

**Cumulative Effects Study, Request for Proposal (RFP) for  
Wave Energy Projects within Oregon's Territorial Sea  
OPAC DRAFT – March 27, 2008**

Goal – Inform resource managers, other decision-makers the public, and the wave energy industry about possible cumulative environmental (ecology, biology, physical) and socio-economic effects wave energy development within Oregon's Territorial Sea.

Definition of Cumulative Effects to be used for RFP -

The Council of Environmental Quality's regulations for implementing the National Environmental Policy Act define cumulative effects as:

“the impact on the environment (... encompassing the environmental [ecology, biology, physical] parameters and human dimension (economic, social, etc.) which results form the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-federal) or person undertakes such actions (40 CFR § 1508.7).”

The Council on Environmental Quality defines a reasonable alternative (i.e., reasonably foreseeable future actions) to, “include those that are practical or feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant.” (Memorandum for Federal NEPA liaisons, Federal, state, and local officials and other persons involved in the NEPA Process, March 16, 1981).

Objectives –

1. Develop an analysis framework to assess the cumulative effects of wave energy development that incorporates risk and uncertainty parameters.
2. Using an ecosystem-based management approach<sup>1</sup>, provide scientific data, information, and analyses to understand, describe, model and quantify, to the extent practicable, the cumulative environmental (ecology, biology, physical) and socio-economic effects wave energy development offshore the Oregon coast to inform management decisions regarding the siting, operation, and decommissioning of wave energy facilities. The following information should be addressed in the study, but is not limited to:

---

<sup>1</sup> The West Coast Governor's Agreement on Ocean Health defines ecosystem-based management as, “Ecosystem-based management (EBM) is a process that integrates ecological, social, and economic goals, recognizes humans as key components of the ecosystem, and considers ecological rather than political boundaries. Further, an EBM approach assesses cumulative impacts from various sources and strives to balance conflicting uses. It accounts for complexity and uncertainty of natural processes and social systems, incorporating adaptive policies in the face of uncertainties. Using this approach to manage resources requires the consideration of multiple factors such as pollution, coastal development, harvest pressure, ecological interactions, and watershed management. EBM therefore requires engaging multiple stakeholders to define problems, incorporate scientific understanding, set goals, and find solutions.”

- a. Ocean conditions such as baseline conditions (e.g., current and changing), impacts of climate change and, catastrophic disasters such as a Cascadia earthquake and accompanying tsunami.
  - b. Current ocean uses (e.g. fishing, existing marine protected areas and reserves, wildlife viewing areas, and undersea cables, navigation, and coastal communities) and future ocean uses (e.g., aquaculture and marine reserves).
  - c. Potential physical, chemical, and biological effects from wave energy development over the next 50 years.
  - d. Changes in fishing effort, income changes, market changes, population/demographic changes.
  - e. Socio-economic and cultural changes to community character/way of life.
3. Ensure that the results and conclusions of the study are consistent with the siting and operation of wave energy facilities. Examples of legislation that should be considered in the regulatory framework include, but are not limited to:
- a. Oregon Ocean Resources Management Plan and Part II of the Territorial Sea Plan
  - b. National Environmental Policy Act
  - c. Endangered Species Act
  - d. Federal Power Act
  - e. Marine Mammal Protection Act
  - f. Migratory Bird Treaty Act
  - g. Energy Independence and Security Act of 2007 (Sections 1121 – 1123 - short sea transportation)
4. The completed study is a “living document” that will be subject to revision based on new data and information. Final reports should be produced both in paper form and as a web-based document for on-line viewing.

#### Study Components –

The essential study components necessary for completing a cumulative effects assessment of wave energy development on the Oregon coast is divided into two phases. **Phase I** of the study consists of eight steps that requires a synthesis of existing environmental (ecology, biology, physical), socio-economic and regulatory information, as well as the generation of new information where applicable. The study components as outlined below must be addressed as part of this RFP, but does not exclude the inclusion of other components not described below. **Phase II** of the study consists of three additional steps (9-11) that extends on **Phase I** by undertaking the actual cumulative effects assessment. This last phase of the RFP will be subject to additional future funding.

**Phase I** – Develop the framework for a cumulative effects study and synthesize existing environmental (ecology, biology, physical), socio-economic and regulatory information as they relate to wave-energy development on the Oregon coast.

1. General introduction (the basic components of a wave energy project, pending and proposed facility locations, description of the physical and biological environment, etc.) should be provided.

Draft of Step 1 provided to oversight committee by xxx. Comments provided back to contractor within 30 days of receipt. Contactor incorporates comments within 30 days of receipt from the oversight committee.

2. Provide a rationale for a cumulative effects study that includes, but is not limited to the following elements:
  - a. Improve understanding of potential effects on coastal ocean ecosystems, ocean resources, socio-economic structure, and current and future coastal ocean uses.
  - b. Improve understanding of economic and social effects of wave energy on coastal communities.
  - c. Identify and quantify cumulative effects in relation to design and implementation of the technology within relevant legal constructs.
  - d. Inform managers and industry in relation to project siting, potential project benefits, and avoiding, reducing, eliminating, minimizing and/or mitigating cumulative environmental, ecological, and socio-economic effects.

Draft of Step 2 provided to oversight committee by xxx. Comments provided back to contractor within 30 days of receipt. Contactor incorporates comments within 30 days of receipt from the oversight committee.

3. Conduct a literature review of data and information from existing literature on current and pending wave energy efforts from around the world and analogous technologies like wind, tidal and the offshore oil and gas industry for inclusion in the analysis.

Draft of Step 3 provided to oversight committee by xxx. Comments provided back to contractor within 30 days of receipt. Contactor incorporates comments within 30 days of receipt from the oversight committee.

4. Identify known information about the Oregon coast and its territorial waters. This section should include, but is not limited to:
  - a. Description of the physical environment.
  - b. Biological/ecological resources (e.g., sensitive areas, Habitat Areas of Particular Concern, critical habitats, and species [e.g., plovers, whales]).
  - c. The proportion of habitat type(s) that wave energy development is proposed to occupy.

- d. Identification of major data gaps.

Draft of Step 4 provided to oversight committee by xxx. Comments provided back to contractor within 30 days of receipt. Contactor incorporates comments within 30 days of receipt from the oversight committee.

5. Discuss the existing regulatory environment for the Oregon's territorial sea, and Federal waters. This section should discuss the existing regulatory framework between Federal, state, and local governments. The existing regulatory framework for Washington and northern California should also be included to the extent it will impact wave energy development on the Oregon coast.

Draft of Step 5 provided to oversight committee by xxx. Comments provided back to contractor within 30 days of receipt. Contactor incorporates comments within 30 days of receipt from the oversight committee.

6. Discuss current and future ocean uses:
  - a. Identify existing uses and users (e.g. fishing, existing marine protected areas and reserves, wildlife viewing areas, and undersea cables, navigation, and coastal communities).
  - b. Specific economic information to be collected should include, but not limited to is:
    - i. Opportunity costs (loss and gain)
    - ii. Changes in non-wave energy industry/businesses
    - iii. Fish landings
    - iv. Changes in fishing effort
    - v. Income changes
    - vi. Market changes
    - vii. Population/demographic changes
    - viii. Economic cost/benefit analysis for coastal communities as wave energy is developed
  - c. Specific social/cultural information to be collected should include, but not limited to is:
    - i. Population/demographic changes
    - ii. Changes to community character/way of life
  - d. Identify potential future uses such as aquaculture, marine reserves, and other types of alternative energy ocean development. This section of the study should also explore how existing uses could change as wave energy development occurs.
  - e. How might current and future ocean uses contribute to wave energy cumulative effects?

Draft of Step 6 provided to oversight committee by xxx. Comments provided back to contractor within 30 days of receipt. Contactor incorporates comments within 30 days of receipt from the oversight committee.

7. Identify and prioritize the most critical data and modeling needs on individual and multiple projects for cumulative impact assessments, and develop specific testable hypotheses where appropriate. As a component of this, identify techniques that will aide coastal managers to identify the relative efficiencies and risks posed by different technologies (i.e., risk: benefit analysis).

Draft of Step 7 provided to oversight committee by xxx. Comments provided back to contractor within 30 days of receipt. Contactor incorporates comments within 30 days of receipt from the oversight committee.

8. Produce report integrating findings of Steps 1 through 7.

Draft final report to be provided to oversight committee by xxx. Comments provided back to contractor within 60 days of receipt. Contactor incorporates comments within 30 days of receipt from the oversight committee. Final report provided to oversight committee by xxx.

**Phase II** – Undertake a cumulative effects assessment of wave energy development on the Oregon coast.

9. Characterize and assess the spatial (local to regional) and temporal effects, including the short (next 5-10 years), medium (10-20 years) and long-term (20-50 years) effects developed in Step 7. This includes establishing a risk/benefit analysis for siting wave energy facilities based on an individual site and the “scaling up” of multiple sites on the Oregon coast. Factors that should be considered in the analysis are number of wave energy facilities, size of facilities, spacing between facilities, etc.

Draft of Step 8 provided to oversight committee by xxx. Comments provided back to contractor within 30 days of receipt. Contactor incorporates comments within 30 days of receipt from the oversight committee.

10. Discuss policy implications. What are the policy implications of the above various sections to effectively managing Oregon’s natural resources in the context of future wave energy facilities. Can areas now be identified where wave facilities may be an appropriate use or not? What recommendations can be developed to maximize project benefits? What recommendations can be developed to avoid, reduce, eliminate, minimize and/or mitigate the impacts of wave energy development?

Draft of Step 9 provided to oversight committee by xxx. Comments provided back to contractor within 30 days of receipt. Contactor incorporates comments within 30 days of receipt from the oversight committee.

11. Produce final report.

Draft final report to be provided to oversight committee by xxx. Comments provided back to contractor within 60 days of receipt. Contactor incorporates comments within 30 days of receipt from the oversight committee. Final report provided to oversight committee by xxx.