

Science, Service, Stewardship



Stressors and Receptors: Proposed evaluation of environmental effects of an Oregon Wave Energy Project

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METAP Webinar on August 19, 2010

August 23, 2010

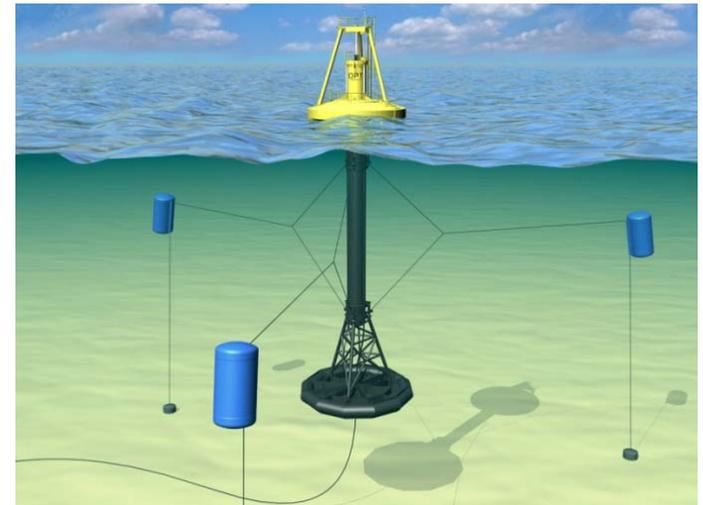
**NOAA
FISHERIES
SERVICE**



The path thus far....

July 2007 – OPT began Settlement Agreement process for 10-PowerBuoy deployment, 2.5 miles offshore

July 2010 – Settlement Agreement signed by 14 parties (state, federal, non-governmental organizations, fishing)

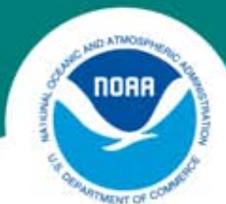




A host of issues identified by stakeholders...

No.	Issue	Company-Proposed Study	APEA Section
<i>Aquatic Species/Water Quality</i>			
Issue 1	Cetaceans	Cetacean Study	5.C.3.b
Issue 2	EMF	EMF Study	5.C.3.b
Issue 3	Pinnipeds	Pinniped Study	5.C.3.b
Issue 4	Alteration of Habitat/Effects of Installation	Fish and Invertebrates Study	5.C.1.b, 5.C.3.b
Issue 5	Biofouling	Fish and Invertebrates Study	5.C.3.b
Issue 6	Impacts to Offshore Avians	Offshore Avian Use Study	5.C.3.b
Issue 7	Water Quality	Fish and Invertebrates Study	5.C.2.b
Issue 8	Macroalgae	Fish and Invertebrates Study	5.C.3.a
Issue 9	Noise/Vibration	Cetacean Study	5.C.3.b
Issue 10	Sea Turtles	N/A*	5.C.3.b
<i>Public Safety/Recreation/Fishing Issues</i>			
Issue 11	Recreation Uses	N/A	5.C.6.b
Issue 12	Navigational Safety; Notification to Mariners	N/A	5.C.6.b
Issue 13	Aesthetics	Visual Assessment Review	5.C.7.b
Issue 14	Transport Moratorium; Transit Lanes from Port to Wave Park	N/A	5.C.6.b
Issue 15	Lost Productivity and Gear	N/A	5.C.6.b
<i>Other Issues</i>			
Issue 16	National Security	N/A	5.C.6.b
Issue 17	Wave, Current, and Sediment Transport	Wave, Current, and Sediment Transport Study	5.C.1.b
Issue 18	Cultural Resources	Cultural Resources Survey, Monitoring, and Contingency Mitigation Plan	5.C.9.b
Issue 19	Decommissioning/Anchor Removal	N/A	3.A.3
Issue 20	Economic Impact/Additional Uses	N/A	5.C.6.b, 5.C.8.b
Issue 21	Terrestrial Effects	N/A	5.C.1.b, 5.C.4.b
Issue 22 (Misc.)	Emergency Response	N/A	5.C.6.b, Appendix I
	Insurance		3.A.1.b, 5.C.2.b
	Ground Fault Protection		5.C.6.b
	Site Security		5.C.6.b
	System Survivability		5.C.6.b
Beach Access	5.C.6.b		





Where did we land?

Studies addressing issues raised by stakeholders

No.	Baseline Study Request	Company-Proposed Study	APEA Section
1	Local Wave Environment	Wave, Current, and Sediment Transport Study	5.C.1
2	Ocean Currents	Wave, Current, and Sediment Transport Study	5.C.1
3	Local Littoral Transport	Wave, Current, and Sediment Transport Study	5.C.1
4	Bathymetry and Surficial Geology	Marine Geophysical Study (completed September 2007)	5.C.1
5	Physical Characterization of Benthic Habitat	Marine Geophysical Study (completed September 2007)	5.C.1
6	Characterization of Benthic Infauna	Fish and Invertebrates Study	5.C.3
7	Characterization of Epibenthic Macrofauna	Fish and Invertebrates Study	5.C.3
8	Characterization of Pelagic Nekton	Fish and Invertebrates Study	5.C.3
9	Characterization of Key Forage Plankton (Euphausiids and Mysids)	No specific study proposed*	5.C.3
10	Site Use by/Presence of Salmonids	Fish and Invertebrates Study	5.C.3
11	Characterization of Background Electrical and Magnetic Fields	EMF Study	5.C.3
12	Characterization of Acoustic Background	Cetaceans Study	5.C.3
13	Site Use by/Presence of Offshore Birds	Offshore Avian Use Study	5.C.3
14	Site Use by/Presence of Cetaceans	Cetaceans Study	5.C.3
15	Site Use by/Presence of Pinnipeds	Pinnipeds Study	5.C.3
16	Neuston Survey/Presence of Invasive Species	Fish and Invertebrates Study (no neuston survey was proposed *)	5.C.3
17	Presence of Toxic Chemicals in Water Column and Sediment	None proposed **	5.C.2
18	Background Turbidity	Fish and Invertebrates Study	5.C.2
19	Beach Gradient Profile	Wave, Current, and Sediment Transport Study	5.C.1
20	Survey of Nontoxic Water Quality Parameters	Fish and Invertebrates Study	5.C.2





Cetacean Study

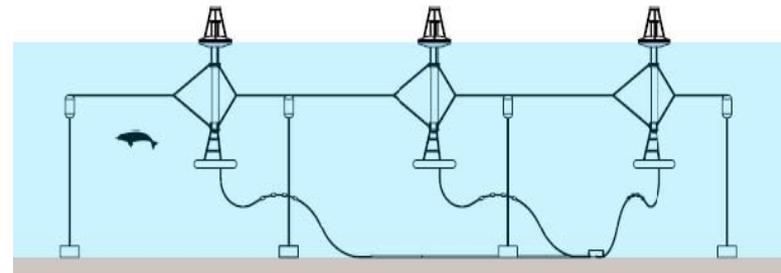


Concerns

1. collision/entanglement during operation
2. underwater noise/vibration
3. change in migration route (gray whales)

Studies

1. baseline characterization of gray whale migration routes
2. acoustic emissions characterization
3. presence/absence monitoring





Pinniped Study

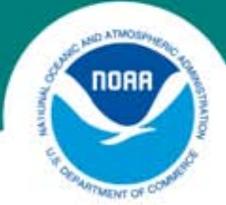
Concerns

1. Haulout on floats
2. Use of the array

Studies

1. Observations for haulout behavior
2. Presence/abundance in array





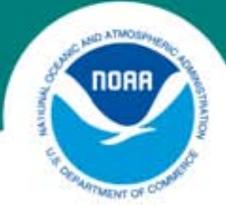
Alteration of Habitat/ Effects of Project Installation

Concerns

1. direct effects to benthic community from placing mooring components and subsea transmission on seabed
2. changes to marine community composition and predator/prey interactions

Studies

1. 8 studies addressing these concerns based on higher priority species of interest



Alteration of Habitat/ Effects of Project Installation Salmon

Concerns

1. attraction/avoidance of the array
2. attraction of predatory fish to the array
3. attraction of predatory bird and mammal species to the array

Studies

1. relative abundance via multi-mesh gillnets
2. gut content analysis



Alteration of Habitat/ Effects of Project Installation Rockfish



Concerns

1. change in distribution
2. predation on smaller fishes (i.e. juvenile salmon)

Studies

1. hook and line
2. multimesh gillnet
3. gut content analysis



Alteration of Habitat/ Effects of Project Installation Dungeness Crab



Concerns

1. decreased available habitat
2. increased predation from changes to predatory species
3. attraction of crabs to the array
4. avoidance of the array

Studies

1. baited trap deployment



Alteration of Habitat/ Effects of Project Installation Green Sturgeon

Concerns

1. attraction of individuals
2. repulsion of individuals
3. change in migratory patterns

Studies

1. hydrophone receivers to cover footprint of array



Alteration of Habitat/ Effects of Project Installation Pelagic Fish and Invertebrates

Concerns

1. changes to habitat
2. changes to predatory species assemblages
3. attraction to the array
4. avoidance

Studies

1. Hook and line
 2. Multimesh gillnet
 3. Gut content analysis
 4. Visual SCUBA surveys
- Rockfish Study
- Biofouling Study
-



Alteration of Habitat/ Effects of Project Installation Flatfish and Epibenthic Invertebrates



Concerns

1. habitat reduction from artificial structures
2. changes to predator species assemblages increasing predation
3. attraction
4. avoidance

Studies

1. trawling around the array



Alteration of Habitat/ Effects of Project Installation Bioufouling

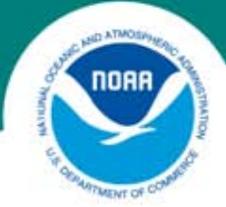


Concerns

1. invasive species
2. cleaning effects on dissolved oxygen

Studies

1. settlement plates
2. SCUBA visual observation
3. ROV inspections



Alteration of Habitat/ Effects of Project Installation Benthic Infauna

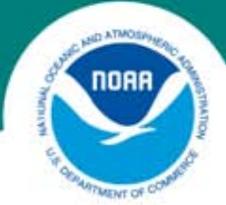


Concerns

1. changes in habitat associated
2. changes to predatory species that may decrease abundance,
3. attraction
4. avoidance

Studies

1. grab samples



Alteration of Habitat/ Effects of Project Installation Water Quality

Concerns

1. any changes in water quality

Studies

1. Temperature
2. pH
3. dissolved oxygen
4. chlorophyll-a
5. optical characteristics
6. conductivity



Alteration of Habitat/ Effects of Project Installation Control Sites

Monitoring Method	Study Plan Section	Number of Control Sites	Proposed Control Site Location(s)*
Hook and Line (predator and gut content sampling)	Juvenile salmon 5.3.1; Rockfish 5.3.2; Pelagic fish and invertebrates 5.3.6	2	Control sites would be located in the vicinity of the array, within 5 kilometers of array, but outside of the Project influence. One site will be north and one site will be south of the Project area, and likely some of the same control sites can be used for the relative abundance experiment. Control sites would be located within the same "area of influence" of the Project site relative to the Umpqua River with comparable water quality characteristics (turbidity, salinity, temperature).
Multi-mesh gillnet (relative abundance, gut content sampling)	Juvenile salmon 5.3.1; Rockfish 5.3.2; Pelagic fish and invertebrates 5.3.6	2	Control sites would be located in the vicinity of the array, within 5 kilometers of array, but outside of the Project influence. One site will be north and one site will be south of the Project area, and likely some of the same control sites as hook and line predator surveys.
Trapping	Dungeness crab 5.3.3	3	Control sites would be located within 20 kilometers of the array. One control site will be located approximately equidistant between the mouth of the Umpqua River and Coos Bay**. The other two control sites will be located closer to the Project area but outside of Project influence, to the north and south of the Project area.
Trawling	Flatfish and epibenthic invertebrates 5.3.5	2	Control sites would be located within 20 kilometers of the array. One control site will be located approximately equidistant between the mouth of the Umpqua River and Coos Bay. The other site will be located closer to the Project area but outside of the Project influence.
Grab samples	Benthic infauna 5.3.9	2	Control sites would be located within 5 kilometers of the array. One control site will be located at USACE control site (clean site) to provide additional years of data for comparison purposes (from past work done at the site).

* All proposed control sites to be comparable to Project area with respect to depth, substrate and exposure



Electromagnetic Fields



Concerns

1. Creation of EMF fields above ambient that alters electrosensitive species' behavior

Studies

1. ambient measurements
2. single PowerBuoy measurements
3. 10 PowerBuoy array and transmission cable



Wave, Current, and Sediment Transport



Concerns

1. Change to wave characteristics with subsequent effects to the shoreline topography

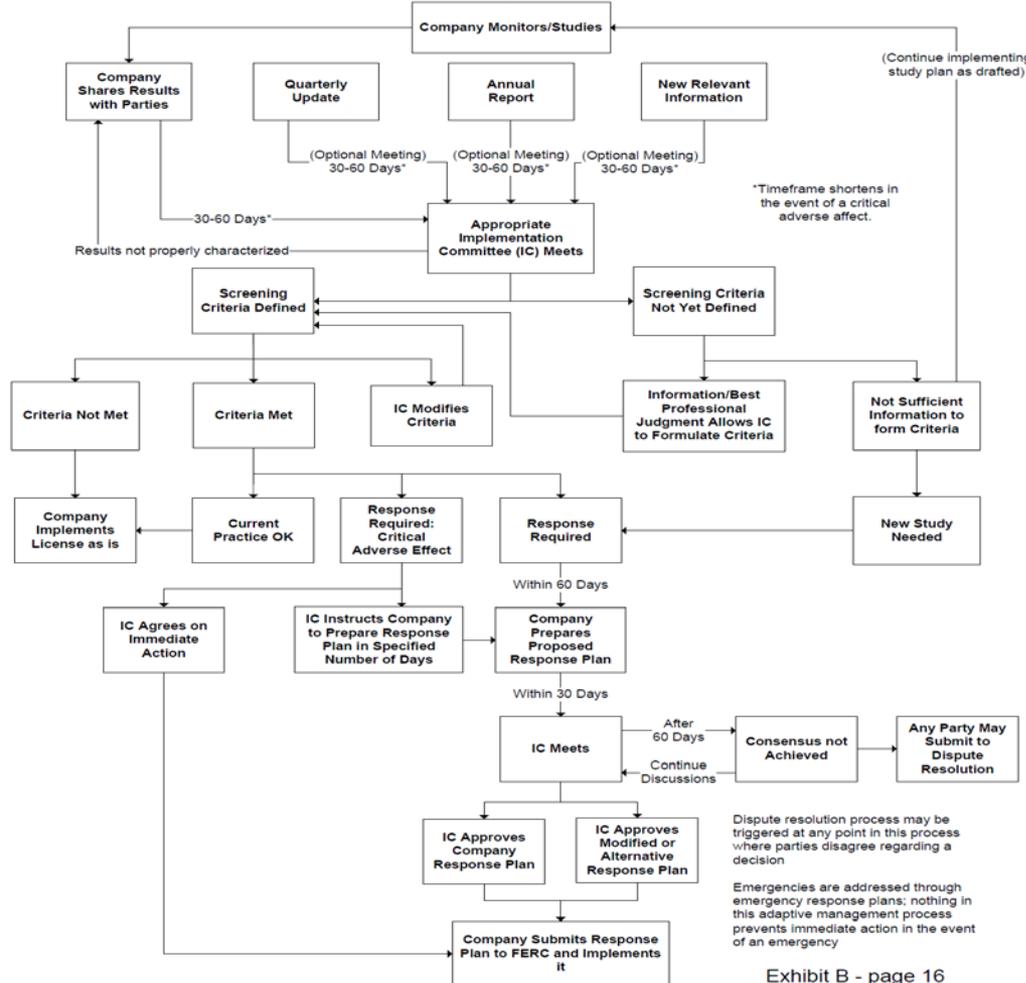
Studies

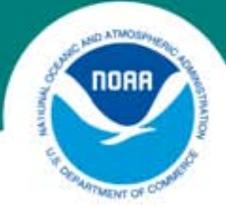
1. in-situ observations of the wave field before and after PowerBuoy installation
2. vertical structure of horizontal currents and water-column properties
3. beach surveys and video to detect changes in topography and bathymetry.
4. Modeling



Adaptive Management

**Figure 1
Reedsport OPT Wave Park
Adaptive Management Process**





Thank you

Questions:

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OPT Materials (Final License Application, Settlement Agreement, etc) on FERC's website:

<http://ferc.gov/docs-filing/elibrary.asp>

Docket #: P-12317