

***Fishermen Interested in Safe Hydrokinetics
(FISH Committee)***

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RE: FERC PROJECT NO. 13053-000, GREEN WAVE MENDOCINO PROJECT, GREEN WAVE ENERGY SOLUTIONS, LLC, APPLICATION FOR PRELIMINARY PERMIT

SUBJECT: MOTION TO DEVELOP COMPREHENSIVE PLAN AND TO DENY OR HOLD IN ABEYANCE PRELIMINARY PERMIT APPLICATION FOR THE GREEN WAVE MENDOCINO PROJECT

This Motion is filed on behalf of Fishermen Interested in Safe Hydrokinetics (the *FISH Committee*), an unincorporated association of fishing and fishing-related businesses and organizations based in Fort Bragg, California, and on behalf of Elizabeth R. Mitchell, a resident of Mendocino County, California, as an individual. Both parties have filed timely Motions to Intervene in P-13053 simultaneously with the filing of this Motion.

The *FISH Committee* and Elizabeth R. Mitchell hereby move FERC to develop a comprehensive plan for hydrokinetic energy development in the Pacific Ocean as required by the Federal Power Act at 16 U.S.C. § 803(a) and the Ninth Circuit Court of Appeals decision in *National Wildlife Federation v. FERC*, 801 F.2d 1505 (9th Cir. 1986). We also move FERC to either hold in abeyance or deny

Green Wave Energy Solutions' application for a preliminary permit until a comprehensive plan has been developed.

This motion is based on 1) the existing law; 2) the regulatory background described below, under which FERC is authorizing numerous hydrokinetic energy projects in and around the Pacific Ocean on an ad hoc basis without a comprehensive plan; 3) four scientific studies (described herein) that address the complex human and environmental factors common to hydrokinetic projects in and around the Pacific Ocean; 4) the California Study's recommendation for specific uniform study guidelines derived from existing science, and which can be applied to all the projects; and 5) special considerations related to marine mammals subject to the Marine Mammal Protection Act, and to marine mammals and fish populations listed under the Endangered Species Act.

By "comprehensive plan," we mean that FERC should 1) collect baseline environmental data and furnish it to the permittees; 2) include uniform study criteria and guidelines in preliminary permit articles; and 3) require permittees to conduct studies to provide data by which cumulative impacts of proposed projects can be assessed.

The area covered by the comprehensive plan should be the Pacific Region, i.e., any waters over which FERC claims jurisdiction in or adjacent to the Pacific Ocean. The plan should incorporate such sub-regional considerations as may be

warranted by the best scientific information available. A Pacific Region area plan is justified by both environmental and human use considerations that apply either throughout the entire area, or to significant sub-regions.

As described further below, the ecological setting off California, Oregon, and Washington is described as a single biogeographic region that is collectively termed the Coastal Upwelling Domain. It is comprised of several smaller-in-scale physical zones consisting of nearshore, middle and outer continental shelf, and benthic and demersal habitats. Baseline environmental data should be collected and provided to preliminary permit holders so there is a benchmark from which subsequent environmental effects can be measured. To our knowledge, this data has not yet been collected.

In the Pacific Region, most environmental effects resulting from individual hydrokinetic projects will arise from the same causes. These include alteration of currents and waves; alteration of substrates, and sediment transport and deposition; alteration of habitats for benthic organisms; emission of electromagnetic fields; and interference with animal movements and migrations. Uniform study criteria included in preliminary permits should require that developers address these environmental effects through literature review, modeling, and field studies before equipment testing begins.

Extensive human uses already permeate the Pacific Region and significant sub-regions. Uniform study criteria included in preliminary permits should include a requirement that human uses be mapped in overlay formats so that judgments can be made about appropriate areas for project placement. Uniform study guidelines should also address infrastructure needs, and port facilities. Human uses that will be affected include fishing, vessel traffic, ocean viewing, ocean recreation, tourism, military uses, and local economies.

Species of protected marine mammals and marine fish move throughout the Pacific Region. The entire migratory path of gray whales from Alaska to Baja California will be affected. Endangered and threatened species of salmon and steelhead move throughout the entire area. Critical habitat for green sturgeon listed as threatened under the Endangered Species Act includes coastal waters within 110 meters depth from Monterey Bay, California, north to Cape Flattery, Washington. The endangered southern resident population of killer whales occurs in coastal waters off Washington and Oregon, and has recently been observed off the coast of central California. Uniform study guidelines included in preliminary permits should require developers to address effects, including collection of data necessary to analyze cumulative effects, of their projects on these protected species.

If FERC determines that a comprehensive plan is unnecessary, its decision must be supported by substantial evidence on the record, employing relevant professional expertise. Therefore, we request that FERC 1) create a special docket number for this motion and any other motions or petitions for comprehensive planning; 2) prepare draft documents relevant to a comprehensive plan; and 3) hold public hearings in the affected areas to obtain technical and scientific information. See, *National Wildlife Federation v. FERC*, 801 F.2d 1505.

Movants want to make it clear that they do not necessarily oppose wave energy development in the Pacific Ocean. However, they believe that a rational approach with uniform guidelines based on the best science currently available must be used, and that anything less is arbitrary and capricious, as well as dangerous to humans and the environment. The logical vehicle for accomplishing this goal is the existing legal requirement that FERC develop a comprehensive plan before issuing more preliminary permits. Existing scientific information compels the conclusion that a comprehensive plan is necessary, warranted, and feasible. The California Study contains specific recommendations for uniform study guidelines that can be adapted and incorporated into a comprehensive plan for hydrokinetic energy development in and around the Pacific Ocean.

We believe that thoughtful developers will agree with this approach, which will provide greater certainty for developers and investors than FERC's current

program. FERC's current program is based on ad hoc decision making without any uniform guidelines or standards. There is no assurance that the decisions that FERC and its staff make today can be relied upon in the future.

A comprehensive plan is a more certain, efficient approach. It will provide developers, investors, other federal and state agencies, and the affected public (including their local governments) with environmental baseline information, knowledge of what studies are required before they are undertaken (and funds are committed), and a framework for analyzing cumulative effects. It will reduce conflict between developers and stakeholders over what studies are required under preliminary permits, and will prevent the needless duplication and waste of money, time, and professional resources that ensue from battles over individual projects. It will provide a framework for considering, addressing, and respecting existing ocean uses, and will help protect marine species that are already imperiled by human activity. We also believe that it is legally required.

I. Legal Requirement to Develop Comprehensive Plan

The Federal Power Act at 16 USC § 803 states in relevant part:

All licenses issued under this Part shall be on the following conditions: (a) That the project adopted . . . shall be such as in the judgment of the Commission will be best adapted to a comprehensive plan for improving or developing a waterway or waterways for the use or benefit of interstate or foreign commerce, for the improvement and utilization of water-power development, for the adequate protection, mitigation, and enhancement of fish and wildlife (including related spawning grounds and habitat, and for other beneficial public uses, including irrigation, flood control, water supply,

and recreational and other purposes referred to in section 4(e) [16 USC § 797(e)] [;and] if necessary in order to secure such plan the Commission shall have authority to require the modification of any project and of the plans and specifications of the project works before approval.

[Emphasis added.]

In *National Wildlife Federation v. FERC*, 801 F.2d 1505 (9th Cir. 1986), the Ninth Circuit Court of Appeals held that the requirement for FERC to develop a comprehensive plan applies before the issuance of preliminary permits, and not just before licensing, if the ecological system is complex, and the proposed projects are numerous. In these situations, FERC's issuance of preliminary permits is arbitrary and capricious, and an abuse of discretion, if FERC has not 1) prepared a comprehensive plan; 2) required permittees to conduct studies to provide data by which cumulative impacts of proposed projects can be assessed; 3) collected baseline environmental data and furnished it to the permittees; and 4) included uniform study criteria and guidelines in the permit articles. Any decision by FERC not to develop a comprehensive plan must be supported by substantial evidence on the record as required by 16 USC § 8251(b). Id.

FERC has not developed a comprehensive plan for hydrokinetic energy development in the Pacific Ocean off California, Oregon, and Washington, nor has it developed any record as to why it is unnecessary to do so. Movants therefore submit that, under the Federal Power Act at 16 USC § 803, and the Ninth Circuit ruling in *National Wildlife Federation v. FERC*, 801 F.2d 1505 (9th Cir. 1986),

FERC is required to develop a comprehensive plan for hydrokinetic energy development in the Pacific Ocean, and to either hold in abeyance or deny Green Wave Energy Solutions' application for a preliminary permit for the Mendocino Green Wave Project until a comprehensive plan has been developed. If FERC denies that a comprehensive plan is necessary, it must support that decision by substantial evidence on the record, which it has not done to date.

II. Regulatory Background

A. Hydrokinetics: FERC's Current Regulatory Scheme

“Hydrokinetic energy” is a general term used by FERC to refer to electricity generated by waves, tides, and currents, without the use of a traditional hydropower dam. Hydrokinetic generating devices currently consist of new, mostly untried technologies that, it is hoped, will generate enough electricity from moving water to help alleviate U.S. dependence on hydrocarbon fuels.

Hydrokinetic energy proposals are proliferating all over the United States, and in U.S. coastal waters. The Federal Power Act confers jurisdiction on FERC to license hydropower projects in waters of the United States. FERC asserts that this jurisdiction extends to hydrokinetic energy projects in ocean waters, including waters over the Outer Continental Shelf beyond the 3-mile limit. See, 125 FERC 61,045 (PG&E Mendocino and Humboldt WaveConnect Projects, Project Nos. 12781 and 12779) (Order on Rehearing issued October 15, 2008). FERC's claim

of ocean jurisdiction for wave energy projects beyond the 3-mile limit is contested by the Minerals Management Service (MMS), U.S. Department of the Interior, under the Energy Policy Act of 2005. *Id.* For MMS's position, see FERC Docket Nos. P-13306, P-13307, P-13308, P-13309, P-13310, P-13311, and P-13312, Protest of the Minerals Management Service dated January 26, 2009.

Under the Federal Power Act at 16 U.S.C. § 798, FERC issues preliminary permits for periods of three years. Preliminary permits are the precursors to original FERC licenses good for up to fifty years. They give the permit holders "first in time, first in right" claims to original licenses for the geographic areas designated in the permits. They also confer on permit holders the exclusive rights to study their areas for hydrokinetic energy development in preparation for filing original hydropower license applications with the Commission.

In order to exercise their priority rights to an original hydropower license, FERC requires preliminary permit holders to submit original license applications within their 3-year preliminary permit periods.

FERC's current scheme for developing hydrokinetic energy is to issue preliminary permits, followed by initial original hydropower licenses called "pilot project licenses." Holders of preliminary permits are encouraged by FERC to apply for these pilot project licenses during the terms of their preliminary permits. Putative terms for pilot project licenses are posted on FERC's Web site, but have

never been the subject of public notice-and-comment rulemaking, so there are no firm regulatory standards. Requirements for pilot project licenses will be determined on a case-by-case basis, with actual terms based on waivers of FERC's existing licensing regulations.

Pilot project licenses will be original hydropower licenses. As a result, it appears that holders of pilot project licenses will gain the significant rights of original license holders to apply for relicenses under the Federal Power Act at 16 U.S.C. § 808. As a result, FERC's current hydrokinetics program -- starting with the issuance of the initial preliminary permit, and proceeding through pilot project licenses and relicense proceedings -- may well result in today's preliminary permit holders becoming the permanent owners of their designated ocean sites.

To date, FERC itself has not conducted scientific studies or developed any environmental documents addressing the number of projects, the locations of projects, environmental baseline data requirements, the environmental effects of projects, the cumulative effects of projects, the impacts of projects on existing ocean uses, uniform study requirements, or any other issues that would be addressed in a comprehensive plan. FERC simply issues preliminary permits to would-be developers who apply for ocean areas that they deem desirable.¹

¹ The chaotic nature of FERC's current process is illustrated by the issuance of a preliminary permit on January 29, 2009, to a wave energy project off Newport, Oregon proposed by the developer Ocean Power Technologies (P-12750). According to the local press, FERC's action

FERC plans to continue its ad hoc approach, which has no fixed substantive parameters, into the indefinite future. The ad hoc approach was recently confirmed by Ann Miles, Director of Hydropower Licensing for FERC, at a public meeting she conducted on FERC's hydrokinetics process on January 13, 2009 in Fort Bragg, California. This meeting was filmed by Mendocino Coast Community Television.

In response to questions by the audience, Ms Miles stated that such important parameters as project sizes, locations (including "sensitive areas" from which projects might be excluded), and study requirements would be decided by project developers and FERC on a case-by-case basis. She further stated that it was up to individual members of the public and the community to make its issues and concerns known to FERC and project developers, although any decisions would be made solely by FERC in its final project licensing orders.

It is clear that FERC does not plan to administer a rational, science-based program based on uniform study guidelines for hydrokinetic development. It currently has no uniform standards to guide its process, and ultimately no yardstick against which to evaluate proposed projects.

came as a surprise to everyone affected, including the developer. It stirred up a "hornet's nest" for several reasons. It appeared to violate a Memorandum of Understanding between FERC and the State of Oregon on project siting, to challenge the Department of the Interior's ocean jurisdiction, to impinge on high value crab grounds, and to disrespect an ongoing community process. "Feds OK Wave Energy at Newport," Coos Bay World, February 3, 2009.

Instead, FERC is going to place the burden on the affected public and their local communities and governments to expend the huge resources in time and money that will be necessary to participate in decision-making for each project. Without uniform study guidelines in place, we cannot rely on the developers' choice of which studies to conduct, or how to conduct them. The affected public will carry the ultimate burden to attend endless rounds of developers' consultants' meetings, to plead for the studies that we believe are necessary, to maintain intervenor status, to observe FERC's intricate rules for participating in the administrative process, and, finally, if there is an unsatisfactory result, will have the burden to litigate against the immeasurably greater resources of project developers and FERC.²

B. Project Proliferation

The growing interest in hydrokinetics is illustrated by the ever-increasing numbers of preliminary permits processed by FERC in the last four years. According to FERC's Web site, FERC first began issuing preliminary permits for hydrokinetic projects in 2005. In 2005, it issued one permit. In 2006, it also issued one permit. In 2007, it issued 32 permits. In 2008, it issued 123 permits. At the end of 2008, 74 additional preliminary permit applications remained

² We believe that the minimum professional assistance that would be required for affected stakeholders to interact in a meaningful way with project developers and their consultants, and with FERC staff, would consist of employing the professional services of an attorney, a hydrologist, a biologist, and a mapping consultant, on an ongoing basis for several years.

pending in front of FERC. One of the pending permits was issued on January 29, 2009, for the area off Newport, Oregon.

Applications for hydrokinetic projects have also proliferated for areas in, and adjacent to, the Pacific Ocean off California, Oregon, and Washington. Appendix 1 to this motion is current as of the end of 2008, and lists sixteen active West Coast projects. It is known that new applications are being prepared for projects in addition to those listed in Appendix 1. In addition to the sixteen projects listed in Appendix 1, FERC has issued eight additional preliminary permits for hydrokinetic projects in Puget Sound, Washington. Puget Sound connects to the Pacific Ocean through the Strait of Juan de Fuca, and supports salmon runs and populations of marine mammals that may also be affected by preliminary permits issued for hydrokinetic projects off the Pacific Coast, including the California Coast.

FERC has established no limit on the number of new preliminary permit applications that can be submitted, or that it will approve. Nor has it exerted any meaningful control over siting, or over the size of areas that developers can claim. Although FERC has said that it will apply a standard that it calls “strict scrutiny” to new preliminary permit applications, the reality is that FERC issues permits for whatever areas developers care to designate. Rare exceptions have occurred when a developer has applied for an area that is physically located within an area already claimed by another developer, or where FERC suspects that the applicant is trying

to protect a water body, and does not intend to proceed with actual development. FERC cancelled one permit that it had already issued when the developer did not timely pursue studies deemed necessary for development. See, FERC Docket No. P-12752 (Coos County [Oregon] Wave Project).

The Green Wave Project itself abuts another wave energy project directly to the north, for which a preliminary permit has already been granted. See, FERC Project No. P-12781 (Mendocino WaveConnect Project). The northern boundary of the Green Wave Project is at Point Cabrillo ($39^{\circ}20.024'$ N. latitude), while the southern boundary of the Mendocino WaveConnect Project starts at $39^{\circ}20.976'$, a distance of less than a mile. Together the two projects cover 85 square miles of the Pacific Ocean off Mendocino County, California.

Wave energy generating devices are commonly referred to as Wave Energy Conversion” or “WEC” devices. To date, up to a hundred different possible types of wave energy technologies have been described in the media. Most are nowhere near commercial production. Of devices likely to be used in the foreseeable future, most are huge. For example, one of the devices proposed for the Green Wave Mendocino project is 460 feet long, 15 feet in diameter, and weighs (displaces) 720 tons. The entire Green Wave project will consist of an unspecified number of these devices arrayed in rows running parallel to shore. They will be anchored to

the seabed, cabled together, and joined to a transmission cable that runs to shore. The arrays will be surrounded by navigation exclusion zones.

III. Need for Uniform Study Guidelines Based on Existing Science

Although FERC's preliminary permits for hydrokinetic projects give the permit holders the exclusive rights to study their areas for development, preliminary permits issued to date impose no uniform study guidelines or requirements. In fact, they impose no specific study requirements at all. The standard permit article states:

The purpose of the permit is to maintain priority of application for a license during the term of the permit while the Permittee conducts investigations and secures data necessary to determine the feasibility of the proposed project and, if said project is found to be feasible, prepares an acceptable application for license. In the course of whatever field studies the Permittee undertakes, the Permittee shall at all times exercise appropriate measures to prevent irreparable damage to the environment of the proposed project.

See, e.g., P-12781, Pacific Gas & Electric Company, Order Issuing Preliminary Permit issued March 13, 2008, p.7, Article 1.

Calls for collaborative research efforts began in 2007 with a U.S. Department of Energy workshop convened to address the potential impacts of hydrokinetic and wave energy conversion technologies on aquatic environments. As stated in the results of that workshop:

[M]any environmental research questions of general interest might best be addressed by collaborative groups, and the results made freely available to all. Collaborative studies could include experiments to understand the mechanisms of impacts of kinetic hydro and wave conversion devices . . .

Individual developers rarely have the resources to carry out this general research on their own, but the information that comes from such studies is often of interest to a wide audience seeking to refine their designs and operations in order to minimize environmental impacts. The results of collaborative efforts are much more likely to influence decision making if the studies are funded, designed, conducted, and analyzed by a broad group representing all interests.

“Potential Impacts of Hydrokinetic and Wave Energy Conversion Technologies on Aquatic Environments,” 32 *Fisheries* 174 (April 2007) (available at www.fisheries.org).

Several recent studies on informational and data requirements for hydrokinetic energy development indicate that there are issues common to all the projects for which uniform study requirements can be established. The following sections summarize some of the relevant information from four of these studies.

A. NOAA Technical Memorandum 92 (hereinafter “NOAA TM 92”)³

This study describes the complex ecological setting and the major processes in the coastal Pacific Ocean, as follows:

The marine and anadromous resources along the west coast of the United States occupy diverse habitats in the coastal ocean off Washington, Oregon, and California—a biogeographic region that is collectively termed the Coastal Upwelling Domain (Ware and McFarlane 1989). Within this domain, several smaller-in-scale physical zones are recognized:

³ Boehlert, G.W, G.R. McMurray, and C.E. Tortoici (editors). 2008. *Ecological effects of wave energy in the Pacific Northwest*. U.S. Dept. Commerce, NOAA Tech. Memo. NMFS-F/SPO-92, 174 p. (available online at <http://spo.nmfs.noaa.gov/tm/>).

1. A nearshore zone where mysids, juvenile fall Chinook salmon (*Oncorhynchus tshawytscha*), sand lance (*Ammodytes hexapterus*), smelts, Dungeness crabs (*Cancer magister*), and gray whales (*Eschrichtius robustus*) reside, and which includes sand, rocky shore, and intertidal habitats. Small estuaries and river mouths also play a role in this zone.
2. The middle and outer continental shelf where juvenile and adult coho (*Oncorhynchus kisutch*) and Chinook salmon reside along with abundant krill and seasonally changing fish and plankton communities.
3. The upper 10–20 m of the water column across the continental shelf and slope where many of the pelagic fishes, including juvenile coho and Chinook, reside.
4. The benthic and demersal habitats where various fishery resources reside, including the continental shelf (Dungeness crabs, English sole [*Parophrys vetulus*]), the shelf break (whiting, rockfish), and beyond the shelf break to depths of 1,500 m (sablefish [*Anoplopoma fimbria*], Dover sole [*Microstomus pacificus*], and thornyheads [*Sebastolobus* spp.]).

NOAA TM 92 at 7.

B. EISA Report⁴

This report addresses general environmental effects that may be expected from hydrokinetic energy development:

There are numerous conceptual designs for converting the energy of waves, river and tidal currents, and ocean temperature differences into electricity. Appendix B lists well over 100 ocean energy and hydrokinetic renewable energy technologies. Most of these technologies remain at the conceptual stage – they have not yet been tested in the field or as prototype, full-scale devices. Consequently, there have been few studies of their environmental effects. Most considerations of the environmental impacts have been in the form of predictive studies and environmental assessments that have not yet

⁴ U.S. Department of Energy, Report to Congress, “Potential Environmental Effects of Marine and Hydrokinetic Energy Technology, Prepared in Response to the Energy Independence and Security Act of 2007, Section 633(b),” November 21, 2008 (Public Review Draft) [available online at <http://www.ornl.gov/sci/eere/EISARepor/report.html>].

been verified. The assessments have identified common elements among these technologies that may pose a risk of adverse environmental effects. These potential impacts include the alteration of currents and waves; alteration of substrates and sediment transport and deposition; alteration of habitats for benthic organisms; noise during construction and operation; emission of electromagnetic fields; toxicity of paints, lubricants, and antifouling coatings; interference with animal movements and migrations; and strike by rotor blades or other moving parts. . . . Project installation and operation will change the physical environment. Effects on biological resources could include alteration of the behavior of animals, damage and mortality to individual plants and animals, and potentially larger, longer-term changes to plant and animal populations and communities.

EISA Report at iii.

The EISA Report “does not address human use conflicts, other possible impacts to humans (e.g., aesthetics, noise, light, recreation, transportation, navigation, cultural resources), or socioeconomic impacts.” However, it states that “[t]he cultural and socioeconomic impacts of these technologies on coastal communities and other users of rivers and oceans are important, and are better addressed more fully in separate, focused reports,” citing the Minerals Management Service’s Programmatic Environmental Impact Statement, and the California Study. EISA Report at 2. These studies are described below.

C. MMS Programmatic EIS⁵

The Energy Policy Act of 2005 conferred jurisdiction on the Minerals Management Service (MMS), U.S. Department of the Interior, over alternative

⁵ U.S. Department of the Interior, Minerals Management Service, “Programmatic Environmental Impact Statement for Alternative Energy Development and Production and Alternate Use of Facilities on the Outer Continental Shelf,” Final Environmental Impact Statement, October 2007 (available online at <http://ocsenergy.anl.gov/documents/index.cfm>).

energy development on the Outer Continental Shelf (OCS), generally the area from 3-200 miles offshore. In October 2007, MMS completed a Programmatic Environmental Impact Statement (EIS) in support of its program, which includes lease requirements necessary for the development of hydrokinetic energy projects.⁶

The proposed action analyzed in the Programmatic EIS is the establishment of the MMS Alternative Energy and Alternate Use Program on the OCS through rulemaking. Under this approach, “[t]he evaluation of alternative energy . . . project proposals by the MMS would be performed pursuant to nationwide guidelines and informed by [Best Management Practices].” MMS Programmatic EIS at ES-2 – ES-3. The MMS Programmatic EIS specifically considers, and rejects, a case-by-case approach. MMS Programmatic EIS at 2-4 – 2-5. The Programmatic EIS also establishes a framework for environmental analysis that may be used for future, project-specific environmental documents. MMS Programmatic EIS at ES-2 – ES-3. MMS followed the Programmatic EIS with a Record of Decision (issued in December 2007) that incorporates 52 Best Management Practices.⁷ A proposed rule was published on July 9, 2008 (73 FR

⁶ MMS uses the term “lease” instead of the terms “permit” and “license” that are used by FERC. MMS leases are disfavored by wave energy developers because FERC runs a looser regulatory regime, and unlike MMS, does not require competition or impose rents for use of public resources. See, e.g., FERC Docket No. P-13309, Cover Letter and Preliminary Permit Application for the Ventura Ocean Energy Project filed October 21, 2008.

⁷ Available online at <http://ocsenergy.anl.gov/documents/index.cfm>.

39376).⁸

In addition to analyzing possible alternatives for program management, the MMS Programmatic EIS also addresses the impacts on existing human uses of the ocean that were not part of the EISA Report. For the Pacific Region, these impacts include effects on 1) marine sanctuaries, national parks, national wildlife refuges, national estuarine research reserves, and the National Estuary Program; 2) military use areas; 3) transportation; 4) socioeconomic resources including regional demographics, sociocultural systems, and environmental justice; 5) cultural resources; 6) land use and existing infrastructure; 7) visual resources; 8) tourism and recreation; and 9) commercial and recreational fisheries. MMS Programmatic EIS at 4-273 – 4-302. A summary of the discussion of these nine issues from the EIS is included in Appendix 2 to this motion.

D. California Study⁹

The California Study is entitled “Developing Wave Energy in Coastal California: Potential Socio-Economic and Environmental Effects,” and was published in November 2008. It was prepared at the direction of two California

⁸ Efforts to persuade FERC to establish a similar program for areas under its jurisdiction, and to promulgate national regulations, have been rejected. See, FERC Docket Nos. AD07-14-002 and PL08-1-002, Order Denying Rehearing issued August 8, 2008.

⁹ Nelson PA, D Behrens, J Castle, G Crawford, RN Gaddam, SC Hackett, J Largier, DP Lohse, KL Mills, PT Raimondi, M Robart, WJ Sydeman, SA Thompson, S Woo. November 2008. *Developing Wave Energy in Coastal California: Potential Socio-Economic and Environmental Effects*. California Energy Commission, PIER Energy-Related Environmental Research Program & California Ocean Protection Council CEC-500-2008-083. (available online at <http://www.energy.ca.gov/2008publications/CEC-500-2008-083/>).

state agencies, the California Ocean Protection Council and the California Energy Commission. Its authors' affiliations include the Bodega Marine Laboratory (University of California at Davis), the Farallon Institute for Advanced Ecosystem Research (Petaluma, California), the Department of Oceanography at Humboldt State University (Arcata, California), the Department of Ecology and Evolutionary Biology at the University of California at Santa Cruz, the Department of Economics at Humboldt State University, and H.T. Harvey & Associates (Arcata, California).

The California Study includes chapters that address economic and social considerations for wave energy development in California; the potential impact of WEC development on nearshore and shoreline environments through a reduction in nearshore wave energy; predicted effects of wave energy conversion technology on California's marine and anadromous fishes; potential impacts on marine birds and mammals; and tools and approaches for detecting ecological changes resulting from WEC development.

The California Study's "Abstract" states:

Growing interest in converting the energy of California's ocean waves into electricity is matched by concerns regarding the potential effects of wave energy conversion technology on marine resources. This study finds ecological and socio-economic challenges associated with wave energy conversion are likely to depend fundamentally on project scale and location. Social and cultural impacts to fisheries, marine transportation, and some recreation are expected, and may have economic ramifications. Changes to the physical environment are predicted to result from a reduction in wave

energy and alterations to nearshore wave-driven processes. Benthic communities may exhibit direct or indirect responses to these changes, with the potential for non-linear effects. Fish are expected to use wave energy conversion installations as artificial habitat, and environmental perturbations such as acoustic or electro-magnetic stimuli may affect behavior. Marine bird and mammals effects are expected to be minimal, but there is cause for caution regarding select species. Dramatic ecological, social, or economic effects are not clearly indicated by this study, but a strong case for caution is supported when developing wave energy conversion technology off the California coast. Impacts to human activities, wave exposure, benthic communities, fishes, birds and mammals are all virtually certain, but the impacts' magnitudes and the cumulative effects remain difficult to anticipate.

California Study at xiii. The California Study contains very specific conclusions and recommendations concerning study requirements for the most important impacts, as follows:

For potential social and economic effects caused by WEC implementation, researchers must or should:

- Collect higher-resolution spatial data on marine uses, beach recreation, wildlife viewing, tourism, and non-use values (culturally significant areas and existence values), commercial fishing, and vegetation harvest; compile this data into a geographical information system (GIS) map format.
- Inventory marine cultural resources, in a GIS compatible format, to assess the cultural and historical connectivity of sites.
- Identify the minimum scale of commercial and recreational fishing and other activities that are needed to sustain small harbor facilities and local fishing industry complexes.
- Describe the public's level of acceptance regarding wave farm development in California, and identify the factors that have led to those levels.

For wave energy conversion-induced physical process changes and their potential effects in the nearshore environment, researchers must or should:

- Determine the efficiency and performance criteria of each device, as described by the device manufacturers or through “third party” studies.
- Select and evaluate a suitable refraction-diffraction (change in wave height and direction) model to run simulations of waves around wave energy conversion array-like objects, before permitting significant wave energy conversion arrays.
- Collect detailed monitoring of wave conditions inshore of pilot systems using combinations of different instruments, confirmed with existing agency data collection programs. If a significant shadow zone is indicated, monitoring should extend to benthic processes, including defining settlement and resuspension rates.
- Directly observe impacts on sediment transport, morphology, and nearshore water quality through before-and-after studies, in areas expected to exhibit an inordinate impact on ecological communities (for example, estuary mouths such as at the Russian River, or areas receiving contaminated outflows such as the Noyo River plume at Fort Bragg).

For potential effects on biological communities in the nearshore environment, researchers must or should:

- Evaluate how biological communities vary along a wave energy gradient, particularly since the relationship could be non-linear rather than linear. Qualitative models are provided in this study (for example, the zonation model), but data to support these models are needed.

Wave energy changes in the 0 to 15 percent range should be studied.

- Design studies that would determine how the frequency and size of disturbance events varies, when wave exposure also varies.
- Identify the relative importance of suspended sediment and light, versus the availability of nutrients, to plant growth in the nearshore environment.

For potential effects on fishes and fish habitats, researchers must or should:

- Assess artificial reef effects and fish aggregation device effects, determining the processes associated with wave energy conversion-related fish community formation, evaluating alterations in local predatory behavior (especially of salmonids), and assessing the evidence for a fish aggregation device effect.
- Characterize physical stimuli associated with wave energy conversion technology especially electromagnetic field (EMF), sound and vibration, and evaluate their potential impacts on selected species.
- Evaluate the potential impacts of wave energy conversion development on fisheries management. Because public access (including fishing access) to wave energy conversion sites is likely to be curtailed for safety reasons, wave energy conversion sites will probably function as de facto marine reserves, with fisheries management and conservation implications.

For potential effects on marine birds and mammals, researchers must or should:

- Support the development of a coast-wide program for tracking seabird mortality patterns comparable to the Coastal Observation and Seabird Survey Team (COASST).
- Monitor Gray Whale migration behavior, to evaluate responses to wave energy conversion installations, and to determine if there is a minimum installation size such that behavior appears to be unchanged.
- Conduct a literature review on light induced seabird mortality and perform additional studies if the literature cannot provide information sufficiently applicable to wave energy conversion installations.
- Perform direct field studies on species that are almost certainly affected by wave energy conversion installations, such as some marine birds (that is, gulls and cormorants) and mammals (that is, sea lions). Collision and entanglement with installations are effects of particular concern; researchers should provide wave energy conversion designers with criteria so that wave energy conversion systems can be designed to minimize negative effects.

To provide more complete baseline information, and to better monitor potential wave energy conversion-induced effects, researchers utilizing ocean observing systems must or should:

- Foster partnership agreements between ocean observing system organizations, ecological monitoring programs, and the wave energy conversion industry, so data can be freely shared.
- Design data collection using standardized instruments and quality assurance/quality control (QA/QC) protocols, particularly for water quality measurements.
- Widen existing observation networks to fill spatial “gaps” in coverage, such as observing estuaries.
- Evaluate the extent to which existing ocean observation systems can provide useful data for studying nearshore physical and ecological processes.

California Study at 3-5.

The California Study further details the concern over WEC devices’ effects on migrating whales, which are a special focus of the Mendocino coastal community, as follows:

Numerous large-scale wave parks along the California coast could block the migratory pathway of the entire population of eastern gray whales (*Eschrichtius robustus*); this appears to be one of the most significant concerns.

* * *

The habitat overlap between gray whales and potential wave energy parks could be substantial.

* * *

Migrating marine mammals may experience disruption in their pattern of migration that may lead to disrupted breeding cycles, habitat exclusion,

increased energetic cost and different predator threats (Reynolds and Rommel 1999, 2007). Most gray whales and humpback whales migrate between feeding grounds in Alaska and breeding grounds in Mexico and large wave parks may cause the migrating whale to choose a different route in order to circumvent the obstacle. This occurrence may create issues by delaying the arrival to the breeding or feeding grounds. Additionally, diverting around wave parks may cause mammals to move into deeper water, exposing them to greater threats from predators they may otherwise avoid in shallow waters, such as great white sharks and killer whales. To complicate this issue, delays may force whales to search for other food sources or prevent them from using their primary habitat (habitat exclusion), producing an additional energetic cost. In the spring, mother whales escort their babies from breeding grounds northward, and both mother and offspring may be even more susceptible to all of these risks.

[Emphasis added.] California Study at 123, 125, 129.

IV. Special Considerations Related to Protected Marine Mammals and Endangered Species

The Pacific Region contains numerous species of species of fish and mammals protected under the Marine Mammal Protection Act (MMPA) and the Endangered Species Act (ESA). Many of these species cross two or more project areas. This circumstance alone is a compelling reason to mandate uniform study guidelines so that the individual and cumulative effects of the proposed projects on these species can be analyzed. Some examples are given below.

A. Migrating Whales

Gray whales migrate from Alaska to Baja California along the entire coastline of the Pacific Region (Washington, Oregon, and California) in and near the areas

of the proposed hydrokinetic projects. The California Study warns that “[numerous large-scale wave parks along the California coast could block the migratory pathway of the entire population of eastern gray whales.” [Emphasis added.]

B. Salmon and Steelhead

ESA listings of salmon and steelhead are discussed at the National Marine Fisheries Service’s Web site at <http://www.nwr.noaa.gov/ESA-Salmon-Listings/Index.cfm>, which includes a “Snapshot of Salmon and Steelhead ESA Status.” On the Status list, there are six salmon and steelhead species that are shown as endangered, and another twenty-one salmon and steelhead species that have been listed as threatened. Three additional species have been designated “Species of Concern.”

Sometime in the near future, before any hydrokinetic license orders are issued, FERC will be required to conduct formal consultations with the National Marine Fisheries Service on the salmon and steelhead species that are listed under the ESA. Uniform study guidelines for these species should be established now, before more preliminary permits are issued, so that energy developers will gather the necessary information for consultations on listed salmon and steelhead species that pass through their project areas. These guidelines should include requirements

to collect data that will be necessary for the cumulative effects analysis of impacts on listed species that will necessary for the numerous species that pass through multiple project areas.

The ESA salmon and steelhead listings are especially significant because all of the listed species migrate within, and depend on, the Pacific Ocean to complete their life cycles. Huge resources are currently being expended by federal and state governments, Indian tribes, and local communities to conserve and recover these fish. For example, the Bonneville Power Administration (FERC's fellow agency in the U.S. Department of Energy) has already spent more than a billion dollars to mitigate the effects of hydropower development on salmon and steelhead. Study of the listed species as they will be affected by hydrokinetic projects should be mandated now in order to avoid working at cross purposes with recovery programs and wasting resources.

It is also noted that many of the listed species (as well as non-listed salmon and steelhead species) are subject to Indian tribal fishing rights, including rights of the treaty and non-treaty Indian tribes of Washington, Oregon, and Idaho, and the rights of the Yurok and Hoopa Valley tribes on the Klamath River in Northern California. Fish to which Indian fishing rights apply pass through many of the proposed project areas, and are subject to court decisions that may serve as constraints on the projects themselves. This is also an appropriate topic for

uniform study guidelines.

C. Green Sturgeon

Another ESA-listed marine fish species is the southern population segment of green sturgeon. On September 8, 2008, the National Marine Fisheries Service proposed to designate critical habitat for this species. 73 FR 52084. The area proposed for designation includes coastal waters of the U.S. within 110 meters depth from Monterey Bay, California, north to Cape Flattery, Washington. Under Section 7 of the ESA, 16 U.S.C. § 1536(a)(2), FERC will be required to consult with NMFS, and to ensure that its actions are “not likely to jeopardize the continued existence of [the listed species] or result in the destruction or adverse modification” of its critical habitat. This is also an issue appropriate for uniform study guidelines and analysis of cumulative effects.

D. Killer Whales

The southern resident population of killer whales (*orcinus orca*) are listed as “ESA Endangered” and “MMPA Depleted” by the National Marine Fisheries Service. This population occurs in coastal waters off Oregon, and Washington, and has recently been observed off the coast of central California, in areas where hydrokinetic projects have been proposed. According to the National Marine Fisheries Service:

The Southern Resident killer whale (SRKW) population contains three pods (or stable family-related groups)--J pod, K pod, and L pod--and is

considered a stock under the Marine Mammal Protection Act (MMPA). Their range during the spring, summer, and fall includes the inland waterways of Puget Sound, Strait of Juan de Fuca, and Southern Georgia Strait. Their occurrence in the coastal waters off Oregon, Washington, Vancouver Island, and more recently off the coast of central California in the south and off the Queen Charlotte Islands to the north has been documented. Little is known about the winter movements and range of the Southern Resident stock. Southern Residents have not been observed associating with other resident whales, and mitochondrial and nuclear genetic data suggest that Southern Residents rarely interbreed with other killer whale populations.

<http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/killerwhale.htm>.

Only about 88 Southern Resident killer whales remain. Threats to killer whales include pollution, vessel traffic, and noise. It appears that hydrokinetic projects proposed from the central California Coast north through the Strait of Juan de Fuca, and into Puget Sound, all have possible effects on these whales. This is another issue appropriately addressed with uniform study guidelines, including data collection that will enable analysis of cumulative effects.

V. Conclusion

For the reasons stated above, FERC should deny or hold in abeyance the preliminary permit application for the Green Wave Mendocino project until such time as it has developed the comprehensive plan required by the Federal Power Act at 16 U.S.C. § 803(a) and *National Wildlife Federation v. FERC*, 801 F.2d 1505 (9th Cir. 1986).

Respectfully submitted, on behalf of the ***FISH Committee***, and on behalf of
Elizabeth R. Mitchell as an individual, this 6th day of February, 2009,

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APPENDIX 1¹
**PROPOSED HYDROKINETIC ENERGY PROJECTS IN AND
AROUND THE PACIFIC OCEAN (AS OF JANUARY 29, 2009)**

- 1. P-13309: Ventura Ocean Energy Project, preliminary permit pending.** The project location is in the Pacific Ocean approximately 5 to 10 miles due west of Ventura, California, and appears to cover about 20 square miles. The developer currently proposes to use 100 WEC devices.
- 2. P-13052: Green Wave San Luis Obispo Wave Park, preliminary permit pending.** The project location is in the Pacific Ocean about 1 to 3.5 miles offshore from Morro Bay in San Luis Obispo, California. It covers approximately 17 square miles. The developer has declined to specify the number of WEC devices it intends to use.
- 3. P-13308: San Francisco Ocean Energy Project, preliminary permit pending.** The project location is in the Pacific Ocean due west of San Francisco about 20 to 25 miles offshore, and appears to cover approximately 47 square miles. Use of 100 WEC devices is currently proposed.
- 4. P-12585: San Francisco Bay Tidal Energy Project, preliminary permit pending.** This project will use tidal energy turbines within areas of San Francisco

¹ This list was compiled from FERC's Web site at <http://www.ferc.gov/industries/hydropower/indus-act/hydrokinetics.asp>, and is current as of the end of 2008.

Bay, which directly connects to the Pacific Ocean through the Golden Gate Narrows. The application, if approved, would continue in force a preliminary permit that expired in September 2008.

5. P-13053: Green Wave Mendocino Wave Park, preliminary permit

pending. The project location is in the Pacific Ocean between 0.5 and 2.6 miles offshore running roughly north and south between Point Cabrillo (39°20.024 N. latitude) and the Navarro River mouth (39°14.238' N. latitude), in Mendocino County, California. It covers approximately 17 square miles. The developer has declined to specify the number of WEC devices it intends to use.

6. P-12781: Mendocino WaveConnect Project, preliminary permit issued

2008. The project is located in the Pacific Ocean about 0.5 to 6 miles offshore from the City of Fort Bragg, Mendocino County, California. The project area is 68 square miles. PG&E currently says that the project will consist of an array of 8 to 200 WEC devices.

7. P-13075: Centerville OPT Wave Energy Park, preliminary permit issued

2008. The project is in the Pacific Ocean about 2.5 miles offshore southwest of the City of Eureka, Humboldt County, California. The project area is about 7 square miles. Currently, the project will consist of 40 to 80 WEC devices.

8. P-12779: Humboldt WaveConnect Project, preliminary permit issued

2008. The project is located in the Pacific Ocean 2 to 10 miles offshore from the

City of Eureka in Humboldt County, California. The project area is 136 square miles. Currently, PG&E says that project will consist of an array containing 8 to 200 WEC devices.

9. P-12753: Humboldt County Wave Project, preliminary permit issued

2008. The project is located in the Pacific Ocean about 2 to 3 miles offshore, and northwest of the town of Trinidad in Humboldt County, California. The project area is about 8 square miles. Use of 200 to 300 WEC devices is currently proposed.

10. P-12749: Coos Bay Project, preliminary permit issued 2007. The project is located in the Pacific Ocean about 2.5 miles offshore northwest of Coos Bay, Oregon. The project area is about 5 square miles. Use of 200 to 400 WEC devices is currently proposed.

11. P-12743: Douglas County Wave and Tidal Energy Project, preliminary permit issued 2007. The project is located in the Pacific Ocean at the mouth of the Umpqua River in Douglas County, Oregon. It consists of 1 to 3 generating units.

12. Reedsport OPT Wave Park, preliminary permit issued in 2007. The project location is in the Pacific Ocean about 3 miles offshore west of the town of Reedsport, Douglas County, Oregon. The project area is about 5 square miles. Use of 200 WEC devices is currently proposed.

13. P-12750: Newport OPT Wave Park, preliminary permit issued January 29, 2009. The project area is described as about 17 square miles located 3 to 6 miles offshore between Newport and Waldport, Oregon. Use of 200-400 WEC devices is currently proposed.

14. P-13047: Oregon Coastal Wave Energy Project, preliminary permit issued 2008. This project is located in the Pacific Ocean off Tillamook County, Oregon. It consists of six separate developments using a total of 30 to 540 WEC devices.

15. P-12729: Willapa Bay Project, preliminary permit issued 2007. This is a tidal energy project that will be placed in unspecified areas of the Pacific Ocean and Willapa Bay in Pacific County, Washington. It consists of 3 Red Hawk TISEC generating units.

16. P-13058: Gray's Harbor Ocean Energy Project, preliminary permit issued 2008. The project is located in the Pacific Ocean 0.1 to 3 miles offshore from Gray's Harbor County, Washington. The project area is about 28 square miles. Two "wind and wave generation arrays" are proposed.

In addition to the sixteen projects listed above, FERC has issued eight additional preliminary permits for hydrokinetic projects in Puget Sound, Washington. Puget Sound connects to the Pacific Ocean through the Strait of Juan de Fuca, and supports salmon runs and populations of marine mammals that may

also be affected by preliminary permits issued for hydrokinetic projects off the Pacific Coast. FERC continues to accept new applications on an ad hoc basis.

APPENDIX 2
**HYDROKINETIC ENERGY DEVELOPMENT –
EFFECTS ON EXISTING HUMAN USES**

The following paragraphs briefly summarize information on existing human uses within hydrokinetic project areas of the Pacific Region found in U.S. Department of the Interior, Minerals Management Service, “Programmatic Environmental Impact Statement for Alternative Energy Development and Production and Alternate Use of Facilities on the Outer Continental Shelf,” Final Environmental Impact Statement, October 2007, pages 4-273 – 4-302.¹

1) Marine Protected Areas: The report states that nearly 50 Marine Protected Areas have been identified for the Pacific Region. These areas are associated with five National Marine Sanctuaries, six National Park sites, twenty-eight national wildlife refuges, five national estuarine research reserves, and the National Estuary Program. *Id.* at 4-273 – 4-278.

2) Military Use Areas: Military use areas in the Pacific Region include Warning Areas and Restricted Areas from Washington to Southern California where daily military activities vary from unit-level training to full-scale Carrier Expeditionary Strike Group operations and certification. *Id.* at 4-278.

¹ Available online at <http://ocsenergy.anl.gov/documents/index.cfm>.

3) Transportation: The Pacific Region contains a vast transportation network that includes major commercial ocean ports, designated shipping lanes, and precautionary areas for vessel traffic, as well as commercial fishing ports, departure points for cruise ships, and helicopter operations. Development of wave energy itself will be influenced by existing ocean port capabilities and vessel activities. Id. at 4-281 – 4-287.

4) Socioeconomic Resources Including Regional Demographics, Sociocultural Systems, and Environmental Justice: This section of the EIS provides demographic statistics for the Pacific Region as a whole, pointing to its variety of different types of economies. In general, there are a number of large metropolitan areas, and a number of urban areas that have more specialized economic functions including renewable and nonrenewable resource development, maritime shipping, power generation, recreation, tourism, and residential retirement. Outside urban areas there are a large number of local and regional market areas serving the resource extraction, agriculture, power generation, and transportation industries. The smaller areas have simpler economic structures and contain less diversified labor markets. Id. at 4-286.

Sociocultural systems (including demography, employment, income, and land use characteristics) of the Pacific Region are “extremely diverse and varied.” Rural areas such as the Mendocino Coast “are predominantly characterized by

small communities that rely, variably, on the timber and fishing industries, as well as recreation and tourism.”

The ocean is an important component of the sociocultural systems of the Pacific Region:

The beach, coast, and the ocean itself exist as important geographic, spiritual, and socially constructed components for many Pacific Coast residents. Recreation and tourism and ocean related industries provide substantial income for local community economies. Additionally the beach, the coast, and the ocean provide a “coastal connection” between residents and the sea (citation omitted).

Id. at 288.

With respect to environmental justice, the EIS states that “[u]nder Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (59 FR 7629), Federal agencies are required to address, as appropriate, any disproportionately high and adverse human health or environmental effects of their actions, programs, or policies on minority and low-income populations.” Id. at 4-281 – 4-287.

5) Cultural resources: With respect to cultural resources, the EIS references the Advisory Council on Historic Preservation’s regulations defining “historic property;” Section 106 of the National Historic Preservation Act of 1966; onshore cultural resources ranging from small, temporary use sites to substantial permanent settlements; and offshore cultural resources including shipwrecks and

submerged archeological sites, including prehistoric sites. *Id.* at 4-290 – 4-292.

6) Land Use and Existing Infrastructure: Land use and existing infrastructure is also important. The Pacific Region has eight of the U.S.’s largest cities and ports, for which transportation networks including marine, rail, and highway are well developed. In addition to the major population centers that have developed infrastructure, “there are also large undeveloped and rural areas along the coasts that include numerous State and federally managed units focused on recreation, marine environment protection, resource protection, and wildlife management,” and “[t]he coastal portions of all three States are heavily visited and used by recreation users and are a major recreation destination.” All states in the Pacific Region participate in the Coastal Zone Management Program. *Id.* at 4-292 – 4-293.

7) Visual Resources: Visual resources are also valuable, and will likely be affected by the proposed projects. As a simple prescription for study, the EIS notes that:

Description of the visual resources potentially affected by the proposed facilities involves establishing landscape types and scenic quality in the areas in which energy facilities would be located, followed by an assessment of the potential sensitivity to changes in the visual environment, including the likely number of viewers.

Viewers include recreational users of the shoreline as well as seaside residents, who are potentially very sensitive to changes visible from shore. *Id.* at 4-292 – 4-

293.

8) Tourism and Recreation: With respect to tourism and recreation, currently two of the most important economic activities in the Green Wave Project area, the Programmatic EIS states:

Recreation and tourism are primary components of the socioeconomic environment of the Pacific region. The Pacific coastline is an outstanding visual resource of great variety, grandeur, contrast, and beauty and contributes to the economic success of the tourist industry. Most of the coastal region is a highly sensitive natural resource area and is an important recreational asset to the residents (citation omitted). Many of the national parks, reserves, sanctuaries, State parks, and marine protected areas are preferred destinations for residents and visitors. Tourism activities represent an important revenue source to local and State economies. Recreational activities conducted in the coastal zone include sightseeing, camping, clam digging, hiking, biking, beachcombing, picnicking, boating, swimming, diving, wading, sunbathing, surfing, and sportfishing (citation omitted). Sightseeing and beachcombing are enjoyed along the entire coast and are dependent on the aesthetic aspect of the coastline and ocean view.

Id. at 4-294.

9) Fisheries: Many species of fish and invertebrates are caught and landed in commercial fisheries of the Pacific Region. Coastwide, according to National Marine Fisheries Service statistics for 2004, the most valuable commercial species is Dungeness crab, followed by other invertebrates such as squid, Pacific oyster, sea urchins, and California spiny lobster. Finfish that also contributed substantially to the overall commercial value included Chinook salmon, albacore tuna, and sablefish (black cod). Squid and seaweed (kelp) also contributed. Id. at 4-294 – 4-302.

Marine sports fishing is also an important recreational activity, with an estimated 4 million recreational fishing trips, and a catch of more than 18 million fish in 2004. Id. at 4-301.

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