, USFWS and ODFW to determine if an earlier or more immediate response is necessary (as described in the Adaptive Management Thresholds below).
- iv. **Return:** NNMREC will make every effort to return gear to owner and will be responsible for storing the gear and contacting the owner to retrieve it; ODFW can provide owner contact information.
- v. **Recycle:** In the event that attempts to return gear are unsuccessful, it may be recycled at the “Fishing for Energy” project located at Newport’s International Port.

Adaptive Management Threshold 1: If Annual Reports indicate that derelict gear is being ensnared on the *Ocean Sentinel* or project structures and posing harm to species, NNMREC will, after consultation with the Adaptive Management Committee, in consultation with and after approval by NMFS, USFWS and ODFW pursuant to their respective statutory authority, implement one or more of the following actions to ensure Project compliance with ESA, MMPA and other relevant federal and state statutes:

- Modify the Adaptive Mitigation Plan² to assure that derelict gear is addressed in a timely manner; or

Modify the Project to reduce the incidences of derelict gear being ensnared on the Ocean Sentinel and/or its mooring configuration.

Adaptive Management Threshold 2: If Annual Reports indicate that derelict gear is being ensnared on and posing harm to species during project tests on WEC devices similar to those proposed for upcoming test, NNMREC will, after consultation with the Adaptive Management Committee, in consultation with and after approval by NMFS, USFWS and ODFW pursuant to their respective statutory authority,

² An individual Adaptive Mitigation Plan will be developed for each installation of any anchors, mooring lines, and devices associated with the Ocean Sentinel and WEC devices. Each Adaptive Mitigation Plan will be in effect as long as project structures are deployed.

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implement one or more of the following actions to ensure Project compliance with ESA, MMPA and other relevant federal and state statutes:

- Recommend an Adaptive Mitigation Plan , which includes derelict gear removal, to the WEC developer to assure that derelict gear is addressed in a timely manner; or
- Require WEC developer to modify its device and/or mooring configuration to reduce the incidences of derelict gear being ensnared.

3.3 MARINE MAMMALS

Opportunistic Observations

As a matter of practice, NNMREC staff will make visual observations from the water surface during all visits to the project site, and at least all bi-weekly during project deployment. If project devices are not deployed but anchors and mooring lines remain in place during the April/May grey whale migration, NNMREC will perform visual observations at least bi-weekly during that period. NNRMEC will record all opportunistic observations of marine mammals and other listed species and include them in the Annual Report of monitoring results provided to the Adaptive Management Committee, NMFS and ODFW. Additionally, NNMREC will coordinate with NMFS and ODFW, either through their participation in the Adaptive Management Committee or otherwise, to develop a standard form to use in recording and reporting marine mammal observations.

Adaptive Management Threshold 1: If Annual Reports indicate observations of pinnipeds hauled out on the Ocean Sentinel, NNMREC will, after consultation with the Adaptive Management Committee, in consultation with and after approval by NMFS and ODFW pursuant to their respective statutory authority, implement one or more of the following actions to ensure Project compliance with ESA, MMPA and other relevant federal and state statutes:

- Modify the Project to reduce the potential for pinniped haul-out on the Ocean Sentinel; and/or
- Apply for an Incidental Harassment Authorization if needed for deterrence or removal of hauled-out pinnipeds.

Adaptive Management Threshold 2: If Annual Reports indicate observations of pinnipeds hauled out on WEC devices similar to those being proposed for upcoming test, NNMREC will, after consultation with the Adaptive Management Committee, in consultation with and after approval by NMFS and ODFW pursuant to their respective statutory authority, require the WEC developer to implement one or more of the following actions:

- Require WEC developer to modify its device to reduce the potential for pinniped haul-out; and/or
- Require WEC developer to apply for an Incidental Harassment Authorization if needed for deterrence or removal of hauled-out pinnipeds.

3.4 ACOUSTICS

Adaptive Management Threshold 1: If acoustic monitoring indicates that sound pressure levels attributable to the Ocean Sentinel device at a distance³ of 100m are above Level A injury threshold criteria (either continuous or impulse of 180dB RMS for cetaceans and 190dB RMS for pinnipeds) or Level B harassment threshold criteria (120dB RMS continuous and 160dB RMS impulse), NNMREC will, after consultation with the Adaptive Management Committee, in consultation with and after approval by NMFS and ODFW pursuant to their respective statutory authority, implement one or more of the following actions to ensure Project compliance with ESA, MMPA and other relevant federal and state statutes:

- Design and perform additional monitoring;
- Modify the operation of the Ocean Sentinel to decrease its acoustic emissions (e.g., locking down the device during high surf, increasing controls to slow the motion of the device, or repairing the device if noise is due to device malfunction);
- Apply for an Incidental Harassment Authorization for acoustic emissions of the Ocean Sentinel.

Adaptive Management Threshold 2: If acoustic monitoring indicates that sound pressure levels attributable to a WEC device similar to the device type (e.g. buoy or attenuator) proposed for testing are above Level A injury threshold criteria (either continuous or impulse of 180dB RMS for cetaceans and 190dB RMS for pinnipeds) or Level B harassment threshold criteria (120dB RMS continuous and 160dB RMS impulse) at a distance of 100m (see footnote 4 regarding rationale for 100m), NNMREC will, after consultation with the Adaptive Management Committee, in consultation with and after approval by NMFS and ODFW pursuant to their respective statutory authority, assure that one or more of the following is implemented during testing of the WEC device to ensure Project compliance with ESA, MMPA and other relevant federal and state statutes:

- Additional monitoring;

³ It may be ineffective to use an acoustic threshold 10 meters from the Ocean Sentinel as it not likely to result in measurements of the actual noise levels generated solely by the device. A 10-meter distance would be inside the larger project installation and the signals received may be inaccurate due to reflections (and other interactions) with other physical structures nearby. Therefore a greater threshold distance of 100 meters is proposed. Marine mammal detections in surveys covering the Oregon-Washington coast (*Green et al. 1992*) indicate a mean incidence of 0.5 animals per square kilometer. A 100-meter radius around the device corresponds to an area of 0.03 square kilometer so the risk of marine mammal exposure within that area is $0.03/0.5 = 0.06$ animals, or about a 6% risk in association with a day or an incident of elevated underwater sound generation. Since the test device would be deployed for limited periods of time, there is lower potential for such incidents to occur frequently or for a sustained long period of time. As such the risk of exposure for any marine mammal is very low, even within the 100-meter radius.

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- Modify the operation of the WEC device to decrease its acoustic emissions (e.g., locking down the WEC device during high surf, increasing controls to slow the motion of the WEC device, or repairing the WEC device if noise is due to device malfunction);
- Applying for an Incidental Harassment Authorization for acoustic emissions of the WEC device.

Adaptive Management Threshold 3: After review of individual test results, NNMREC, in consultation with the Adaptive Management Committee, will:

- Evaluate whether acoustic monitoring techniques are sufficient to adequately assess potential effects of different technologies;
- Assess new information about other sources of noise to confirm confidence in study ability to assess device noise; and
- Determine whether acoustic testing is required for all devices and whether previous study results can be used to support future tests.

Based on the evaluation and assessment described above, NNMREC, after consultation with the Adaptive Management Committee, in consultation with and after approval by NMFS and ODFW pursuant to their respective statutory authority, will implement one or more of the following to ensure Project compliance with ESA, MMPA and other relevant federal and state statutes:

- Modified or additional monitoring techniques;
- Utilize data and information from existing studies to estimate acoustic emissions and perform potential effects analysis for future tests.

3.5 ELECTROMAGNETIC FIELDS

Monitoring electromagnetic fields (EMF) for marine renewable energy is a newly emerging application, and mission-specific instrumentation is needed. NNMREC has designed and will carry out the first deployment of an advanced 2nd generation EMF monitoring instrument to characterize the ambient EMF at the project site and measure the EMF during an energized WEC test. Post monitoring data analysis will take approximately 90 days. The results will be written up in a monitoring summary and provided the Adaptive Management Committee as soon as possible following the initial test.

Adaptive Management Threshold 1: NNMREC, after consultation with the Adaptive Management Committee, in consultation with and after approval by NMFS and ODFW pursuant to their respective statutory authority, will consider the following:

- Validate the effectiveness of the EMF Propagation Model and assess its efficacy in measuring EMF for future tests. If necessary, potential modifications to the model will be recommended.
- Consider both the ability to detect and the level of EMF from the project devices and determine whether there is a meaningful source of EMF from the Project.

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Adaptive Management Threshold 2: Based on the evaluation and assessment described above, NNMREC will, after consultation with the Adaptive Management Committee, in consultation with and after approval by NMFS and ODFW pursuant to their respective statutory authority implement one or more of the following to ensure Project compliance with ESA, MMPA and other relevant federal and state statutes:

- Modified or additional monitoring techniques;
- Compare the EMF results with known values for impact on endangered species known or likely to be present in the area.
 - If the results indicate that WEC-related EMF levels are within the documented magnetic or electric field sensitivity range of such species and could have an effect on orientation, reproduction, predator/prey dynamics, or the behaviors of any affected species or of fish aggregations either residing nearby or migrating through the project area, NMFS, ODFW, OSU scientists and the Ocean Facilities Manager will work together on an approach to reduce EMF levels during a test.
 - In the event that the monitoring shows EMF signatures at levels below concern, and after consulting with NMFS and ODFW, the EMF monitoring program will be modified accordingly; and/or
- Utilize data and information from existing studies to estimate EMF emissions and perform potential effects analysis for future tests.

Adaptive Management Threshold 3: If monitoring indicates that EMF attributable to the project components is in excess of levels known to have an adverse impact on marine life, NNMREC will, after consultation with the Adaptive Management Committee, in consultation with and upon approval by NMFS and ODFW pursuant to their respective statutory authority, develop and implement a response plan that outlines the appropriate mitigation action. Actions may include, but are not limited to:

- Additional shielding of cables or other project components;
- Delaying subsequent deployment of tests until resolution of the issue is achieved;
- Adoption of new timeframe restrictions designed to address specific resource conflicts (e.g., green sturgeon); or
- Decommissioning the site and terminating the test.

4 REFERENCES

Green, G.A., J.J. Brueggeman, C.E. Bowlby, R.A. Grotefendt, M.L. Bonnell, and K.T. Balcomb, III. 1992. Cetacean Distribution and Abundance Off Oregon and Washington, 1989-1990. Chapter I. In Oregon and Washington marine mammal and seabird surveys, J.J. Brueggeman (ed.). Final Report prepared for the Minerals Management Service, Pacific OCS Region. OCS Study MMS 91-0093. 400 pp

Attachment 1: WET-NZ/Ocean Sentinel Adaptive Mitigation Plan

A) ADAPTIVE MITIGATION ACTIONS

This Adaptive Mitigation Plan outlines the thresholds and real-time mitigation actions that may be taken during the test of the NNMREC's Ocean Sentinel and the WET-NZ device. All mitigation action decisions associated with the WET-NZ and Ocean Sentinel will be made by NNMREC and Northwest Energy Innovations, Inc. (NWEI) in consultation with NMFS and ODFW. The Adaptive Management Committee (described in Section 2 of the Adaptive Management Plan) will not be convened or be used to inform real-time decisions for mitigation outlined below.

No later than December 1 following the test an Annual Report of monitoring results, adaptive management thresholds, and any mitigation actions associated with the deployment of the WET-NZ and Ocean Sentinel will be provided to the Adaptive Management Committee (as described in Section 2 of the NNMREC Test Facility Adaptive Management Framework). This report will be used to inform the Committee's discussion of monitoring and adaptive management plans associated with the NNMREC test center and future tests.

B) ADAPTIVE MITIGATION THRESHOLDS AND MEASURES

In addition to conducting the monitoring referenced below, NNMREC staff will make opportunistic visual observations from the water surface during installation, maintenance, monitoring and other activities at the project site, and at least bi-weekly during project deployment. NNRMEC will record all opportunistic observations of marine mammals, seabirds, listed species, and/or derelict gear and include them in the Annual Report of monitoring results provided to the Adaptive Management Committee, NMFS and ODFW. Additionally, NNMREC will coordinate with NMFS, USFWS and ODFW, either through their participation in the Adaptive Management Committee or otherwise, to develop a standard form to use in recording and reporting marine mammal observations.

i. BENTHIC SPECIES AND HABITAT

Consistent with the Benthic Monitoring Plan, benthic monitoring will be conducted prior to, during, and after the test. The monitoring results will be summarized and provided to the Adaptive Management Committee as outlined in Section 2 of the NNMREC Test Facility Adaptive Management Framework.

There are no adaptive mitigation thresholds for benthic habitat associated with this test.

ii. DERELICT GEAR

Derelict gear monitoring and removal will be conducted in accordance with the procedures and adaptive mitigation thresholds and measures described below.

WET-NZ TEST ADAPTIVE MITIGATION PLAN

General Procedures for Derelict Gear

- i. **Detection:** NNMREC will perform underwater visual monitoring at least three times for each test: once prior to device deployment, once during active deployment, and once after device removal. Video lander sampling of anchors and reference locations will continue for the duration of the project (i.e., when any project related structure or equipment is in the water) weather permitting. In addition, NNMREC will make visual observations from the water surface, at least bi-weekly during project deployment, during all visits to the project site to identify any derelict gear.
- ii. **Notification:** If derelict gear is detected, NNMREC will contact NMFS, USFWS and ODFW within two days of detection.
- iii. **Removal:** Any gear entangled with project structures or moorings will be removed in spring/summer (prior to test device deployment) or in fall (immediately following test device removal). If the gear poses an entanglement risk to marine organisms, NNMREC will consult with NMFS, USFWS and ODFW to determine if an earlier or more immediate response is necessary (as described in the Adaptive Management Thresholds below).
- iv. **Return:** NNMREC will make every effort to return gear to owner and will be responsible for storing the gear and contacting the owner to retrieve it; ODFW can provide owner contact information.
- v. **Recycle:** In the event that attempts to return gear are unsuccessful, it may be recycled at the “Fishing for Energy” project located at Newport’s International Port.

Adaptive Mitigation Threshold and Measure 1: If monitoring shows that derelict gear has become ensnared or collected on any Project structure but no organisms are caught within it and the gear poses no threat to navigational safety or marine species, NNMREC will remove the derelict gear during removal of the test devices.

Adaptive Mitigation Threshold and Measure 2: If monitoring shows that derelict gear has become ensnared or collected on any Project structure and has entangled or poses the risk of entanglement to organisms, NNMREC will remove the derelict gear as soon as feasible, notify NMFS, USFWS and ODFW within two days, and provide a report with all available information on the case. NNMREC will then, after consulting with NMFS, USFWS and ODFW, modify the Project and/or monitoring plan if necessary.

Adaptive Mitigation Threshold and Measure 3: If monitoring shows marine mammals or sea turtles entangled in fishing gear or marine debris, NNMREC will report the incident as soon as practical and remove the gear consistent with the Reporting Protocol for Injured or Stranded Marine Mammals (outlined in Section iii below). NNMREC will then, after consulting with NMFS, USFWS and ODFW, and approved by NOAA modify the Project and/or monitoring plan if necessary.

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iii. ENTANGLED OR INJURED SPECIES

As a matter of practice, NNMREC staff will make visual observations from the water surface during all visits to the project site and at least bi-weekly during project deployment. If project devices (i.e. Ocean Sentinel, WET-NZ) are not deployed but anchors and mooring lines remain in place during the April/May grey whale migration, NNMREC will perform visual observations at least bi-weekly during that period. NNMREC will record all opportunistic observations of marine mammals, seabirds, listed species, and/or derelict gear and include them in the Annual Report provided to the Adaptive Management Committee, NMFS and ODFW. Additionally, NNMREC will coordinate with NMFS and ODFW, either through their participation in the Adaptive Management Committee or otherwise, to develop a standard form to use in recording and reporting these observations.

Adaptive Mitigation Threshold and Measure 1: If marine mammals or sea turtles are observed entangled, injured or impinged at the Project Structure, NNMREC will immediately follow the Reporting Protocol for Injured or Stranded Marine Mammals (listed below) and give NMFS and ODFW all available information on the incident. In addition, NNMREC will contact NMFS and ODFW as soon as practical within 24 hours to consult with them regarding modifying the Project and/or monitoring plans.

Reporting Protocol for Injured or Stranded Marine Mammals: NNMREC proposes to implement the following NMFS protocols in the event an injured or stranded marine mammal is observed:

- i. *Live marine mammals or sea turtles observed swimming but appearing debilitated or injured.*

Capability to respond to free swimming animals is very limited and relocation is a major issue. In addition, medical treatment facilities for marine mammals and sea turtles are for the most part non-existent in Oregon. Therefore, we recommend that monitors record the sighting as part of the monitoring report and provide the information to the Stranding Network. The data should include: 1) any photos or videos, if possible 2) species or common name of the animal involved; 3) date of observation; 4) location (lat/long in decimal degrees); 5) description of injuries or unusual behavior observed.

- ii. *Live marine mammals or sea turtles observed entangled in fishing gear or marine debris.*

The marine mammal disentanglement network in Oregon is based at Hatfield Marine Science Center - contact Jim Rice at 541-867-0446 or Barb Lagerquist at 541-867-0128. The national network is available at 877-SOS-WHALE (877-767-9425). Contact should be made immediately if an entanglement is observed and, if possible the reporting vessel should remain on scene while contact is made. Report should include the following information: 1) species or common name of animal involved; 2) location (lat/long in decimal degrees); 3) whether the animal is anchored by the gear or swimming with the gear in tow; 4) a description of the entangling gear (line size, line color, size number and color of floats if attached, presence or absence of pots or webbing; 5) if animal is towing gear, give direction of travel and current speed; 6) local weather conditions (sea state, wind speed and direction) 7) whether the vessel can stand by until someone is able to get there. The disentanglement network will determine

WET-NZ TEST ADAPTIVE MITIGATION PLAN

whether or not a response can be mounted immediately and will advise the reporting vessel on next steps.

iii. *Dead marine mammals or sea turtles observed floating at sea.*

Dead floating marine mammals fall within the definition of "stranded" under the MMPA. To report strandings off central Oregon coast contact the Oregon Marine Mammal Stranding Network (Jim Rice) 541-867-0446.

iv. *Dead protected species found entangled or otherwise impinged at the project.*

These should be reported as part of the monitoring report to NMFS and ODFW, giving all available information on the case. The report should include the following information; 1) species or common name of animal involved; 2) location (lat/long in decimal degrees); 3) whether the animal was found on a project device or anchoring system; 4) a description of injuries or entanglement observed; if derelict fishing gear or other debris was involved, give a description of the gear (line size, line color, size number and color of floats if attached, presence or absence of pots or webbing; photographs if possible. In the event derelict gear is involved, the presence of protected species entangled in the gear should be included in the report initiating gear removal planning and coordination.

Adaptive Mitigation Threshold 2: If pinnipeds are identified on one or more of the project structures, NNMREC will implement the NMFS haulout protocols listed below. In addition, NNMREC will notify NMFS and ODFW within two weeks of the haul-out incident.

Pinniped Haulout Protocols

- i. If pinnipeds are present on one of the project structures, monitoring or maintenance activities will occur at minimum of 100 yards from the structure (in accordance with the current NMFS guideline of 100 yards for vessel approach of hauled out pinnipeds).
- ii. If the pinnipeds do not leave the structure upon approach up to 100 yards and the pinnipeds are non-ESA listed species (e.g., California sea lions), NNMREC may proceed to deter the pinniped from project structures so long as such measures do not result in the death or serious injury of the animal (pursuant to Section 101.(a)(4)(A) of the Marine Mammal Protection Act). NNMREC will follow NOAA guidance on deterring pinnipeds: <http://www.nwr.noaa.gov/marine-mammals/seals-and-sea-lions/detering-pinnipeds.cfm>
- iii. If pinnipeds present on project structures are an ESA-listed species (e.g., Steller sea lions), NNMREC will not pursue any directed take or intentional harassment, and will remain at least 100 yards from the structure so long as the ESA-listed species is present.
- iv. If NNMREC needs to perform emergency maintenance that requires immediate attention (e.g. closing an opened hatch, repairing a failed mooring or electrical fault) and deterrence of a listed species is necessary, NNMREC staff will request assistance from a government

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official.⁴ The NNMREC Response Coordinator will provide an account of the incident to the appropriate staff at NMFS and ODFW as soon as possible.

iv. ACOUSTICS

The objective of the acoustic monitoring is to determine if the WET-NZ and/or Ocean Sentinel devices increase the ambient noise at the project site beyond mammal harassment thresholds, as described in the Acoustic Monitoring Plan. This will be accomplished by measuring time-dependent acoustic background levels and frequency distributions of environmental, biological and anthropogenic sound sources that contribute to the noise budget during the test. NNMREC has collected continuous passive acoustic data to characterize the baseline acoustic conditions at the test site. During the WET-NZ/Ocean Sentinel test, amplitude and frequency distribution through time of the ambient noise field will be characterized and sound sources will be identified.

- Initial monitoring will occur within two weeks following deployment of the WET-NZ/Ocean Sentinel test. (This window may be modified if the health and safety of personnel is at risk due to unforeseen conditions such as weather or operational complications where approaching the device is not safe.)
- Results will be made available to NMFS and ODFW within seven days of the completion of monitoring. If results cannot be transmitted to NMFS and ODFW within seven days, NNMREC will contact NMFS and ODFW with an updated delivery schedule and the reason for delay.
- The following contacts will be notified regarding monitoring results and proposed mitigation, if applicable:
 - NMFS: Keith Kirkendall, Chief of FERC and Water Diversion Branch, 503-230-5431 or keith.kirkendall@noaa.gov
 - ODFW: Delia Kelly, Ocean Energy Coordinator, 541-867-0300 or delia.r.kelly@state.or.us

Adaptive Mitigation Threshold and Measure 1: If acoustic monitoring indicates that sound pressure levels attributable to the WET-NZ and/or Ocean Sentinel device at a distance⁵ of 100m are above Level A

⁴ Section 109(h) of the Marine Mammal Protection Act provides exceptions for take of listed and non-listed marine mammals by Federal, state or local government officials if such taking is for the protection or welfare of the mammal, the protection of the public health and welfare, or the nonlethal removal of nuisance animals [50 CFR 223.202].

⁵ It may be ineffective to use an acoustic threshold 10 meters from the Ocean Sentinel as it not likely to result in measurements of the actual noise levels generated solely by the device. A 10-meter distance would be inside the larger project installation and the signals received may be inaccurate due to reflections (and other interactions) with other physical structures nearby. Therefore a greater threshold distance of 100 meters is proposed. Marine mammal detections in surveys covering the Oregon-Washington coast (*citation pending*) indicate a mean incidence of 0.5 animals per square kilometer. A 100-meter radius around the device corresponds to an area of 0.03 square kilometer so the risk of marine mammal exposure within that area is $0.03/0.5 = 0.06$ animals, or about a 6% risk in association with a day or an incident of elevated underwater sound generation. Since the test device would be

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injury threshold criteria (either continuous or impulse of 180dB RMS for cetaceans and 190dB RMS for pinnipeds) or Level B harassment threshold criteria (120dB RMS continuous and 160dB RMS impulse),, NNMREC scientists and Ocean Test Facility Manager, in coordination with and after approval from NMFS and ODFW pursuant to their respective statutory authority, will develop and implement a response plan that outlines the appropriate mitigation action within 14 days of acquiring monitoring results. Actions may include, but are not limited to:

- Performing additional or alternative monitoring;
- Modifying the operation of the WET-NZ and/or Ocean Sentinel (e.g., locking down the device during high surf, increasing controls to slow the motion of the device, or conducting on-site repairs if noise is due to the device malfunction);
- Ceasing operations and performing necessary modifications to minimize noise levels. Subsequent monitoring would be conducted to verify that the noise associated with the test has been abated;
- Decommissioning of the test/installation; and/or
- Applying for an Incidental Harassment Authorization.

v. ELECTROMAGNETIC FIELDS

As described in the in Biological Assessment, monitoring of Electromagnetic fields (EMFs) will be conducted during deployment of the Ocean Sentinel and the WET-NZ when the devices are energized. Following device removal and before any subsequent deployments, NNMREC will return to project site and repeat the survey to characterize baseline levels of EMF at the project site. The monitoring results will be summarized and provided to the Adaptive Management Committee as outlined in Section 2 of the NNMREC Test Facility Adaptive Management Framework.

Adaptive Mitigation Threshold and Measure 1: If monitoring results indicate that EMF attributable to the project components is in excess of levels known to have an adverse impact on marine life, NNMREC will, in consultation with and after approval by NMFS and ODFW pursuant to their respective statutory authority, develop and implement a response plan that outlines the appropriate mitigation action any 2013 Ocean Sentinel/WET-NZ test. Actions may include, but are not limited to:

- Additional shielding of cables or other project components;
- Delaying subsequent deployment of tests until resolution of the issue is achieved;

deployed for limited periods of time, there is lower potential for such incidents to occur frequently or for a sustained long period of time. As such the risk of exposure for any marine mammal is very low, even within the 100-meter radius.

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- Adoption of new timeframe restrictions designed to address specific resource conflicts (e.g., green sturgeon); or
- Decommissioning the site and terminating the test.