

CALIFORNIA COASTAL COMMISSION

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**Tu 15a**PROPOSED FINDINGSON CONSISTENCY DETERMINATION

Consistency Determination No.	CD-102-99
Staff:	JRR-SF
File Date:	10/6/99
45th Day:	11/20/99
60th Day extended to:	12/15/99
Date of Commission Action:	12/10/99
Hearing Date:	2/**/2000

FEDERAL AGENCY: **NATIONAL MARINE FISHERIES SERVICE**

DEVELOPMENT
 LOCATION:

Offshore of the Cities of San Diego and Imperial Beach
 (Exhibit 1)

DEVELOPMENT
 DESCRIPTION:

Small-scale test of a pulse-power device used to deter sea lions' depredation on fish caught on sport fishing vessels

EXECUTIVE SUMMARY

The National Marine Fisheries Service (NMFS) has submitted a consistency determination for a small-scale test of a pulse power device used to deter sea lions depredation on charter fishing vessels. The tests would be conducted offshore of the cities of San Diego and Imperial Beach, in southern California. The test would take place over a series of approximately 327 vessel cruises over a period not to exceed five months. The test is designed to investigate the effectiveness of the pulse power device to deter sea lions from approaching the chartered fishing vessel. The pulsed power device produces a discharge that includes a compressed wave (shock wave) and an acoustic wave. NMFS believes that the combination of acoustic and compressed waves may be more effective at deterring sea lion depredation.

The proposed test has the potential to adversely affect marine mammals, sea turtles, and other marine species. The device would emit a sound and shock wave that may deter sea lions from coming too close to the vessel. NMFS proposes to monitor for non-target marine mammals and other species to prevent exposing any non-target

Therefore, the project is not consistent with the recreational resource policy of the CCMP.

SUBSTANTIVE FILE DOCUMENTS:

1. Environmental Assessment for testing a pulse power generator to reduce California sea lion depredation of gear and catch aboard an actively fishing charter boat off southern California, October 5, 1999.
2. Letter Dated June 11, 1999, from Joel R. Reynolds, Natural Resources Defense Council to Sara Wan, Chair, California Coastal Commission (Exhibit 2).
3. *Marine Mammals and Noise*, W. John Richardson, Charles R. Greene, Jr., Charles I. Malme, Denis H. Thomson, 1995.
4. *Behavioral Responses and Temporary Shift in masked Hearing Threshold of Bottlenose Dolphins, Tursiops truncatus, to 1-second Tones of 141 to 201dB re 1µPa*, Sam H Ridgeway, et al., July 1997.
5. Consistency Determinations: CD-110-94, CD-95-97, CD153-97, CD-109-98, and CD-32-99.
6. High Energy Seismic Survey Review Process and Interim Operational Guidelines for Marine Surveys Offshore Southern California, the High Energy Seismic Survey Team, for the California State Lands Commission and the U.S. Minerals Management Service Pacific OCS Region, September 1996 – February 1999 (Exhibit 3)

STAFF SUMMARY AND RECOMMENDATION:

I. PROJECT DESCRIPTION

The NMFS proposes a small-scale test of a pulse power device intended to deter sea lion depredation on sport fishing charter boats. The test would occur offshore of the cities of San Diego and Imperial Beach and last for a period not to exceed five months. NMFS describes the proposed project as follows:

Under this alternative, a limited experimental test of the PPD [Pulse Power Device] would be conducted aboard an actively fishing CPFV [commercial passenger fishing vessel] off southern California. The test would take place over a series of approximately 327 vessel cruises: one-third of the cruises would involve a vessel with the PPD installed (~109 trips) and the other two-thirds would be aboard control vessels (~218 trips), operating in the same area but without the PPD. Trained field technicians on the test vessel would operate the PPD and serve as on-board observers to collect data on shipboard fishing activities and effectiveness of the device. The duration of the test period would be

kJ. The arc creates an omni-directional pulse wave. The pulse frequency ranges from 2.43 kHz to 98 kHz, with a median value of 11.2 kHz. (At these levels, the sound is considered to be high frequency.)

In developing its alternatives, NMFS estimated exposure levels at various distances from the source in order to determine the distance from the source where received levels would reach 180 dB_{RMS} re 1μPa (the "safety zone"). The 180 dB level was recommended by acoustic experts as the maximum level of exposure for marine mammals exposed to high energy impulsive sound sources (airguns) during seismic exploration surveys. The volume of the pulse would be at the 180 dB re 1μPa level at 200 meters (656.2 Feet) using the 1.34 kJ power setting on the device. At the 1.8 kJ power setting, the safety zone of 180 dB re 1μPa would be reached at 262 meters (859.6 feet) from the source. The NMFS provides the following table to illustrate the sound pressure levels and energy flux density of the pulse at various distances:

Table 1. Sound pressure levels (dB_{RMS} re 1μPa) calculated for source energy versus distance.

Meters from Source	SPL @1.34 kJ (dB _{RMS} re 1μPa) ¹	SPL @1.8 kJ (dB _{RMS} re 1μPa) ²
1	235	233
5	218	219
10	211	213
15	207	210
20	204	207
30	200	204
50	194	199
70	191	196
90	188	193
100	187	192

¹From Equation 8 in Greeneridge (1998a)

²From Equation 6 in Greeneridge (1998a)

³From Equation 4 in Greeneridge (1998a)

⁴From Equation 2 in Greeneridge (1998a)

The 180 dB re 1μPa protective buffer would be used for all non-target marine mammals and sea turtles. In other words, if any marine mammal, other than sea lions, comes within 200 meters (656.2 feet) at the 1.34 kJ power level or 262 meters (859.6 feet) at the 1.8 kJ power level, NMFS would turn off the device. The sea lions, however, would be exposed to significantly higher volumes. The sea lions would be exposed to a sound pressure level of 205 dB re 1μPa, 18 meters (59.1 feet) from the device at the 1.34 kJ power level and 26 meters (85.3 feet) at 1.8 kJ.

III. FEDERAL AGENCY'S CONSISTENCY DETERMINATION

The National Marine Fisheries Service has determined the project to be consistent to the maximum extent practicable with the California Coastal Management Program.

IV. STAFF RECOMMENDATION

The staff recommends that the Commission adopt the following motion:

I move that the Commission adopt the revised findings in support of the Commission's action on December 12, 1999, concerning CD-102-99.

Staff recommends a **YES** vote on the motion. Passage of this motion will result in the adoption of revised findings as set forth in this staff report. The motion requires a majority vote of the members from the prevailing side present at the February **, 1999 hearing, with at least three of the prevailing members voting. Only those Commissioners on the prevailing side of the Commission's action are eligible to vote on the revised findings.

V. ADOPTED RESOLUTION

The Commission hereby **objects** to the consistency determination made by the National Marine Fisheries Service for the proposed project, finding that: (1) the project is not consistent to the maximum extent practicable with the California Coastal Management Program; and (2) the consistency determination for the proposed project does not contain enough information to evaluate the project's consistency with the California Coastal Management Program.

VI. CONSISTENT TO THE MAXIMUM EXTENT PRACTICABLE

Section 930.32 of the federal consistency regulations provide that:

The term "consistent to the maximum extent practicable" describes the requirement for Federal activities including development projects directly affecting the coastal zone of States with approved management programs to be fully consistent with such programs unless compliance is prohibited based upon the requirements of existing law applicable to the Federal agency's operations. If a Federal agency asserts that compliance with the management program is prohibited, it must clearly describe to the State agency the statutory provisions, legislative history, or other legal authority which limits the Federal agency's discretion to comply with the provisions of the management program.

The Commission recognizes that the standard for approval of Federal projects is that the activity must be "consistent to the maximum extent practicable" (Coastal Zone Management Act Section 307(c)(1)). This standard allows a federal activity that is not fully consistent with the CCMP to proceed, if compliance with the CCMP is "prohibited [by] existing Federal law applicable to the Federal agency's operations"

- D. **Shock Wave.** Redesign the project to remove the shock wave component from the pulse power device.
- E. **Sound Pressure.** Redesign the proposed test so that no marine mammal is exposed to sound levels greater than 180 dB re 1 μ Pa.

VIII. NECESSARY INFORMATION:

Section 930.42(b) of the federal consistency regulations (15 CFR Section 930.42(b)) requires that, if the Commission's objection is based on a lack of information, the Commission must identify the information necessary for it to assess the project's consistency with the CCMP. That section states that:

If the State agency's disagreement is based upon a finding that the Federal agency has failed to supply sufficient information (see Section 930.39(a)), the State agency's response must describe the nature of the information requested and the necessity of having such information to determine the consistency of the Federal activity with the management program.

As described fully in the habitat and recreation sections below, the Commission has found this consistency determination to lack the necessary information to determine if the proposed project is consistent with Sections 30230, 30240, and 30220 of the Coastal Act. In order to evaluate the project's consistency with the CCMP, the Commission needs the following information:

- A. Provide the Commission with a published scientific study that is generally accepted by the scientific community that evaluates the appropriate physiological and behavioral responses to the pulse power device (or a pulsed sound of similar frequency and duration).
- B. Provide the Commission with adequate evidence that demonstrates that the pulse power device will not interfere with recreational fishing or redesign the proposed small scale test to include analysis of the pulse power device's effect on physiological or behavioral responses of fish and associated effects on recreational fishing resources.
- C. Provide the Commission with additional information on the relationship between salmonids declines and increases in sea lion population and predation.

IX. FEDERAL AGENCY RESPONSIBILITY

Section C(a)(i) of Chapter 11 of the CCMP requires federal agencies to inform the Commission of their response to a Commission objection. This section provides that:

If the Coastal Commission finds that the Federal activity or development project ... is not consistent with the management program, and the

1. **Marine Mammals.** Marine mammals rely on sound for communication, orientation, and detection of predators and prey. In reviewing the Navy's "LFA" research (Phases I and II, CD-95-97 and CD-153-97 respectively), the Commission noted: (1) the growing evidence that anthropogenic sounds can disturb marine mammals (Richardson et al. 1995); (2) that observed mammal responses to such sounds include silencing, disruption of activity and movement away from the source; and (3) that sound carries so well underwater that animals "have been shown to be affected many tens of kilometers away from a loud acoustic source." The Commission agreed with the Navy in reviewing those research projects that there was a critical need for continuing research to expand the knowledge base concerning human noise impacts on marine mammals.

In its consistency determination the NMFS analyzed potential acoustic effects on a variety of marine mammals and sea turtles in the Southern California Bight. The NMFS describes the types of species that can be found in the area as follows:

*At least 26 species of odontocetes have been identified from sightings or strandings in southern California (Bonnell and Dailey, 1993). Of this total, eight species can generally be found in moderate or high numbers either year-round or during annual migrations into or through the area. These include the Dall's porpoise (*Phocoenoides dalli*), Pacific white-sided dolphin (*Lagenorhynchus obliquidens*), Risso's dolphin (*Grampus griseus*), bottlenose dolphin offshore stock (*Tursiops truncatus*), short-beaked and long-beaked common dolphins (*Delphinus delphis* and *D. capensis*), the northern right whale dolphin (*Lissodelphis borealis*), and the Cuvier's beaked whale (*Ziphius cavirostris*).*

...

*Of the total number of cetaceans that have been identified from strandings and sightings in southern California, there are seven species of mysticetes [Blue whale (*Balaenoptera musculus*), Fin whale (*Balaenoptera physalus*), Gray whale (*Eschrichtius robustus*), Humpback whale (*Megaptera novaeangliae*), Minke whale (*Balaenoptera acutorostrata*), Northern right whale (*Eubalaena glacialis*), and Sei whale (*Balaenoptera borealis*). Only one of these species, the gray whale (*Eschrichtius robustus*) has been found in moderate to high numbers and is the only one of the mysticetes that is not listed as a strategic stock under the MMPA.*

...

*Four pinniped species are found regularly in southern California, and one additional species, the Guadalupe fur seal (*Arctocephalus townsendi*), is seen occasionally. Of the four regularly-occurring species, only one species, the California sea lion, is common throughout offshore waters throughout the year. Large numbers of northern*

Nevertheless, as noted in the HESS guidelines mentioned above (and attached as Exhibit 3], any received level above 180 dB may raise cause for concern and warrant the need for monitoring and avoidance measures. In addition, the fact that the proposed survey is partly located within the coastal zone, combined with the fact that it triggers the need for National Marine Fisheries Service (NMFS) "take" permit under the Marine Mammal Protection Act (MMPA),² mean that the survey would clearly affect the coastal zone and needs to be carefully reviewed by the Commission for marine resource impacts.

The pulse power device would discharge a brief sound pulse that is in the order 235 dB re 1 μ Pa at its sources. In order to protect the sea lions from temporary or permanent hearing impairment (known as temporary threshold shift or TTS and permanent threshold shift or PTS), NMFS proposes a zone around the sound source that would trigger turning off the device if a sea lion enters it. According to NMFS, the zone would protect the sea lions from being exposed to sound pressure levels above 205 dB re 1 μ Pa. This protective sound pressure level is higher than the 180 dB re 1 μ Pa level recommended in the HESS guidelines and that which has been generally accepted by the Commission. The purpose of this threshold is to protect marine mammals from behavioral and physiological impacts from human induced sound pressure levels. The propose project will expose sea lions to sound pressure levels higher then that recommended by HESS and, as such, is likely to cause temporary and possibly permanent hearing damage.

In its environmental assessment, NMFS justifies this sound pressure level exposure in this case because it believes that the pulse nature of the sound increases the pressure level at which temporary or permanent damage is caused. Specifically, in its environmental assessment, NMFS states that:

Many studies of the effects of strong airborne noise pulses on human hearing have been done (Kryter, 1985 in Richardson et al., 1995) and most were based on TTS, assuming that noise pulses causing substantial TTS have some risk of causing PTS. From these data, human Damage Risk Criteria (DRC) were developed for airborne impulse noise. The basic criterion specifies the maximum permissible peak pressure during exposure to 100 impulses over an interval of at least 4 minutes on one day. The study found that the DRC diminished by 2 dB re 20 μ Pa for each doubling of pulse duration. In addition, a study by Johnson (1968) investigated the effect of signal duration on

² For purposes of NMFS review under The Marine Mammal Protection Act of 1973 (MMPA) and, for endangered marine mammals, the Endangered Species Act (ESA) of 1973, and their respective amendments, which prohibit taking (including harassment, harm, and mortality), unless under permit or authorization or exempted from the provisions of these Acts.

harbor seal, two California sea lions, and one northern elephant seal to pure tone signals (500 ms duration) that lasted a total of 20-22 minutes. Test frequencies ranged from 100 Hz to 2000 Hz and octave-band exposure levels were approximately 60-75 dB sensation level (at center frequency). Following exposure, the harbor seal showed an average threshold shift of 4.8 dB, one sea lion showed an average threshold shift of 4.9 dB, and the elephant seal experienced an average threshold shift of 4.6 dB. Recovery to baseline threshold levels was observed within 24 hours. Because the PPD emits shorter sound signals (<500 msec versus 500 msec) with less duration (one pulse every 10 seconds versus many pulses in a 20-22 minute period) and has different sound specifications (higher frequencies, non-pure tone) than those used in the Kastak et al. (1999) experiment, it would be difficult to extrapolate the results to the proposed PPD test. The only other information on noise-induced TTS or PTS for pinnipeds is for a harbor seal, who was intermittently exposed to an airborne noise and suffered TTS for one week (Kastak and Schusterman, 1996). Since the PPD will be operated underwater, the results and sound characteristics used would be difficult to extrapolate.

For seismic surveys, NMFS (1995) concluded that there would be no hearing damage or TTS to pinnipeds in the water if the received level of seismic pulses did not exceed 190 dB re 1 μ Pa. This criterion was based on exposure to low frequency sound signals, and has been used in several recent seismic monitoring and mitigation programs (e.g. NMFS, 1995, 1997). In addition, this 190 dB re 1 μ Pa criterion for pinnipeds was supported by marine mammal and acoustics experts at NMFS' 1998 acoustic criteria workshop. Pinnipeds, like odontocetes, hear better at higher frequencies (the elephant seal is an exception - it hears better at low frequencies). Seals and sea lions have thresholds of roughly 60 to 80 dB (re 1 μ Pa) in the range of best hearing. In particular, phocids have lower thresholds and a wider frequency range of hearing than otariids. Below about 30-50 kHz, the hearing threshold of phocid seals is essentially flat down to at least 1 kHz, and ranges between 60 and 85 dB re 1 μ Pa. The high frequency cut-off for these true seals is around 60 kHz, based on the species tested. In contrast, the high frequency cut-off for eared seals is 36-40 kHz. The fur seal hearing is most sensitive, ~60 dB re 1 μ Pa, between 4 and 17-28 kHz, where as the California sea lion is apparently the most sensitive, ~80 dB, at 2 and 16 kHz (in Richardson et al., 1995).

Using the DRC developed for hearing on humans in air, as described above for odontocetes, the DRC for pinnipeds exposed to 100 pulses in one day emitted by the pulsed power generator might be 224-244 dB_{RMS} re 1 μ Pa (164 dB+ 60-80 dB re 1 μ Pa (hearing threshold for pinnipeds at moderate to high frequencies) = 224-244 dB re 1 μ Pa).

Based on the most recent study by Ridgway (unpublished), two species of odontocetes, which are significantly more sensitive to high frequency sounds (10-100 kHz, the dominant frequencies of the PPD) compared to eared seals (~40-60 dB for belugas and bottlenose dolphins compared to ~80-140 dB for California sea lions, pp. 209 and 212 in Richardson et al., 1995), experienced no TTS when exposed to peak pressure levels of 217 dB re 1 μ Pa (222 dB re 1 μ Pa peak-to-peak). At 18-26m, California sea lions may be exposed to 218 dB re 1 μ Pa peak-to-peak sound pressure levels. Because sea lions are less sensitive to higher frequency sounds than odontocetes, and based on Ridgway's most recent study, it is highly unlikely that California sea lions will experience TTS.⁴

The environmental community has raised concerns about drawing conclusions on the effects of the pulse power device on sea lions based on a study of odontocetes. In their responses (Exhibits 4 and 5), they raise concerns with respect to the ability of the sea lion's physiology to protect the animal from the higher levels of sound. They use a study by Dr. Kastak et al. (1999) that they believe demonstrates that the sea lions lack some physiological attributes that other marine mammals have that protect them from noise impacts. Without these protections, the sea lions' susceptibility to TTS may be much lower than the generally agreed upon level of 180 dB re 1 μ Pa. Specifically, the Natural Resources Defense Council states that:

However willing NMFS may be to speculate with data derived from other species, it dismisses the only published study on auditory injury in California sea lions. That study found that temporary threshold shift, or deafness, occurred in sea lions exposed to noise of "moderate intensity and duration." A series of ... tones lasting 20-22 minutes was shown to induce deafness at 60-75 dB above the animal's natural threshold of hearing (perhaps as low as 140 dB re 1 μ Pa), leading the researchers to conclude that their subjects "clearly... do not have mechanisms that protect against noise-induced hearing loss," as some in the scientific community believed.⁵ Allowing for differences between impulsive and continuous noise, these findings indicate that sea lions and other pinnipeds may be more vulnerable to hearing loss than was previously thought, putting even the 180 dB "safety zone" into question.⁶

In evaluating the information submitted by the NMFS and the environmental community, the Commission is unable to clearly conclude that the proposed test will

⁴ Attachment to Email from Christina Faye, NMFS, to James Raives, California Coastal Commission, November 12, 1999.

⁵ D. Kastak, R.J. Schusterman, B.L. Southall, & C.J. Reichmuth, Underwater temporary threshold shift induced by octave-based noise in three species of pinniped, *Journal of the Acoustical Society of America* 106 (1999): 1142, 1148.

⁶ Letter From Joel Reynolds, Senior Attorney, NRDC to Members of the California Coastal Commission, October 28, 1999.

area. In order to supplement the on board professionals, NMFS proposes to use the clients of the fishing vessel to help monitor for animals. However, the clients are untrained and may have a vested interest in keeping the device on.

Finally, the Commission is concerned about NMFS' proposal to test this device in the spring (April-May). This period coincides with northerly migration of the gray whale. During this migration period, the gray whale calves are migrating with their mothers as they head north. Gray whale calves make clicking sounds at frequencies between .01 and 20 kHz.⁷ The pulse power device generates sounds at 2.43 kHz to 98 kHz. At these frequencies, it is possible for the pulse power device to interfere with gray whale calves' communication. Additionally, it is reasonable to assume that the calves can hear at these frequencies, and thus the device could potentially affect the hearing of gray whale calves. Although the Commission does not have conclusive information to conclude that the device will have an adverse effect on the gray whale calves, there is an easy alternative to avoiding any potential for effect, which is to avoid testing the device during the spring migration. Such a restriction would still allow NMFS to proceed with the tests between July and September. Since this potential effect can be avoided, the Commission finds that testing during the gray whale migratory period does not avoid disturbances to the gray whale and the project is not consistent with Sections 30230 and 30240 of the Coastal Act.

In conclusion, the Commission finds that the NMFS has not made sufficient commitments for monitoring and protecting the gray whales from testing of the pulse power device. Without such commitments, the Commission cannot find that the activity protects sensitive marine species in a manner required by Sections 30230 and 30240 of the Coastal Act.

4. **Shock Waves.** The pulse power device produces a shock wave in addition to the sound wave. The NMFS describes the shock wave as follows:

When operated, the PPD emits a pulse with a very fast rise time and a combination of a shock wave followed by an acoustic wave. Because of this unique pulse signature, pulses from the PPD, though much less intense (see section 4.3.4), can be compared to the pressure pulses of a small explosive.

...

The shock from an explosion shows an instantaneous rise in pressure to a maximum value and then decays exponentially. The shock wave carries about half the energy of the explosion and propagates spherically at speeds greater than the conventional 1500 m/s (Medwin and Clay, 1998). The shock front, however, always travels more slowly

⁷ *Marine Mammals and Noise*, Richardson et al., Academic Press, San Diego, 1995, p. 162.

significant disruption, and the Commission finds that the proposed project is not consistent with the Marine Resource Policies of the CCMP.

B. Recreational Fishing Resources. The Coastal Act protects the recreational fishing. Section 30220 of the Coastal Act provides that:

Coastal areas suited for water-oriented recreational activities that cannot readily be provided at inland water areas shall be protected for such uses.

Section 30234 provides that:

Facilities serving the commercial fishing and recreational boating industries shall be protected and, where feasible, upgraded. Existing commercial fishing and recreational boating harbor space shall not be reduced unless the demand for those facilities no longer exists or adequate substitute space has been provided. Proposed recreational boating facilities shall, where feasible, be designed and located in such a fashion as not to interfere with the needs of the commercial fishing industry.

Section 30234.5 provides that:

The economic, commercial, and recreational importance of fishing activities shall be recognized and protected.

The purpose of the proposed project is to protect chartered fishing boat activities from economic impacts associated with sea lion depredation of caught fish and bait. The NMFS proposes to investigate the pulse power device as a non-lethal deterrent. The NMFS describes the current effect that sea lions are having on the chartered fishing boats as follows:

The recreational marine fishing industry is an important economic asset in California, estimated to be a \$536 million business in southern California, according to the CDFG [California Department of Fish and Game] (Beeson and Hanan, 1996). Anglers fish year-round from jetties, piers, beaches, shores, private boats and CPFVs [commercial passenger fishing vessel]. Sport anglers pay a fee to ride and fish from CPFVs because these vessels provide the best opportunity for the average angler to catch a variety of fish species.

Interviews with fishers, reports from state fishing logbooks, and reports to NMFS indicate that California sea lions are negatively impacting CPFV fishing operations, both economically, and socio-economically. Sea lions directly affect CPFV fishing by consuming bait and chum and depredating fish (partially eating fish, rendering them useless for selling or consumption purposes) that have been hooked and are being reeled in (Miller et al., 1983). Typically, during sea lion depredation, the angler

although rockfish, mackerel, kelp fish and barred seabass were also taken (Beeson and Hanan, 1996).

Based on the discussion above and supporting letters from recreational fishing interests (Exhibit 6), NMFS has concluded that sea lions present a significant economic impact to this type of recreational fishing. NMFS also believes that if the proposed device deters sea lions, prevents habituation, and does not harm the sea lions, it would provide an acceptable non-lethal method for improving recreational fishing. However, the significance of the economic impact that sea lions have on recreation fishing is questionable. According to NMFS, recreational fishing is a \$536 million industry. The NMFS uses the commercial value of the fish to estimate the economic impact from the sea lions. The NMFS estimates this impact to be \$145 thousand or 0.03% of the recreational fishing industry. Based on these figures, it does not appear that the sea lions are having a significant economic impact. However, the Commission believes that the use of the commercial value of the fish caught on the charter boats does not represent the economic cost of the sea lions. Since the fish caught on these vessels are not sold commercially, the NMFS must show that the sea lions are causing a reduction in charter boat passengers in order to demonstrate an economic impact. Without this type of evidence, the Commission cannot conclude that the proposed project is necessary to protect the recreational fishing industry.

NMFS also believes (which is also supported by comment letters from fishing interests) that the sea lions are interfering with the recreational value of this fishing activity. If the proposed device is effective and the sea lions do not habituate to it, the pulse power device could benefit this recreational resource by deterring sea lion depredation. However, the NMFS has not provided the Commission with any analysis of the device's effect on fishing. As described above, the pulse power device will emit both a sonic and shock wave. It is possible that these energy waves will scare fish away from the fishing boats and interfere with fishing. In its environmental assessment, the NMFS does not analyze the project's adverse effect on recreational fishing. Without this information, the Commission cannot evaluate the project's consistency with the CCMP. Therefore, the Commission finds that the consistency determination for the proposed project does not contain enough information to evaluate it for consistency with the recreational fishing policies of the CCMP.

C. Recreational Diving. The proposed experiment would occur in an area that is also popular for recreational scuba diving. The Coastal Act protects this resource. Section 30220 of the Coastal Act provides that:

Coastal areas suited for water-oriented recreational activities that cannot readily be provided at inland water areas shall be protected for such uses.

In its environmental assessment, the NMFS proposes the following mitigation for potential impacts to recreational diving:

ATTACHMENT 1
PROPOSED FINDINGS WITH CHANGES
IDENTIFIED

exposed to a sound pressure level of 205 dB re 1 μ Pa, 18 meters (59.1 feet) from the device at the 1.34 kJ power level and 26 meters (85.3 feet) at 1.8 kJ.

In order to protect marine species, NMFS proposes to hire two technicians to operate the pulse power device and function as marine mammal observers. The observers would also gather data for the experimental trial, including vessel position, time of day, ambient weather conditions, water depth, water temperature, sea state, and other appropriate environmental and physical parameters of the fishing location. In addition, observers would record the number of anglers participating, the time spent fishing at the location, and the number and species of fish caught by anglers. Observers would also record the number and time of sea lions seen farther than 100 meters from the boat and within 100 meters of the boat (defined as an "interaction"). Additionally, the observers would note the number and time of sea lions seen within the protective buffer zone. Observers would record "depredation," defined as a sea lion removing a fish from a fishing line or a sea lion consuming or destroying a fish at the surface following a suspected depredation event. If possible, the observer would record the number and species of fish lost to sea lions.

In order to mitigate any potential effects, NMFS proposes the following measures:

1. The device will be turned off when sea lions come within the pre-determined protective buffer zone.
2. The device will be turned off when any non-target marine mammals or sea turtles are within their pre-determined protective zone.
3. The device will not be turned on near marine mammal rookeries or when weather conditions do not permit adequate monitoring of marine mammal protective buffer zones or collection of data (a Beaufort rating of 4 or greater).
4. The device will not be turned on if dive flags are in the vicinity.

In addition, NMFS has modified its project to address some of the concerns raised by the Commission. These modifications include the following: (1) only testing the device when weather, sea state, and light conditions allow visual monitors to see non-target marine mammals within the protective buffers, 200 meters (656.2 feet) at the 1.34 kJ power level or 262 meters (859.6 feet) at the 1.8 kJ power level; and (2) will use three monitors to identify target and non-target marine animals.

II. STATUS OF LOCAL COASTAL PROGRAM

The standard of review for federal consistency determinations is the policies of Chapter 3 of the Coastal Act, and not the Local Coastal Program (LCP) of the affected area. If the Commission certified the LCP and incorporated it into the CCMP, the LCP can provide guidance in applying Chapter 3 policies in light of local circumstances. If the Commission has not incorporated the LCP into the CCMP, it cannot guide the Commission's decision, but it can provide background information.

~~1. The use of at least two people to monitor for marine animals at any one time, in addition to the person responsible for equipment operation and the person responsible for data collection.~~

~~2. The use of equipment, such as passive sonar, underwater cameras, and aerial surveys, to supplement the visual monitoring.~~

~~B. Timing. The testing of the pulse power device should not occur during nights or in weather conditions where visibility is less than the minimum distance need to view the entire marine mammal buffer zone.~~

C.B. Recreational Diving. Provide maps identifying the location of any regularly used dive area and commit to avoiding testing the pulse power device in the vicinity of those dive areas or at any time when divers may be present.

D.C. Gray Whales. Redesign the project to limit testing of the proposed pulse power device during NMFS' proposed testing period of July through September, which would avoid testing during the gray whale migration period.

D. Shock Wave. Redesign the project to remove the shock wave component from the pulse power device.

E. Sound Pressure. Redesign the proposed test so that no marine mammal is exposed to sound levels greater than 180 dB re 1 μ Pa.

VIII. NECESSARY INFORMATION:

Section 930.42(b) of the federal consistency regulations (15 CFR Section 930.42(b)) requires that, if the Commission's objection is based on a lack of information, the Commission must identify the information necessary for it to assess the project's consistency with the CCMP. That section states that:

If the State agency's disagreement is based upon a finding that the Federal agency has failed to supply sufficient information (see Section 930.39(a)), the State agency's response must describe the nature of the information requested and the necessity of having such information to determine the consistency of the Federal activity with the management program.

As described fully in the habitat and recreation sections below, the Commission has found this consistency determination to lack the necessary information to determine if the proposed project is consistent with Sections 30230, 30240, and 30220 of the Coastal Act. In order to evaluate the project's consistency with the CCMP, the Commission needs the following information:

A. Provide the Commission with a published scientific study that is generally accepted by the scientific community that evaluates the appropriate physiological and behavioral responses to the pulse power device (or a pulsed

that observed mammal responses to such sounds include silencing, disruption of activity and movement away from the source.

Additionally, the Commission recently objected to a consistency determination by the U.S. Geological Survey (USGS). In objecting to that USGS project, the Commission used the High Energy Seismic Survey (HESS) guidelines for its review of potential impacts to marine mammals (Exhibit 3). In the findings for the USGS project, the Commission stated that:

Nevertheless, as noted in the HESS guidelines mentioned above (and attached as Exhibit 3), any received level above 180 dB may raise cause for concern and warrant the need for monitoring and avoidance measures. In addition, the fact that the proposed survey is partly located within the coastal zone, combined with the fact that it triggers the need for National Marine Fisheries Service (NMFS) "take" permit under the Marine Mammal Protection Act (MMPA),² mean that the survey would clearly affect the coastal zone and needs to be carefully reviewed by the Commission for marine resource impacts.

The pulse power device would discharge a brief sound pulse that is in the order 235 dB re 1 μ Pa at its sources. In order to protect the sea lions from temporary or permanent hearing impairment (known as temporary threshold shift or TTS and permanent threshold shift or PTS), NMFS proposes a zone around the sound source that would trigger turning off the device if a sea lion enters it. According to NMFS, the zone would protect the sea lions from being exposed to sound pressure levels above 205 dB re 1 μ Pa. This protective sound pressure level is higher than the 180 dB re 1 μ Pa level recommended in the HESS guidelines and that which has been generally accepted by the Commission. The purpose of this threshold is to protect marine mammals from behavioral and physiological impacts from human induced sound pressure levels. In other words, The propose project will expose the sea lions may be exposed to sound pressure levels higher then that recommended by HESS and, as such, is likely to ~~that may~~ cause temporary and possibly permanent hearing damage.

In its environmental assessment, NMFS justifies this sound pressure level exposure in this case because it believes that the pulse nature of the sound increases the pressure level at which temporary or permanent damage is caused. Specifically, in its environmental assessment, NMFS states that:

² For purposes of NMFS review under The Marine Mammal Protection Act of 1973 (MMPA) and, for endangered marine mammals, the Endangered Species Act (ESA) of 1973, and their respective amendments, which prohibit taking (including harassment, harm, and mortality), unless under permit or authorization or exempted from the provisions of these Acts.

the pulse power device would be turned off. In past projects (CD-109-98 (Navy ADS) and CD-32-99 (USGS Seismic testing)), the Commission has accepted buffer zones to protect these sensitive species provided that there was adequate monitoring to ensure protection of the animals. In this case, however, the proposed monitoring is inadequate to ensure that the animals would be identified and the equipment turned off before they are exposed to damaging sound levels. It appears that NMFS proposes to use visual monitoring as the only tool to detect non-target animals within the buffer area. Specifically, Although NMFS proposes to place two three trained persons on the vessel to monitor for marine animals, it is not proposing any other means to identify species that are not otherwise visible to the human eye. ~~On of these people would be responsible for operating the pulse power device and the other's duties include monitoring for non-target species, monitoring for sea lions, identifying the number, type, and condition of the fish species that are caught, and collecting data on weather, sea state, and location. It is not possible for one person to simultaneously complete all of these tasks.~~ In addition, the Commission is concerned that it will be difficult for the observers to distinguish between different species of pinnipeds. This is an important concern, if the information from the Humane Society is correct and the Guadalupe fur seal is expanding its range into this area. In order to supplement the on board professionals, NMFS proposes to use the clients of the fishing vessel to help monitor for animals. However, the clients are untrained and may have a vested interest in keeping the device on.

~~The HESS guidelines recommend the marine mammal monitoring to be conducted by at least two people or three people if they are also responsible for collecting other data. The HESS report also recommends the use of other equipment to monitor for these animals. These monitoring protocols were developed for geologic surveys where the sound source is towed behind the boat and one person can see the entire buffer zone from the stern of the boat.~~

~~With respect to the proposed project, NMFS would use one monitor without any additional equipment to supplement the visual monitoring. That monitor would also be responsible for several other tasks that would compete with its responsibility to monitor for marine mammals. In addition, the monitor would not be using any equipment to detect non-target (or even target) species underwater. Additionally, the sound source is under the boat and the vessel is in the center of the buffer zone. The pulse power device could be used while an undetected animal is underwater and within the 180 dB re 1 μ Pa range. In addition, although NMFS has made a commitment not to use the pulse power device when weather conditions effect visibility, it defines such a state through the use of a Beaufort rating. However, a Beaufort rating is a description of the sea state and does not reflect visual conditions. Therefore, NMFS could test the device when visibility is poor and still be consistent with their commitment. Finally, NMFS does not make any commitment to avoid testing the device during the nighttime. Although the Commission believes that it is unlikely that these chartered fishing boats to fish at night, without a commitment from the NMFS, there is always a possibility that the device would be operated at night.~~

the ambient noise (Gaspin, J., NWSC, Indian Head, MD, July, 1999). In addition, the rise time of the pulse is extremely brief compared to that of an airgun array or other nonexplosive seismic source. The rapidity of the pressure increase (change in amplitude as a function of time) is related to the extent of biological injury (Richardson et al., 1995) and must be considered in any analysis of shock wave impacts.

The biological impact from such a pressure wave occurs from the interaction of soft tissue and hard tissue (i.e. muscle and bone) and to gas filled organs, such as lungs and air bladders. In evaluating this impact, NMFS concludes that the shock wave pulse power device would not affect fish, marine mammals, birds, or sea turtles. In its environmental assessment, NMFS states that:

...the impulse pressures produced by the PPD would be lower, at a given distance, than the impulse pressures produced by a standard seal bomb and substantially below the impulse pressure produced by a seismic airgun. Furthermore, the impulse pressure produced by the PPD at the 1.8 kJ setting (17 Pa-sec) would fall well below the 35 Pa-sec criteria considered to be safe as estimated for terrestrial animals exposed to underwater blasts (Yelverton 1981). (Yelverton et al. (1981) estimates that a safe level (i.e. no injury) for source impulse strength to range from 26 Pa-s for a very small mammal to 210 Pa-s for a large mammal.)

Based on the information submitted by NMFS, it appears that the shock wave discharged by the pulse power device would not significantly harm marine organisms. The Commission disagrees with the conclusions of NMFS. The shock wave has a potential to cause serious damage to animals exposed to this device. Damage could be caused to muscle as it is forced by the pressure wave against bone. Additionally, the shock wave could damage lungs and ears of marine mammals and sea turtles and damage air bladders of fish. Finally, the Commission is concerned that the shock wave will have a cumulative or synergistic effect on exposed animals when combined with the intense sound pressure level emitted from the device. Therefore, the Commission finds that the shock wave will degrade marine resources and adversely affect species of biological significance, and thus is inconsistent with the Marine Resource policies of the Coastal Act.

the San Diego charterboat fleet experienced sea lion depredation (at least one fish taken by a sea lion per trip) throughout the year, ranging from 7 % in February to a high of 38 % of the trips taken in April. The highest percentage of depredated trips occurred from March through May. California barracuda comprised the highest percentage of fish species taken by sea lions, generally during the spring and summer, although rockfish, mackerel, kelp fish and barred seabass were also taken (Beeson and Hanan, 1996).

~~From the evidence submitted by the NMFS~~ Based on the discussion above and supporting letters from recreational fishing interests (Exhibit 6), ~~it appears~~ NMFS has concluded that sea lions present a significant economic impact to this type of recreational fishing. NMFS also believes that if the proposed device deters sea lions, prevents habituation, and does not harm the sea lions, it would provide an acceptable non-lethal method for improving recreational fishing. However, the significance of the economic impact that sea lions have on recreation fishing is questionable. According to NMFS, recreational fishing is a \$536 million industry. The NMFS uses the commercial value of the fish to estimate the economic impact from the sea lions. The NMFS estimates this impact to be \$145 thousand or 0.03% of the recreational fishing industry. Based on these figures, it does not appear that the sea lions are having a significant economic impact. However, the Commission believes that the use of the commercial value of the fish caught on the charter boats does not represent the economic cost of the sea lions. Since the fish caught on these vessels are not sold commercially, the NMFS must show that the sea lions are causing a reduction in charter boat passengers in order to demonstrate an economic impact. Without this type of evidence, the Commission cannot conclude that the proposed project is necessary to protect the recreational fishing industry.

~~However, the data provided by the NMFS indicates~~ also believes (which is also supported by comment letters from fishing interests) that the sea lions are interfering with the recreational value of this fishing activity. If the proposed device is effective and the sea lions do not habituate to it, the pulse power device could benefit this recreational resource by deterring sea lion depredation. However, the NMFS has not provided the Commission with any analysis of the device's effect on fishing. As described above, the pulse power device will emit both a sonic and shock wave. It is possible that these energy waves will scare fish away from the fishing boats and interfere with fishing. In its environmental assessment, the NMFS does not analyze the project's adverse effect on recreational fishing. Without this information, the Commission cannot evaluate the project's consistency with the CCMP. Therefore, the Commission finds that the consistency determination for the proposed project does not contain enough information to evaluate it for consistency with the recreational fishing policies of the CCMP.

C. Recreational Diving. The proposed experiment would occur in an area that is also popular for recreational scuba diving. The Coastal Act protects this resource. Section 30220 of the Coastal Act provides that: