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October 13, 2004

Mr. Donald Hansen, Chairman
Dr. Donald McIsaac, Executive Director
Pacific Fishery Management Council
7700 NE Ambassador Place, Suite 200
Portland, OR 97220-1384

Dear Chairman Hansen and Dr. McIsaac:

Thank you for your commitment to assess a comprehensive approach to meet the Sustainable Fisheries Act's Essential Fish Habitat mandates off the Pacific coast. We appreciate the opportunity to work with you in the development of the Essential Fish Habitat Environmental Impact Statement that will be used to build a preferred alternative to protect and conserve ocean habitat while maintaining vibrant fishing opportunities.

We will be submitting supplemental materials describing our Comprehensive Alternative before the November Council meeting. A brief description of this Comprehensive Alternative is provided below. Unfortunately, circumstances have precluded us from providing a fuller description and analysis at this time.

As you know, members of the public, like us, are not privy to the full suite of fishery information, and so we must rely on NOAA to analyze the data it collects, and use those analyses to construct our Comprehensive Alternative. In particular, we have had to rely on the agency for fishery effort data, even in the aggregate. NOAA Fisheries was able to provide us with preliminary economic analysis information today, but obviously we are not able to process and modify in time to make today's deadline for materials to be included in the briefing book for Council review.

In addition, and more importantly we do not have the full suite of fishery information that relates to biogenic habitat available to us. The NWFSC's *Preliminary Report on Occurrences of Structure-Forming Megafaunal Invertebrates off the West Coast of Washington, Oregon and California* (2004) was constructed using data and information from trawl surveys, observer data, and submersible dives. The information and data referenced in the report can and should be used in the development of alternatives to mitigate fishing effects on this sensitive habitat. For example, NOAA trawl surveys off the coast of Oregon document over three and a half metric tons (3,600 kg) of *Hexactinellid* glass sponges, clay pipe sponges, and other sponges in a 25 km^2 area. According to science and law, this area should receive some focus and protection. We continue to work on defining "hotspots" of biogenic habitat that warrant protection. But quite simply that is extremely difficult since we do not have the full suite of information and data.

We are frustrated that the agency is apparently uninterested in exploring ways that we suggest to use the NWFSC's available data to develop mitigation measures. In our efforts to develop ways to best use this available information, we were told by that agency that in order to analyze the data, we would have to contract privately with the GIS firm performing the EFH analyses; but the contractor would not be permitted to use the trawl observer bycatch data in any such analyses. This makes it substantially more difficult to review the actual occurrences, identify clusters of structure forming invertebrates and explore ways to use the data to address adverse impacts. Nevertheless, we will continue our efforts to do so, for your review, discussion and ultimate consideration in building a preferred alternative.

We are in this process today because the law mandates that NOAA protect habitat. Specifically, the Sustainable Fisheries Act requires NOAA to describe and identify essential fish habitat (EFH); minimize to the extent practicable adverse effects on essential fish habitat caused by fishing; and identify other actions to encourage the conservation and enhancement of such habitat. By law, essential fish habitat is defined as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. Because NOAA was not complying with federal law in satisfying these requirements, Oceana and others were forced to sue the agency and compel the EFH Environmental Impact Statement currently in progress.

If the law is the direction, science is the compass that sets the course. Concerning habitat destruction, the National Academy of Sciences, National Research Council, 2002 report *The Effects of Trawling & Dredging on Seafloor Habitat* states that bottom trawling reduces the complexity and biodiversity of seafloor habitat and is especially harmful in areas of corals and sponges. The Academy recommends three management measures to mitigate the destructive impacts of bottom trawling: closures, gear modifications, and effort reduction.

Using these guiding management principles, we developed the approach which we are now applying to the EFH EIS process on the Pacific Coast. This approach uses science by gathering and mapping all available data and information on important seafloor habitat as well as on bottom trawling fishing effort. Using this information, we then freeze the existing bottom trawling footprint, close areas within the existing footprint that have important seafloor habitat, establish bycatch caps for corals and sponges, make commensurate effort reduction, employ appropriate gear modifications, and finally, set in place ongoing research and monitoring. Thus, this scientific approach both provides information for management decisions and allows for protection of habitat while maintaining vibrant fisheries.

The approach is both necessary and timely. The Center for Independent Experts is the formalized body that provides this quality assurance for NMFS. A CIE panel comprised of internationally recognized experts with expertise in benthic ecology, fisheries oceanography, fishery biology, fisheries assessment, fishing gear technology, and biophysical modeling recently reviewed the Alaskan region habitat models and conclusions used in their EFH EIS process. The CIE report states: "A precautionary approach needs to be applied to the evaluation of fishing effects on EFH. This is especially important given that many of the stock collapses or severe declines around the world could have been avoided or lessened by following a precautionary approach." (Summary Report at 21)

Both the U.S. Commission on Ocean Policy and the Pew Oceans Commission reports state that our oceans are in peril and we need to immediately change the way we manage our oceans. The above outlined approach manages for the health of the biodiversity of the ocean ecosystem instead of for the productivity of single species money fish. It is the kind of approach we must adopt if we are to save our oceans from further decline and ultimate collapse.

Sincerely,

Jim Ayers
Director, Pacific Region

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October 13, 2004

Mr. Donald Hansen
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Dear Chairman Hansen:

At its September 15-16, 2004 meeting in San Diego, the Pacific Fisheries Management Council identified and adopted a preliminary range of alternatives for its Essential Fish Habitat [EFH] Environmental Impact Statement. These alternatives address designation of EFH and Habitat Areas of Particular Concern, minimization of adverse impacts of fishing on EFH and research and monitoring. The Nature Conservancy and Environmental Defense have put forward an alternative to minimize adverse effects of fishing on EFH [Alternative 11] in our project area; and here we attach information we believe will be useful in your analysis of this alternative during the NEPA process. In addition, we would request that the relevant portions of this information be included in the briefing book for the November PFMC meeting in Portland.

In the process of compiling data to analyze both the economic and ecological impacts of our alternative, we have discovered that much of the necessary information is either not yet available or confidential. For example, we would like to have access to NOAA Fisheries' HSP GIS data for the species and life stages that are available, so that either TNC/ED can analyze that data or have NOAA do that analysis for us. Secondly, for us to do a thorough job of determining the economic costs for fishers if certain areas are closed to bottom trawling, we need better data that reflects their preferred and traditional trawling grounds. And finally, as more information about the negative impacts of fishing gears on benthic habitats, particularly bottom trawl gear, becomes available, we would greatly appreciate you sharing that information with us as well.

Many thanks for your consideration,

Sincerely,

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Analysis of Alternative 11 to Minimize Adverse Impacts to Essential Fish Habitat: Buyout and Establishment of No-Trawl Zones off the Central California Coast

The Nature Conservancy of California
and
Environmental Defense

Chuck Cook and Mary Gleason (The Nature Conservancy)
Rod Fujita (Environmental Defense)

October 13, 2004

Analysis of Alternative 11 to Minimize Adverse Impacts to Essential Fish Habitat: Buyout and Establishment of No-Trawl Zones off the Central California Coast

The Nature Conservancy of California
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October 13, 2004

PROJECT DESCRIPTION

In July 2003, The Nature Conservancy [TNC] of California and Environmental Defense initiated exploratory discussions with participants in the bottom trawling industry (fishermen and processors) along the Central Coast of California. TNC, Environmental Defense, and many of the participants began to explore and understand how, together, we might protect benthic habitat for groundfish and move towards more sustainable fisheries, including bottom trawling, in marine waters extending from Point Conception to Sand Hill Bluff near Davenport, California (Figure 1).

The project aims to protect biodiversity and promote recovery of groundfish stocks through the establishment of large no-trawl zones in waters between Point Conception and Sand Hill Bluff. The concept that emerged is for private funders to purchase a significant majority of the bottom trawlers in the project area contingent upon a commitment from NOAA Fisheries and the Pacific Fishery Management Council to establish substantial no-trawl zones to protect high-value conservation areas within the project area. Participatory research would be conducted to take advantage of the no-trawl zones to investigate their effects on ecosystem structure and function, including groundfish population dynamics. While our mission is the protection and conservation of biodiversity, we strive to employ innovative strategies that engage stakeholders and minimize conflicts with resource users.

Project Area Description

The Central Coast project area extends from Point Conception to Davenport, California and includes the offshore seamounts (Gumdrop, Guide, Pioneer, Davidson, and Rodriguez). This area was selected because of its incredible biological diversity and ecological value. It contains nearly the full range of habitat types found on the continental shelf and slope, including estuaries, nearshore rocky reefs, kelp forests, highly diverse soft and mixed bottom habitats, deep canyons, offshore banks, and seamounts. These diverse habitat types are critical for the support of a correspondingly rich array of species, including 21 cetacean species, 6 pinniped species, 184 species of shore and sea birds, and hundreds of fish and invertebrate species. In addition, there is evidence suggesting that benthic biodiversity peaks in upwelling zones at the shelf/slope break in 200 – 300 m of water in this area.

NEED FOR ACTION

The National Academy of Sciences has stated that "…there is an extensive literature on the effects of fishing on the seafloor. It is both possible and necessary to use this existing information to more effectively manage the effects of fishing on habitat" (NRC 2002). They recommend that management of the effects of trawling should be accomplished by a combination of:

- Fishing effort reductions
- Modification of gear design or gear type
- Establishment of closed areas to fishing

Bottom-trawling has become a source of concern because of the size of the affected fishing grounds, the modification of the substrate, disturbance of benthic communities and removal of non-target species (NRC 2002).

The draft risk analysis for Pacific groundfish included an evaluation of the sensitivity of different habitat types to fishing impacts from 5 major gear types, including bottom trawling, and ranked portions of the project area, especially the slope, with the highest sensitivity ranking (2.26-3.0) and longest recovery times (Risk Assessment for the Pacific Groundfish FMP, v. 4. August 2004).

Few studies of the impacts of trawling have been conducted in the project area; however, the scientific consensus (including the expert opinion of scientists serving on the Pacific Fishery Management Council's technical advisory committee on Essential Fish Habitat, which is charged in part with assessing the impacts of fishing in federal waters off the US Pacific coast) is that inferences about the impacts of trawling in a particular place can be made from the dozens of studies of trawl impacts conducted throughout the world, with appropriate adjustments made for differences in habitat type, biota, and fishing practices. More background information is provided in an addendum to this document.

PROJECT IMPLEMENTATION

Despite some differences of opinion concerning the validity of scientific issues that have guided or misguided past management protocols, trawl fishermen, processors, TNC, and Environmental Defense have moved forward in our discussions concerning a private sector purchase of numerous federal bottom trawling permits and vessels.

TNC and Environmental Defense have a working list of fishermen who we think regularly trawl the project area (23 permit holders) and we have met with all of those owners or their representatives. Most of the fishermen home port in Morro Bay, Moss Landing, Monterey or Half Moon Bay. We are also meeting with local processors and open-access fishery representatives to gauge potential impacts on these sectors and develop solutions to address their concerns. Our project approach would be to purchase a significant majority of the bottom trawling permits and vessels in this region in exchange for a significant portion of the project

area designated as no-bottom-trawl zones. The no-trawl zones would be sited using a participatory process with the goal of maximizing conservation gains while minimizing adverse socioeconomic impacts on processors and fishermen remaining in the fishery.

It is important to note that while this project could potentially result in the establishment of large no-trawl zones, it is being considered only as a mitigation alternative. The project is site-specific and will not apply to the entire area of PFMC's jurisdiction and so should not be construed as a full EFH designation alternative. Rather, it is intended to complement a broader-scale EFH alternative with a geographic scope that is consonant with the PFMC's jurisdiction.

The following project components are being explored and discussed amongst the parties. This summary does not imply that any agreements have been reached or decisions have been made by any of the parties.

Protection of Essential Fish Habitat, Conservation of Biodiversity, and Scientific Research Objectives for the Project

The project aims to protect biodiversity and promote recovery of groundfish stocks through the establishment of large no-trawl zones in federal waters between Point Conception and Sand Hill Bluff. The no-trawl zones would include representative benthic habitats (hard, soft, and mixed substrates in several depth ranges) as well as important benthic features such as submarine canyons, sea-mounts, the shelf-slope break, and offshore reefs and banks that are important components of EFH for multiple species of groundfish and their various life stages. These no-trawl zones should comprise a significant but yet-to-be-determined percentage of the project's geographical area. This proposal aims to protect representative seafloor habitats at sites currently not impacted by bottom trawling and to allow previously trawled areas to recover.

Another important project objective is to be able to scientifically evaluate the ecosystem recovery process, if any, by monitoring, observing and documenting what happens to the benthic habitats, and the biodiversity they support, post-trawling. In discussions amongst industry participants and conservation groups, it is clear that both camps distrust the "science" of the other side and this sticking point has been a major impediment to moving forward on an acceptable management plan for groundfish. This proposal, if successful, will provide a unique "living laboratory" for scientific research opportunities aimed at objectively determining the impacts, if any, on dragging the seafloor in the Central Coast of California. Through careful siting and monitoring of replicated no–trawl zones, the scientific community and industry can address critical questions that need to be answered to guide adaptive management of marine resources.

The Nature Conservancy and Environmental Defense have Attempted to Identify the Fishermen's Objectives for the Project

While we clearly do not pretend to represent Central Coast trawlers, we have been informed about many of the fishermen's concerns with our proposal. The most frequently heard concerns include:

1. Fishermen who wish to remain in the industry are concerned that their "rights" to trawl in their fishing grounds through the establishment of designated bottom trawl zones between Point Conception and Sand Hill Bluff are protected. These areas should

comprise a yet to be determined percentage of the project area and be located in areas that can sustain their businesses financially.

2. Fishermen want to eliminate current and future contradictions and confusion between the Rockfish Closure Areas, potential Essential Fish Habitat designations, potential marine reserves and potential no-trawl zones. In other words, they wish to simplify the rules for bottom trawlers and remove some of the uncertainty going forward.

3. Fishermen want an equitable formula for valuing the permits and vessels that can be agreed upon by buyer and sellers.

4. Fishermen want flexibility in the private acquisition process by giving consideration for allowing fishers to retain their vessels for future participation in NON-bottom trawl related fisheries, especially where they already own permits for different fisheries.

5. Fishermen want readily available landings, processors, and markets to sell their fish.

Mechanism of Transactions and Potential Council Actions; Projected Timelines

There are many project components that need to be executed between the fishers and TNC/Environmental Defense, as well as by the Council and NMFS, for this private buyout endeavor to be successful. Many of these actions are explicitly linked and will require extraordinary coordination and cooperation amongst the private and government parties. Our current thinking includes the following recommended sequence of actions:

Recommended Actions	Timeline
1. PFMC chooses The Nature Conservancy/Environmental Defense proposal as a preferred mitigation alternative to be analyzed in the EFH –EIS; NOAA assists with detailed socioeconomic and ecological analysis.	November, 2004
2. The Council and NMFS work with TNC/Environmental Defense and the fishermen to establish a control date that helps identify the number of participants eligible for the private buyout. Only those fishermen with a bona fide history of trawling in the project area should be eligible.	November, 2004
3. The Council and NMFS work with TNC/Environmental Defense and the fishermen to designate a geographical project boundary for our alternative	November, 2004
4. TNC/Environmental Defense and industry participants continue discussions and negotiations on key issues of valuation and attempt to reach agreement.	Nov. – Dec., 2004
5. TNC/Environmental Defense and industry participants identify and negotiate trawl and no- trawl zones and make a joint recommendation to NMFS and the Council	Nov. – Dec., 2004
6. The Council approves the trawl and no-trawl zones contingent upon	To be determined

TNC/Environmental Defense successfully negotiating an option to purchase or contract to purchase at least 50% of the eligible permits in the project area and TNC/Environmental Defense having a proven line of credit available to close those transactions. The contracts would be required to be consummated before or soon after the no-trawl zones went into effect.	

Identification of Proposed No-Trawl Zones and Designated Trawl Zones

TNC and Environmental Defense want to work with the trawlers and the agencies to jointly develop a benthic habitat map that includes the fishermen's first hand knowledge of the seafloor and the best available information from relevant agencies and informed scientists. Constructing a map of this quality could be useful for all parties in determining EFH in the Central Coast of California. We would work with NOAA to incorporate information on habitat suitability for groundfish and other data and models developed through the EFH process.

In addition to the Greene benthic habitat dataset (Figure 2), TNC has developed a benthic habitat map based on depth, substrate type and topographic position (flats, ridges, canyons, slopes) and compiled a GIS database of important biodiversity targets in the project area for our ecoregional scale conservation planning. Through our ecoregional planning process, TNC has identified areas important for conserving elements of biodiversity such as representative benthic habitats, kelp forests, estuaries, upwelling zones, submarine canyons, seamounts, seabird colonies, and many other targets. We can overlay those important conservation areas with other information or data sources relevant to groundfish such as (Figure 3):

- Top 20th percentile fish diversity (from the NOAA biogeographic assessment)
- Top 20th percentile fish density (from the NOAA biogeographic assessment)
- Shelf-slope break (200-300m)
- Rocky substrate (from Greene)
- Bathymetric complexity (from NOAA biogeographic assessment).

TNC/Environmental Defense proposes to use both a site-selection algorithm, such as MARXAN, and expert/fisher input to identify appropriate trawl and no-trawl zones. These would be the primary inputs into a participatory, facilitated process involving TNC, Environmental Defense, trawlers willing to sell, representatives of trawlers and other sectors that would remain, and processors aimed at maximizing the conservation benefits while accommodating the varied interests of these parties, including: (1) ensuring that sufficiently productive grounds remain open to fishing; (2) minimizing the impacts of changes in fish supply on processors; (3) minimizing adverse impacts on other fishery sectors..

We do not currently have all the information needed to fully analyze this alternative. In particular, the additional data needed to identify no-trawl and trawl zones and analyze conservation and economic impacts include:

- Identification of important sites for conservation (to be compiled from expert input of regional scientists and and fishers). Regional-scale benthic maps do not adequately capture areas of biodiversity importance known from submersible dives and years spent fishing in the region.

- Habitat suitability for groundfish (NMFS models)
- Habitat sensitivity rankings and estimated recovery times for habitats in the project area (from the draft Risk Assessment)
- Identification of areas important for economic sustainability of the fishery (to be compiled from fishers)
- Trawling effort (from confidential trawling logbooks compiled by NMFS)

CONSERVATION IMPACT

Since the no-trawl zones would be sited through a participatory process aimed at minimizing socioeconomic costs and maximizing conservation benefits (and because we do not have access to confidential trawl track information), we cannot provide an accurate appraisal of these costs and benefits at this time.

Designating a significant majority of the project area as no-trawl zones would result in a significant reduction in adverse impacts to habitats important for groundfish and other species. We anticipate a high conservation impact from this alternative, if large areas of high conservation value are protected from trawling impacts, due to the abundance of important biodiversity resources in the project area.

Many economic costs will be minimized by the nature of the project (private sector buyout); we will strive to minimize other costs (e.g., to remaining trawlers, other gear sectors, and processors) through equitable siting of remaining trawlable areas.

Advantages

While this alternative was placed in the context of impacts mitigation, it also addresses other core components of the EFH-EIS process:

- Designation and Protection of Essential Fish Habitat: Identification of a large part of the shelf and slope as no-trawl zones would provide protection for EFH for several life stages of multiple species. Identification of these no-trawl areas would be accomplished in conjunction with the Council and would be based on Habitat Suitability models for groundfish and other data compiled during the EIS, fisher knowledge, and other sources of information that TNC has compiled for our ecoregional planning.
- Identification of Habitat Areas of Particular Concern (HAPCs): TNC has compiled data on representative benthic habitats, seamounts, structure-forming invertebrates, canyon heads, estuaries, kelp beds, and many other components of biodiversity and we will work with the Council and fishers to identify HAPCs as core components of the no-trawl zones.
- Minimization of Economic Impacts: TNC/Environmental Defense will use private funds to purchase permits and vessels, and will work with the Council to identify trawlable zones that would promote economic sustainability for the remainder of the fleet and the processors who buy from them.

- Reduced Conflict: The proposed buyout of willing sellers will be contingent upon a set of no-trawl zones, agreed upon through a participatory and deliberative process, potentially reducing conflict over measures to reduce the impacts of trawling in the project area at the Council level.
- Adaptive Management: The identification of trawlable and no-trawl zones in a replicated and scientific manner and the implementation of scientific studies and monitoring will provide much-needed data for adaptive management of the groundfish fishery.

Disadvantages:

Disadvantages of this alternative include:

- Incomplete geographic scope: While the project area contains important fishing grounds, this project would designate only a portion of the PFMC's area of jurisdiction (about 5%) and so does not constitute a full EFH designation and protection alternative. It should be analyzed as a mitigation alternative.

- Paucity of socioeconomic data: We anticipate that this will be rectified through confidential discussions with fishermen aimed at understanding where critically important areas for economic viability are. In addition, we anticipate that NOAA Fisheries will use existing information on trawl intensity to assist with this effort.

- Incomplete impact protection: The project focuses on reducing the impacts of bottom trawling exclusively, due to the preponderance of evidence suggesting that bottom trawling damages bottom habitats. It does not afford protection from other kinds of fishing, for which there is less empirical evidence of habitat impacts.

CONSEQUENCES

Effects on Fishery

Ecosystem recovery, increased fish size, increased fish fecundity, and increased larval survivorship due to higher egg viability may result from the establishment of no-trawl zones (provided that these benefits are not dissipated by increased fishing effort by other gear sectors). These effects would be expected to enhance larval export and recruit/spawner ratio. Sport fisheries may benefit from larger fish size and higher encounter rates (due to increased fish population density).

Displacement of Effort: Displacement of fishing effort should be minimal due to purchase of trawlers and careful siting of no-trawl zones. However, there is potential for displacement north of Davenport into the northern section of Monterey Bay National Marine Sanctuary and parts of the Gulf of the Farallones National Marine Sanctuary that contain areas of very high conservation value (Figure 3).

Remaining fishery may shift to fishing to maximize value (e.g., by landing live fish) as a result of reduced tonnage and reduced fishing area.

Inelastic effort: Trawl effort (e.g., for flatfish) cannot necessarily shift into other gear sectors (e.g., hook/line, pots for rockfish), potentially reducing supply of flatfish to processors.

Increased costs of federal buyout by remaining trawlers: Existing trawlers are obligated to pay back a share of the federal buyout loan. Because the project would remove some of these trawlers from the fleet, the loan obligation for the remaining trawlers would increase proportionally. Our intent is to include this obligation in our valuation analysis.

Fate of fish "released" through buyout unclear: If all of the fish that was caught by the bought-out trawlers were re-allocated to remaining trawlers, this might compensate for reduced trawlable area; however, it may not be possible for the trawlers remaining in the project area to catch all of this allocation due to the reduced area available for trawling. In addition, if the re-allocated fish were caught somewhere else, this would reduce supply to local processors.

Effects on Other Fisheries

Potential increase in revenues for other gear sectors targeting the same fish (e.g., fixed gear sablefish, thornyhead, rockfish).

Reduced gear conflict (potentially increasing area available for other gear sectors within the project area).

Effects on Protected Species

There are numerous protected species of fish, seabirds, sea turtles and marine mammals that occur in the project area. There are no anticipated adverse impacts to protected species from this alternative. Potential benefits to protected species include: reductions in incidental bycatch or injury of protected species in trawl nets and increases in prey species abundances with habitat recovery and recovery of groundfish populations.

Effects on Non-Fishing Activities

Harbors and ports receive federal dredging funds in proportion to the tonnage of fish landed. Buying out a significant number of trawlers may reduce landings and dredging funds unless legislative changes are made.

Increased species diversity, abundance, and ecosystem recovery could enhance nearshore ecotourism.

Existence value, option value, heritage value of no-trawl zones would be enhanced.

SUMMARY

TNC/Environmental Defense proposes to work with the bottom trawling industry and the Council to develop a private buy-out program that is contingent on the establishment of permanent no-trawl zones covering a large portion of the area between Point Conception and Davenport (including portions of the Monterey Bay National Marine Sanctuary) and nearby seamounts to protect EFH and other important biodiversity targets in the project area of Central California.

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RELEVANT LITERATURE

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Figure 1. Central California Project Area

Figure 2. Benthic Habitats

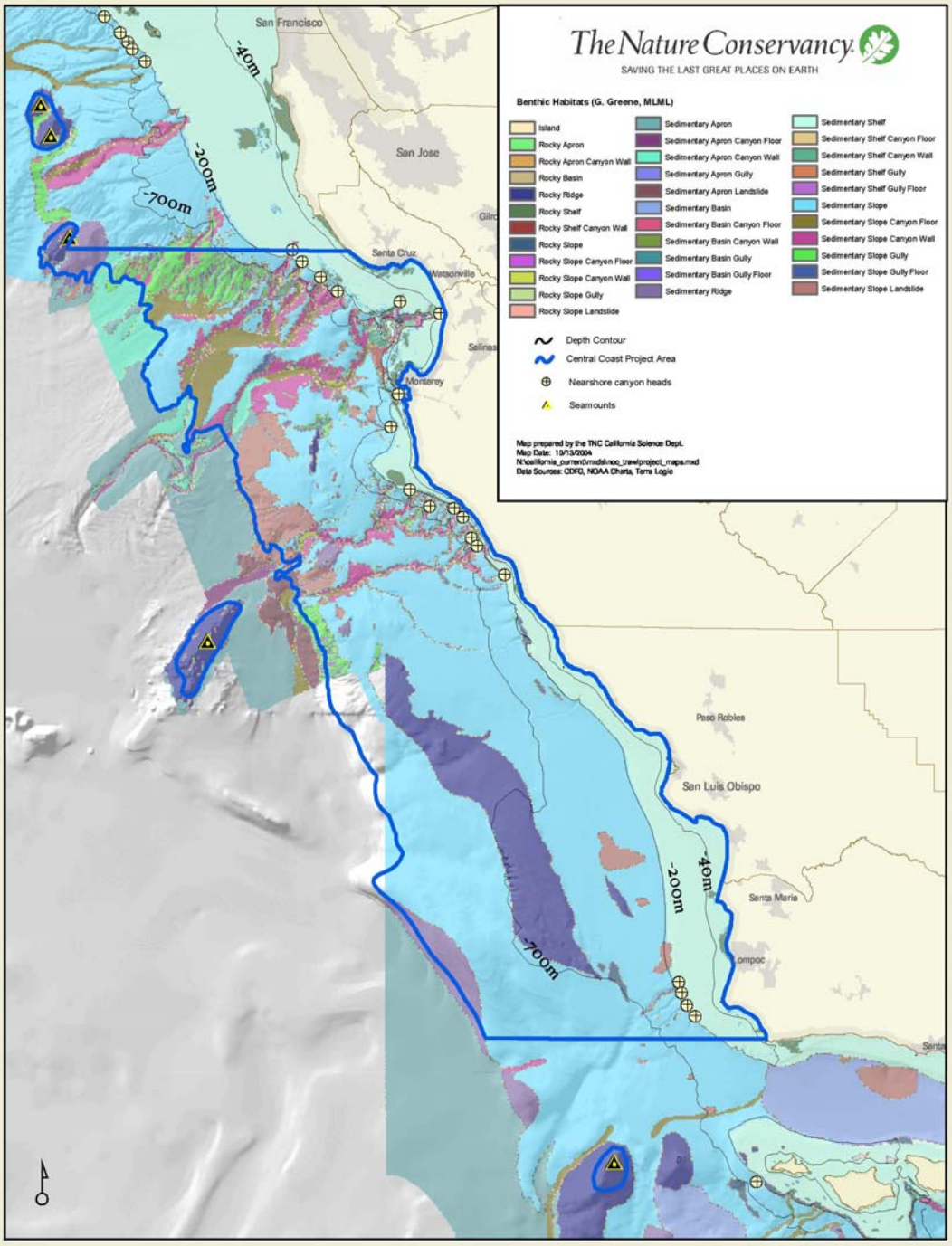
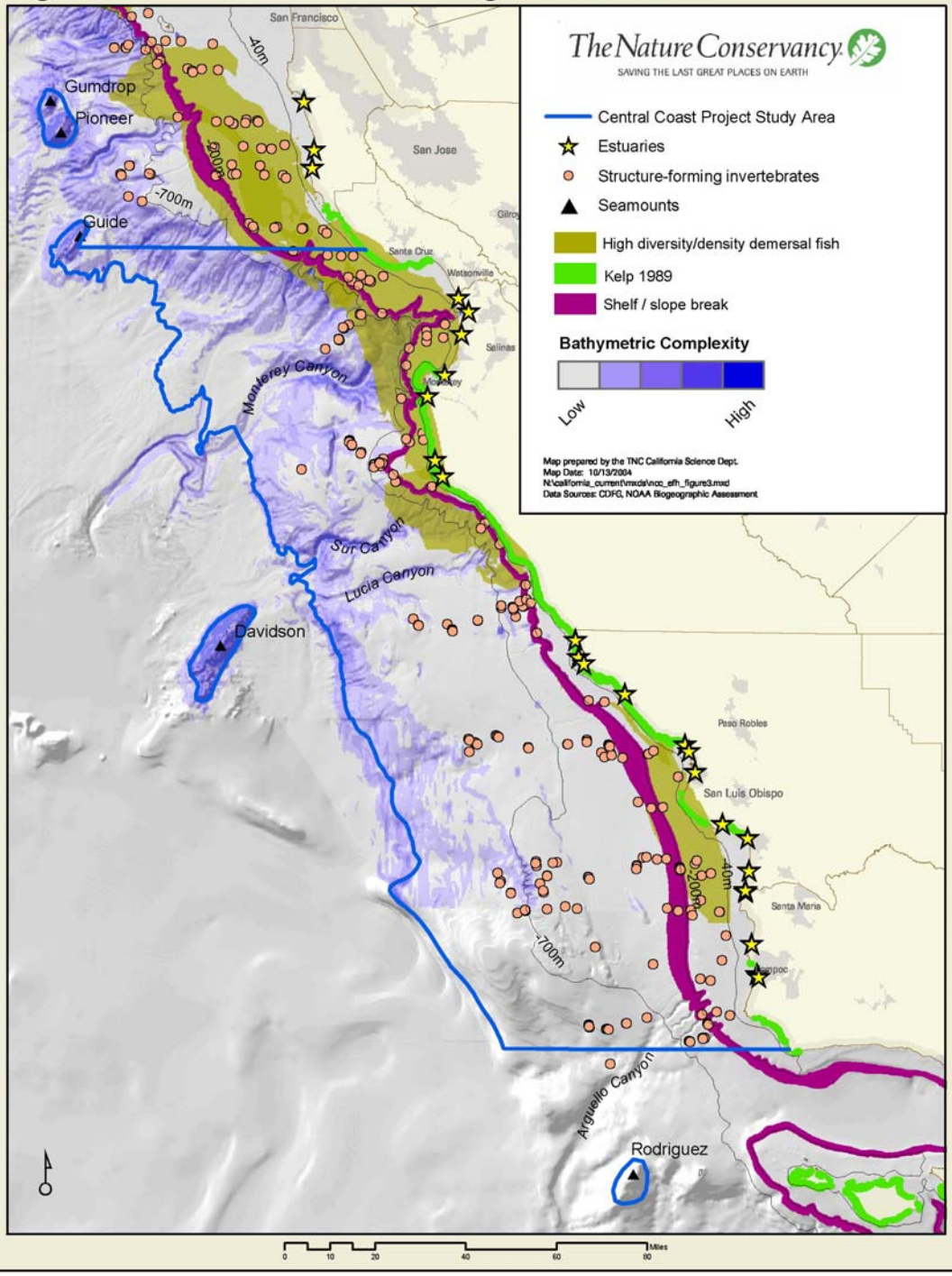


Figure 3. Other Conservation Targets



ADDENDUM: IMPACTS OF BOTTOM TRAWLING

Few studies of the impacts of trawling have been conducted in the project area; however, the scientific consensus (including the expert opinion of scientists serving on the Pacific Fishery Management Council's technical advisory committee on Essential Fish Habitat, which is charged in part with assessing the impacts of fishing in federal waters off the US Pacific coast) is that inferences about the impacts of trawling in a particular place can be made from the dozens of studies of trawl impacts conducted throughout the world, with appropriate adjustments made for differences in habitat type, biota, and fishing practices. Studies off the US Pacific coast have documented many of the impacts of bottom trawling, including substantial losses of biodiversity, reduction of habitat complexity, and changes in species composition. Video cameras attached to trawls operating off the US Pacific coast show, anecdotally, resuspension of sediment and the removal of biogenic structure.

Direct Impacts of Bottom Trawling

While the project area comprises only about 5% of the PFMC's jurisdiction, it supports important commercial fisheries, particularly for sardines, squid, roundfish, flatfish and rockfish. These species occupy a diverse range of habitats including soft sediment, rocky bottom varying in relief from low to high, seamounts, and submarine canyons to depths reaching 3,000 ft. The project is focused on buying bottom trawlers because the best available science strongly indicates that bottom trawling can damage certain kinds of habitats, particularly biogenic habitat such as corals and sponges. The draft risk analysis for the Pacific Coast included an evaluation of the sensitivity of different habitat types to fishing impacts from 5 major gear types, including bottom trawling, and ranked portions of the project area, especially the slope, with the highest sensitivity ranking (2.26-3.0) and longest recovery times (Risk Assessment for the Pacific Groundfish FMP, v. 4. August 2004). In addition, available evidence demonstrates that bottom trawling has significant ecological impacts in unconsolidated soft sediments, due to the removal of small-scale biogenic and physical structure, resuspension of sediments, and exposure of species living in the sediments to higher predation rates.

Bottom-trawling has become a source of concern because of the size of the affected fishing grounds, the modification of the substrate, disturbance of benthic communities and removal of non-target species (NRC 2002). One study suggests that a typical trawl fishery in northern California trawls the seafloor about 1.5 times per year, with some areas being trawled as much as 3 times per year. Considering the slow recovery times of these benthic communities, this level of disturbance is sufficient to result in a vastly altered community (Friedlander et al., 1999).
The repeated use of bottom-tending gear such as trawls can cause long-term biological and physical changes in the marine environment (depending on substrate type, abundance of habitat-forming invertebrates like corals and sponges, and other factors) that can be orders of magnitude greater in intensity and spatial extent than natural disturbances (Watling & Norse 1998).

Alteration of Physical Structure. Trawl gear can scrape, plough, bury mounds, smooth sand ripples, remove stones or drag boulders, remove species that produce structure, and remove or shred submerged aquatic vegetation (Johnson 2002, Kasier et al. 2000). The structural

complexity of rocky outcrops, critical for biodiversity, can be reduced substantially by trawling. These physical alterations reduce the heterogeneity of the sediment surface, alter the texture of the sediments and reduce the structure available to biota as habitat (Johnson 2002), resulting in a concomitant decrease in the quality of habitat for some species (NRC 2002). Rocks and mounds contribute to the structural complexity of the bottom, and are very important to many different kinds of organisms that are found only in association with such structures. Exposed sediments tend to be poorer in food quality than sediments that are covered with encrusting organisms or held together by tube-forming organisms; hence, productivity is usually lower. Debris (usually fragments of kelps, marine "snow", fecal material, and the like) is a critically important food source for many benthic organisms. Not surprisingly, a study in the Monterey Bay National Marine Sanctuary (MBNMS) showed that sea pens, sea stars, sea anemones, sea slugs, and most polychaete worms were all far less abundant in the highly trawled area. Nematode and oligochaete worms (opportunistic species) were more abundant in the highly trawled area, but overall, trawling clearly reduced overall biodiversity (Engel and Kvitek, 1998).

Trawling also alters the structure of soft sediments. In shallower depths, organic-silty sand may become sandy gravel littered with shell fragments (Dayton et.al., 1995; see also Langton & Robinson, 1990). Deep shelf trawling induces sediment changes by transporting fine sediments to regions where currents do not naturally carry them (Churchill, 1989; Churchill et.al., 1994). By increasing turbidity in benthic habitats (via anthropogenically-transported sediments and the re-suspension of naturally-occurring sediments), trawls indirectly smother suspension feeders, kill larvae, and eliminate deep-water corals (Jones, 1992). After intense trawling disturbances, suspension-feeding groups generally become replaced by detritus feeding populations. Rarely do these community structural changes revert back to their initial suspension-feeding dominance because suspension-feeding recruits are frequently smothered or consumed by detritus feeders.

Changes to the Benthic Community. Trawling results in acute effects on resident populations, the range of which depends on the life history, ecology, and physical characteristics of the biota present. In general, species that are larger, less mobile, longer-lived, and experience low rates of natural disturbance appear to sustain longer term damage from bottom trawling. The following trends are observed in repeated or intensively fished areas:

Reduced Biomass: Trawling is capable of removing large amounts of biomass. When the species affected are long-lived and slow-growing, recovery can be slow. Off southern Tasmania, for example, fished seamounts had 83% less biomass than similar lightly fished sites (Dayton et al. 2002).

Reduced Species Diversity: Large, non-mobile, slow growing bottom-dwelling species recover less quickly than species that exhibit high fecundity and rapid generation times or that can adapt to frequent physical disturbance. There is evidence that trawling reduces the abundance and diversity of bottom-dwelling species such as anemones, sponges, and snow crab. In the Monterey Bay National Marine Sanctuary, heavily trawled areas exhibited about half the species diversity of lightly trawled areas (Engel and Kvitek, 1998). Another Pacific study found significant differences in demersal rockfish assemblages between trawled and untrawled areas (Matthews & Richards, 1991). The rockfish assemblages differed significantly in species composition, biodiversity, and biomass, with the untrawlable regions having significantly larger catches than

the trawlable habitats (Matthews & Richards, 1991). This finding indicates that as more regions become trawlable and benthic habitats are altered, there may well be significant changes in species composition and biomass.

Shift in community dominance: Some areas historically dominated by low-productivity, long-lived species are now dominated by high-productivity, short-lived, fast growing species (Kaiser et al. 2000). These species are able to capitalize on the changes in habitat resulting from trawling. For example, heavily trawled areas support low biomass levels of hydroids, soft coral and urchin and high levels of brittlestar, scavenging hermit crab, and masked crab. After trawling exposure, numerous benthic species die, with the greatest injury inflicted upon sessile organisms, including (but not limited to) polychaetes, bryozoans, echinoderms, and mollusks (Jones, 1992; Northridge, 1991; Bullimore, 1985; and Holme, 1983). Trawls remove organisms at the top of the substrate and expose animals which normally live buried in the sediments. These community alterations make many benthic organisms more susceptible to predation. In effect, trawling alters trophic dynamics by creating new food sources for opportunistic species such as scavenger starfish and crabs (Thrush, et.al., 1995; Dayton et.al., 1995). In addition to showing that high levels of trawling reduce overall marine biodiversity, Engel and Kvitek (1998) showed that heavy trawling can increase the abundance of certain kinds of organisms. In this case, the polychaete worm *Chloeia pinnata* achieved very high densities in the heavily trawled area. Many commercially important flatfish feed on this worm as adults, such as sanddab, English sole, and Dover sole. While trawling could thus increase food for adult fish, it could simultaneously decrease food and shelter for more sensitive life stages. This conclusion is supported by other research cited in the study.

Changes in species distribution: Intensively fished areas are likely to remain permanently altered, inhabited by fauna that can cope with frequent physical disturbance (NRC 2002). In the MBNMS, heavily trawled areas support opportunistic species such as oligochaete worms (pioneer species known to be early colonizers in frequently disturbed areas and scavengers that feed on dead organic matter) and nematodes (one of the most abundant animals on earth, often found in extremely harsh environments) (Engel & Kvitek 1998).

Indirect Effects of Bottom Trawling

Trawling directly impacts species diversity and habitat structure and function; but it also has several important indirect effects on marine ecosystem dynamics (NRC 2002).

Sediment Suspension: the drag of the gear along the seafloor can suspend large amounts of sediment in the water, resulting in the reduction of light available for photosynthetic organisms, burial of benthic biota, smothering of spawning areas, and effects on feeding and metabolic rates of species (Johnson 2002).

Nutrient Cycling: trawling can increase or decrease the exchange rate of nutrients between the sediment and water column and the suspension or burial of biologically recyclable organic material, thus changing the flow of nutrients through the food web (NRC 2002).

Ecosystem Processes: trawling can remove species responsible for water purification, substrate stabilization, and structure formation, thus altering these important ecological processes/services (NRC 2002).

The potential of trawl fishing to damage marine habitats has greatly increased (and continues to increase) with technological advances, absent performance standards. For example, beam trawlers (an older, less damaging type of technology than otter trawls) with tickler chains caught 10 times the amount of seabed material in their trawls as did the beam trawls without tickler chains; the amount of debris caught in trawls positively correlates with the number of benthic organisms adversely affected. As engines have become more powerful, synthetic materials have grown stronger, and new gears (e.g. bobbins, rollers, rock hopper sweeps, chains) are developed fishermen gain access to previously un-trawlable, rocky bottoms (Dayton et.al., 1995; Matthews & Richards, 1991).

Because all trawling is not destructive, we favor the implementation of performance standards for gear impacts on habitats would be developed that would apply to all gear types, so as to create incentives for innovative gear designs and practices that will minimize impacts everywhere. Such standards would complement Essential Fishing Habitat (EFH) regulations very well. In addition, we anticipate that over the long-term, other gear sectors will be rationalized in some way, whether through stackable permits, cooperatives, Individual Fishing Quotas (IFQs), or other mechanisms. In this way, capacity issues associated with spatial management in the form of marine reserves, EFH, or Habitat Areas of Particular Concern (HAPC) designations and regulations can be addressed.

HABITAT AREAS OF PARTICULAR CONCERN (HAPC) DESIGNATIONS FOR OFFSHORE OIL & GAS PLATFORMS IN SOUTHERN CALIFORNIA

October 5, 2004

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This paper is submitted by the California Artificial Reef Enhancement Program (CARE) in connection with the Environmental Impact Statement (EIS) being prepared by NOAA Fisheries for the designation of Essential Fish Habitat (EFH) for Pacific coast groundfish, which will be used by the Pacific Fisheries Management Council to update the EFH provisions in its Pacific Coast Groundfish Fishery Management Plan. We understand that NOAA Fisheries will be considering a number of alternatives for the designation of EFH and Habitat Areas of Particular Concern (HAPC) for inclusion in the EIS, including an alternative that would designate certain existing oil and gas production platforms as HAPC. CARE strongly supports the full evaluation of this alternative in the EIS. CARE also believes that the HAPC designations are appropriate based on the considerable evidence of habitat value, which is summarized in this report.

Background on the Existing Platforms off California:

The oil and gas industry began installing steel platforms for the development of offshore oil fields in Southern California in the late 1950's. Today, 27 platforms remain out of the original number of 34 constructed. The seven platforms no longer in service were completely removed from the seabed and disposed of onshore.

Of the remaining 27 platforms, 23 are in Federal Outer Continental Shelf (OCS) waters under leases from the U.S. Department of the Interior Minerals Management Service (MMS) and 4 are in State waters under leases from the California State Lands Commission.

The platforms are located between 1.2 and 10.5 miles from shore and in water depths from 35 to 1198 feet. The platforms are made almost entirely of structural steel tubular beams of up to 6 feet in diameter. The structures weigh from 1,000 to 70,000 tons, depending on water depth, and are very stable and long-lived.

Many of the platforms offshore California are in locations suitable as habitat for certain rockfish species, including overfished species such as bocaccio and cowcod. In addition to providing suitable habitat, most of these structures are not fished and act as de facto reserves.

The average age of the California platforms is approximately 25 years, with the last installation occurring in 1989. Although the operator determines the economic life of these platforms, the MMS estimates that all of the remaining OCS platforms will be decommissioned during the 2010 to 2025 timeframe. With a 3 to 5 year permitting process, it is possible that decommissioning planning and permitting will start within the next few years.

Current MMS regulations that govern decommissioning of offshore platforms require that the platforms be completely removed. The process of removal will completely destroy the habit that exists around these structures and kill most or all of the fishes that live there.

Criteria for Habitat Areas of Particular Concern:

EFH is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity," and such "substrate" can include artificial structures underlying the water, such as oil and gas platforms. 50 C.F.R. § 600.10. Accordingly, under existing regulations it is appropriate for the EIS to include an alternative that explicitly recognizes the EFH value of the platforms by designating them as HAPC, if the structures satisfy the relevant criteria. As indicated in CARE's letter dated August 23, 2004, we believe that the HAPC designation is highly appropriate for the platforms in waters off California, based on the HAPC criteria stated in 50 C.F.R. § 600.815(a)(8):

(i) importance of the ecological function provided by the habitat;
The importance of the platforms to regional rockfish production is described in Love, M. S., Schroeder, D. M. & Nishimoto, M. M. (2003) *The ecological role of oil and gas production platforms and natural outcrops on fishes in southern and central California: a synthesis of information* (Minerals Management Service OCS Study MMS 2003-032) and other studies cited below. This research is ongoing, and recent findings indicate that the scope of impact of the platform habitat is greater than previously thought.

(ii) the extent to which the habitat is sensitive to human-induced environmental degradation;
The platform habitats are at risk for elimination due to the expected obsolescence and subsequent decommissioning of the platforms as required by current regulations. These regulations require the complete removal of the platforms, thereby destroying the habitats and killing all or most of the fish that live there.

(iii) **whether and to what extent development activities are, or will be, stressing the habitat type; and**
See (ii) above.

(iv) the rarity of the habitat type.
The platform habitats are unique in their size and proportions and in the fact that they provide relief through the entire water column. They also provide hard substrate that is limited in the vicinity of the platforms.

EFH determinations should be based on the best scientific information available. 50 C.F.R. § 600.815(a)(1)(ii)(B). If quantitative density or relative abundance data is available for the habitats occupied by the species at various life stages, the degree of habitat utilization can be assumed to be indicative of habitat value. Id. at § 600.815(a)(1)(iii)(B). If data regarding habitat-related growth, reproduction and/or survival by life stage are available, then habitat value should be assigned according to which habitat types support the highest growth rate, reproduction and survival. Id. at § 600.815(a)(1)(iii)(C). As indicated below, current research demonstrates the high habitat value of the oil and gas platforms for rockfish species based on these considerations.

Research on the Utilization of California Platforms by Rockfish:

Soon after the platforms were installed, it became obvious that marine life, both fishes and invertebrates, began to accumulate on and around the platforms. Operators began to periodically remove marine growth to insure platform stability. This removal process eventually became a commercial shellfish harvesting business. Recreational divers, underwater photographers, and marine scientists were drawn to the platforms by the extensive and diverse marine life.

Marine biologists began to examine the marine life in more detail starting in the 1980's, but it was not until 1995 when scientists at the Marine Science Institute (MSI) at University of California at Santa Barbara began to systematically survey the platforms. These surveys have been conducted annually with funding from United States Geological Survey (USGS), MMS and CARE (Love et al. 1999, Love et al. 2000, Love et al. 2001, and Love et al. 2003). Data on the densities of specific rockfish species (including overfished species) at specific platforms, compared to densities at natural reefs, are presented in Love et al. 2003.

MSI scientists have directly surveyed eighteen platforms and have reviewed ROV inspection tapes for five additional platforms. The overall results indicate that most of the platforms are important to rockfish species. Using both direct evidence and analogy, it is probable that a total of 23 platforms (listed in Appendix A) are important to rockfish species. The remaining four platforms (listed in Appendix B), while harboring numerous other fish species, are probably less important to rockfish. Key findings from this research which relate to the group of 23 platforms is summarized below:

1. Although generalizations about the platforms are possible, each platform habitat has unique features due to location, water depth, water temperature, ocean currents, platform configuration and other variables.
2. A total of 42 species of rockfish have been identified as living around the platforms. Rockfish species dominate platforms and platform habitats.
3. Platforms provide habitat for most rockfish species that is better than or equal to natural reefs.
    - Some platforms harbor higher densities of young rockfishes than do many natural reefs.
    - Some platforms harbor higher densities of some species of adult rockfishes than do most natural reefs.
    - In general, compared to platforms, natural reefs harbor higher densities of primarily dwarf rockfish species.
4. Platforms provide habitat for several critically depleted rockfishes and lingcod:
    - Platform Gail has the highest densities of adult bocaccio and cowcod of any location surveyed in Central or Southern California.
    - Some platforms have higher densities of young bocaccio, cowcod, and lingcod than do most natural reefs.

5. Platforms act as nursery grounds for rockfishes:
    - It is probable that platforms provide habitat for recruiting pelagic stages of some rockfishes that would otherwise have perished. Some rockfishes that are recruited to the platforms appear to stay there until they reach maturity. Some rockfishes may stay for life.

This research is ongoing and continues to generate new findings. Recently the 2003 platform survey results for young-of-the-year (YOY) bocaccio were incorporated into the STATC model for fish stock assessments. It was found that, in some years, a significant number of all YOY bocaccio on the entire Pacific Coast live around the platforms. This is a surprising finding given the small scale of the platforms relative to the entire Pacific Coast. The study has been submitted for publication in a scientific journal, and details will be available for discussion once it is published. We will provide copies when available for consideration by NOAA Fisheries in preparing the EIS.

Uniqueness of Habitat:

As documented by Love et al. 1999, Love et al. 2000, Love et al. 2001, and Love et al. 2003, offshore platforms provide unique structural features that make them particularly suited for rockfish habitat. Perhaps the most obvious of these is the fact that the platforms provide relief through the entire water column. Most natural reefs in the vicinity of the platforms consist of rock features of no more than 30 feet above the sea floor. Thus, platforms are easier for larval fish to find and recruit to. Platforms also provide a variation of depths for different life stages of rockfish. Juveniles are found in the mid-waters and adults dominate the bottom. This separation may lead to lower predation rates for juveniles than on natural reefs where the different ages are in closer proximity.

Another feature of many platforms is that they provide sheltered hiding places where platform legs and cross-members near the seafloor leave small openings and crevices that suit rockfish behavior patterns. Adults are found taking advantage of this shelter where the cross-members are close to the bottom and are generally absent where there are no cross-members.

The location of the platforms in the Southern California Current put them in the path of a substantial supply of plankton. The combination of shelter and a plentiful food supply, make them well suited for rockfish habitat.

Finally, the platforms provide hard substrate in some areas where this habitat type is limited. The platform substrate has had, on average, 25 years to develop relatively undisturbed into mature, diverse and thriving reef communities that include substantial rockfish populations.

Benefits of HAPC Designation:

As the oil and gas platforms off California become obsolete, platform operators will propose decommissioning projects to meet applicable regulatory requirements. Since full removal is currently required, operators will be forced to seek permits that will result in the permanent destruction of this habitat. HAPC designation for this habitat will highlight the habitat value to the agencies leading the permitting process. A full and complete evaluation of this habitat weighed against all other factors in the decommissioning process will result in the best project decisions with a minimum of adverse impacts.

Recommendation

Based upon the best available scientific information, CARE recommends that the EIS being prepared by NOAA Fisheries for Pacific groundfish EFH include full evaluation of an alternative for the designation of the 23 platforms listed in Appendix A as Habitat Areas of Particular Concern for rockfish species. As new information becomes available through ongoing studies, our recommendation may be revised to add or delete individual platforms.

The four existing platforms off California that are excluded from this recommendation all have extensive marine life and provide habitat to many fish species. However, at this time, they are not known to be important to rockfish. See Appendix B.

References:

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Appendix A

Platforms recommended for HAPC designation for rockfish:

Platform	Lat/Long	Water Depth
Platform A	34º19'N, 119º36'W	188
Platform B	34º19'N, 119º37'W	190
Platform C	34º19'N, 119º37'W	192
Hogan	34º20'N, 119º32'W	154
Edith	33º35'N, 118º08'W	161
Houchin	34º20'N, 119º33'W	163
Henry	34º19'N, 119º33'W	173
Hillhouse	34º19'N, 119º36'W	190
Gilda	34º10'N, 119º25'W	205
Holly*	34º22'N, 119º52'W	211
Irene	34º36'N, 120º43'W	242
Elly	33º35'N, 118º07'W	255
Ellen	33º34'N, 118º07'W	265
Habitat	34º17'N, 119º35'W	290
Grace	34º10'N, 119º28'W	318
Hildago	34º29'N, 120º42'W	430
Hermosa	34º27'N, 120º38'W	603
Harvest	34º28'N, 120º40'W	675
Eureka	33º33'N, 118º06'W	700
Gail	34º07'N, 119º24'W	739
Hondo	34º23'N, 120º07'W	842
Heritage	34º21'N, 120º16'W	1075
Harmony	34º22'N, 120º10'W	1198

*Platform in State waters

Appendix B

Platforms not recommended for HAPC for rockfish:

Platform	Lat/Long	Water Depth
Ester*	33º19'N, 118º77'W	35
Emmy*	33º39'N, 118º02'W	47
Eva*	33º39'N, 118º03'W	57
Gina	34º07'N, 119º16'W	95

*Platforms in State waters