JOINT MANAGEMENT PLAN REVIEW
Draft Management Plan: Ecosystem Protection – Benthic Habitats

REVISED: 5/1/03

Please Note: The Sanctuary Advisory Council and MBNMS have tasked the management plan working groups with development of draft action plans that characterize the issue or problem and identify strategies and activities that address the issue. The working groups will develop these strategies and activities as they meet over the next several months. With this goal in mind, the progress of the group, the decisions, areas of agreement will be outlined in a progressively developed action plan identifying draft goals, issue characterizations, and strategies and activities. Members of the group as well as other interested parties should look to this draft action plan as it develops as a way of tracking the group's progress and decisions.

GOALS:

To maintain the natural biological communities and ecological processes in the Sanctuary, by evaluating and minimizing adverse impacts of bottom trawling in benthic habitats while facilitating the long-term continuation of sustainable local fisheries in the Sanctuary.

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BACKGROUND:

The Monterey Bay National Marine Sanctuary is dedicated to collaborating with the public in its effort to protect the marine environment. In the ten years since its designation, researchers, managers, and community members have helped the Sanctuary to identify resource protection issues and strategies to augment our management scheme. As part of the Sanctuary's management plan review process, these recommendations were honed through a series of scoping meetings and public workshops. Fifteen specific issues that were of principal concern to the public and the Sanctuary were identified as areas for discussion in a working group context. The effects of bottom trawling on benthic habitats has been a frequently raised concern and one which the Sanctuary has agreed to address as an important part of this process.

The Sustainable Fisheries Act of 1996 required that fishery management plans describe and identify essential fish habitat (EFH) and address how it is affected by fishing activities. The seafloor has thus become an area of acute environmental concern and a

focus of scientific research. Legal challenges have been brought alleging that the Fishery Management Councils, who help implement the Sustainable Fisheries Act have not adequately addressed this issue. Additionally, the Councils generally address habitat issues on a species-specific or species-assemblage basis. By contrast, the Monterey Bay National Marine Sanctuary is concerned not only with the nexus between habitat and the health of a particular species, but with the role the benthic habitat plays in the health of the ecosystem. Therefore the Sanctuary is looking to address both the direct and indirect effects on seafloor habitat that can result from the fishing practice of bottom trawling.

International studies have examined the direct effects of bottom trawling including the incidental killing of benthic and demersal species, and mortality caused by increased vulnerability to predation. Increased food availability is another direct effect as trawling creates fish offal, discarded fish, and dead benthic organisms that provide food for scavenging species. Indirect effects include reductions in the total biomass of target fish, which could be expected to affect predators, prey, competitors of a target species, and overall seafloor community structure. These downstream consequences also encompass potential changes in the flow of materials and energy through ecosystems and shifts in the balance of production and consumption.

Bottom trawling is widely believed to adversely affect benthic habitats based on numerous scientific studies. In the MBNMS there is an incomplete picture about the extent of these impacts within the Sanctuary and the potential need for local protective action. In a 1994 report, the National Research Council stated, "Habitat alteration by fishing activities is perhaps the least understood of the important environmental effects of fishing." Since that report was published, there has been extensive research done on the effects of trawl gear on the seafloor. However, the inherent difficulty in studying offshore habitats, and the problems associated with determining causation under shifting environmental conditions (current, temperature variation, natural migration, storm activity), have left many questions unanswered.

Both despite and because of the uncertainty that remains, the use of trawl gear is a source of concern for the Sanctuary. This is due in part to the potential modification of the substrate, the possible disturbance of benthic communities, and the removal of non-target species. There has been little research conducted within the Sanctuary boundaries, however, a 1998 study indicated the occurrence of many of these suspected impacts.[1] There is also a perception that declines in many traditional fisheries could lead to increased efforts to find under-exploited fish populations in less accessible, previously unfished areas. These efforts would be facilitated by the development of new types of

[1] Engel, J., Kvitek, R. 1998. Effects of Otter Trawling on a Benthic Community in Monterey Bay National Marine Sanctuary. Conservation Biology **12**: 1204-1214.

gear and navigational aids, possibly exposing new regions of the continental shelf, slope, submarine canyons, and seamounts to the effects of bottom trawling.

Statutory and Regulatory Context

There are currently specific area closures imposed by state and federal fishery management agencies in the MBNMS, including the depth based limitations related to new restrictions in the groundfish fishery. There is also a state ban within three nautical miles with an exception allowing trawling within one nautical mile between Yankee Point and Point Sur. There are also exceptions associated with the spot prawn (currently closed) and shrimp fisheries. While these closures provide de facto protection of benthic habitat, they are spatially and temporally limited and do not represent comprehensive long-term protection for future generations.

The National Marine Sanctuary Program recognizes that the primary regulatory authority over fisheries management resides with State Fish and Game Commission, PFMC and NMFS, and will work to encourage these agencies to take the necessary measures to protect Sanctuary resources. In making any management recommendations, the MBNMS would consult with these agencies, as well as affected fishermen to determine an appropriate course of action. While regulation of fishing activities in federal waters is the jurisdiction of PFMC and NMFS, identifying essential fish habitat and designing effective protective strategies has proven to be a difficult goal for the Council to achieve on such a coast-wide geographic scale. It is a task that may be more effectively addressed by an approach that is more regional in its application and more ecosystem oriented in its perspective. PFMC is required by the Magnuson Stevens Act to manage fisheries based on fisheries management plans. These plans focus on individual stocks or species-assemblages and in so doing do not adequately consider the impact of the fishery on non-harvested species. The National Marine Sanctuary Act focuses on protection of the ecosystem as a whole, a field in which the Sanctuary Program has 30 years experience. Addressing the issue of the effects of trawling on benthic habitats is therefore a legitimate means for the Sanctuary to both meet its mandate, and a valuable opportunity to provide its ecosystem based perspective to fisheries management. The Sanctuary thus seeks to assess the potential impacts bottom trawling may have on its resources, and to develop appropriate strategies to protect the marine environment.

Action Plan Development:

The work group will develop a framework plan to gather data on the types and extent of trawling activities and their impacts to the benthic layer and the associated living marine resources other than the targeted species during trawling activities. The plan will also

provide for the examination of impacts related to bottom trawling, the assessment of the adequacy of protections afforded by the current regulatory framework, and as needed will recommend protective measures with which the Sanctuary will approach fishery management agencies. The order of the strategies of the plan are not necessarily to be performed sequentially and the Sanctuary will likely engage in many of the described activities simultaneously. However, certain issues may need to be researched or resolved before the direction of subsequent steps can be determined. The layout of the plan recognizes this approximate chronology. The plan will focus on bottom trawling, however, the working group members have said they believe other types of fishing activities, such as seining, may impact the benthic habitat of the Sanctuary and should also be addressed. The Sanctuary may investigate similar habitat impact issues related to these fisheries in the future but this plan does not specifically address them.

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STRATEGIES OF THE BENTHIC HABITATS ACTION PLAN

Form Partnerships with Fishermen
Determine Extent and Location of Trawling Activity in the Sanctuary
Identify Vulnerable Habitats
Describe Current Regulations
Describe Potential Trawling Impacts and Identify and Pursue Research and Monitoring Needs
Evaluate Management Recommendations
Develop Educational Program

STRATEGY MB-BH1 – FORM PARTNERSHIPS WITH FISHERMEN TO IDENTIFY AND EVALUATE POTENTIAL IMPACTS OF TRAWLING

Fishermen have a wealth of knowledge not only about their fishery but about the physical and biological environment. The Sanctuary recognizes that tapping into this knowledge base is critical to obtain quality information regarding the extent and potential impacts of bottom trawling. Recent regulations have been dramatic and have had severe economic impacts on trawlers. These are an example of the kind of reactive regulation that the Sanctuary seeks to avoid by finding means to conserve the resource and the fishery simultaneously. Working cooperatively with fishermen is the only way to effectively accomplish this goal.

Activities designated for this strategy:

Activity A: Seek to engage fishermen to work with the Sanctuary to address bottom trawling impacts.
Sanctuary staff fully appreciate the challenges associated with this activity. Given the recent regulatory actions fishermen may be reluctant to engage in a discussion on this issue. However, the Sanctuary has worked to create partnerships with fishermen in the past and would continue to draw from, and build on these relationships. The Sanctuary would work with fishermen to help identify potential impacts from bottom trawling and find workable solutions. This type of coordination will in part be conducted through the "Incorporating Fisheries Issues in Research and Education" action plan.

Project status: Ongoing
Potential partners: Alliance, PCFFA, local trawlers, Sea Grant, FMA
Phase: 1

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STRATEGY MB- BH2 - DETERMINE EXTENT AND LOCATION OF TRAWLING ACTIVITY

In order to determine when and where trawling is taking place, the Sanctuary will need to examine a number of existing indicators. The Sanctuary and its partners will evaluate the need for recommending measures that would improve the quality of the data available. Existing tools will be utilized to determine where and when trawling is taking place including landing receipts, log books, and anecdotal information.

Activities designated for this strategy :

Activity A: Compile existing log book, landing receipt, and anecdotal information regarding where, when, and what kind of trawling has been taking place in the Sanctuary.

In an effort to hone potential management recommendations, the Sanctuary will facilitate gathering all of the existing relevant fisheries data on bottom trawling. Some of this information will be incorporated into a map or series of maps that depict closed areas and the spatial and temporal extent of trawling. In addition to looking at current trawling activity, this project will examine annual trawl data from 1994 to July 2002 to account for changes in effort and regulation. It would also describe what types of gear have been recently used in the Sanctuary including net size, boat size, home port, etc.

Project Status: Ongoing
Potential partners: CDFG, NMFS, PFMC, PSMFC
Phase: 1

Activity B: Evaluate effect of current and projected regulations on future fishing effort.

Based on license data, the Sanctuary will facilitate the assessment of the capabilities and potential impacts of a full scale fishery including potential displacement from other areas. Determining the number of potential participants will help establish the spectrum of effort that can be applied in Sanctuary waters. This will affect the range of potential impacts on benthic habitats. This analysis will also evaluate the potential for a shift to factory vessels, the impact of buyback programs, retiring permits, ITQs, IFQs, and the potential revision of existing regulations.

Project Status: Ongoing
Potential Partners: Regional research institutions, CDFG, PFMC, NMFS
Phase I:

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Activity C: Evaluate the need for and potential design of more refined means of data gathering.

The current forms of information provide relatively coarse data regarding the spatial and temporal extent of trawling. The Sanctuary will examine the data collected by fishery management agencies including the degree of resolution in the start and stop points of trawl lines. The Sanctuary will assess the need for recommending measures that could produce more refined data that would help managers to effectively manage and protect resources.

Project status: After Completion of Activity A
Partners: Regional research institutions, CDFG, PFMC, NMFS, local trawlers
Phase: 2

Activity D: Generate cultural profile/history of the fishery.

Trawling is one of the oldest fisheries in the rich fishing culture of central California. However, the number of trawlers operating in the region has decreased over the years as increasingly restrictive regulation and declining stocks have forced some out of business while discouraging others from entering the fishery. The Sanctuary will create a cultural and historical profile of trawling in recognition of the region's fishing tradition and to preserve the history of the fishery.

Project status: Pending
Potential partners: Local trawlers, historians
Phase: 2

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STRATEGY MB-BH3- IDENTIFY AND LOCATE HABITATS VULNERABLE TO TRAWLING

The level of adverse impacts to benthic habitats from trawling depends on the vulnerability of the specific habitat. The Sanctuary will examine what habitats are particularly susceptible and identify these locations within its jurisdiction.

Activities designated for this strategy:

Activity A: Consult literature and scientists to develop criteria for selecting and prioritizing habitats that are vulnerable to the effects of bottom trawling.
The Sanctuary will work to identify vulnerable habitat types and will address them in the order of their susceptibility to the adverse impacts of bottom trawling. The Sanctuary's partners will help establish criteria for this process.

Project status: Pending
Partners: Regional research institutions, NMFS, USGS,
Phase: 1

Activity B: Gather existing data on habitat distribution and incorporate into GIS format.
There are several existing mapping projects that have focused on portions of the Sanctuary. These include work by USGS, MLML, CDFG, and CSUMB. The Sanctuary will generate a series of habitat maps that depict where vulnerable habitats are located and the level of threat posed by trawling activity.

Project status: Ongoing
Partners: Regional research institutions, NMFS, USGS, CDFG
Phase: 1

Activity C: Consult with local scientists, fishermen, and primary literature to determine what and where vulnerable habitats are located.
There is an extensive amount of international research focused on the effects of trawling in benthic habitats. The Sanctuary in partnership with local scientists and fishermen will seek to identify what habitats within the Sanctuary are vulnerable and what the specific impacts are likely to be. Vulnerability will be established in part by reference to stressed local species.

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Project status: Ongoing
Partners: Regional research institutions, NMFS, USGS, NURP, Local trawlers
Phase: 1

Activity D: Evaluate the need for additional habitat distribution data and research, and develop strategy to obtain and conduct it where necessary.
The Sanctuary will assess if the available habitat information in areas where trawling is occurring is sufficiently refined to support management recommendations. If not, the Sanctuary will identify data gaps and will work with local scientists to design research projects that target these needs.

Project Status: Initiate after completion of Activity B
Partners: Regional research institutions, NMFS, USGS, CDFG
Phase: 2

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STRATEGY MB-BH4 – DESCRIBE CURRENT MANAGEMENT SCHEME AND DEVELOP A PROTOCOL FOR TRACKING CHANGES IN REGULATION

Trawlers are heavily restricted by a maze of regulations and exceptions. In order to assess the risk of adverse impacts to benthic habitats and to recommend appropriate management strategies, the Sanctuary and community members helping with this action plan must have a comprehensive understanding of the current regime. Additionally, given that regulations are subject to alteration, the Sanctuary must be able to stay abreast of regulatory and statutory changes.

Activities designated for this strategy:

Activity A: The Sanctuary will work with fishery management agencies to compile the relevant regulations and restrictions and incorporate this information into a series of GIS maps.

Having an easily accessible and updateable database is critical to making informed decisions and in identifying important issues. Much of this work has been done by CDFG. The Sanctuary would offer its support to the Department in its continued evolution. Additionally, the Sanctuary would incorporate the information into its own GIS program to manipulate and update information as needed.

Project status: Pending
Potential partners: CDFG
Phase: 1

Activity B: The Sanctuary will seek to partner with fishery management agencies to address mutual concerns and interests, and will create a means for staying apprised of the current and pending regulatory environment.

Developing a relationship with fishery management agencies early in this process will be critical to forming effective an effective partnership and will help the Sanctuary stay apprised of the current regulatory setting. Staying up to date will require that the Sanctuary allocate sufficient staff resources to the issue and maintain relationships with fishery mangers who can keep the Sanctuary current in regards to regulation changes and pending management action.

Project status: Pending
Potential partners: CDFG, NMFS, PFMC
Phase: 2

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STRATEGY MB- BH5 - DESCRIBE THE TRAWLING IMPACTS ON BENTHIC HABITATS OF THE SANCTUARY AND IDENTIFY AND PURSUE RESEARCH NEEDS

This strategy recognizes the need to articulate what the potential impacts are to benthic habitats from trawling. Being as specific as possible in this regard will help ensure that any remedial action recommended will be narrowly tailored and as effective as possible at addressing Sanctuary concerns. Additionally, clearly identifying impacts will help design specific solutions that have as little impact as possible on the economic viability of commercial fishing within the Sanctuary. Information gaps will be identified and research projects to address data needs will pursued with Sanctuary partners.

Activities designated for this strategy:

Activity A: Work with working group members and other local scientists to identify what types of impacts in benthic habitats are likely to be occurring within the Sanctuary.

The Sanctuary will draw on the scientific expertise of the working group and local scientists to create an inventory of local impacts from trawling. Identifying the extent of some of these impacts will be the subject of additional activities focusing on research needs. However it is important to generate a preliminary list of known impacts in order to guide plan development and to allow the Sanctuary to address issues while data needs are identified and more information is obtained. The following is an initial list of direct and indirect impacts from trawling which will be augmented by future discussion and research:

Direct…

- Altered ecosystem function due to removal of target species
- Incidental mortality of non-target species
- Alter nature of habitat
- Increased short-term food availability for scavengers from discards, offal, and dead benthic organisms
- Shift towards smaller organisms

Indirect…

- Alteration of the seafloor community structure
- Shift in the flow of materials and energy in the ecosystem
- Shift in production and balance between non-human consumers
- Alteration of biodiversity

- Increased vulnerability to other natural or anthropogenic stressors

Project Status: Ongoing
Partners: Regional research institutions, NMFS, CDFG
Phase: 1

Activity B: After determining which habitats are vulnerable, the Sanctuary will identify and prioritize the need for and means of pursuing further studies
This activity recognizes that there is a need to perform further study on the impacts of trawling on benthic habitats, particularly at a local level. Conducting, supporting, and coordinating research in benthic habitats is a critical aspect of the Sanctuary's role in protecting this resource. Working group members have identified a preliminary list of research needs. This list will be augmented during the course of this plan's implementation as additional data gaps are identified. The applicability and relative importance of the studies identified below are dependent upon the type of habitat being considered. Therefore, once the Sanctuary identifies what areas are most at risk, it will be able to determine what the research needs are for that habitat.

1) Promote study that addresses the recovery rates and dynamics of community structures through post-regulatory monitoring
In order to discern the severity of trawling impacts it is necessary to examine the rate at which a trawled site recovers and the ecological dynamics of that recovery over time. Evaluating these on a local, habitat specific level can help identify the severity of impacts and the need for and design of tailored remedial action. This study would also examine the impact on the physical structure of these habitats as it relates to benthic ecology.
Phase 1

2) Promote study that seeks to identify levels of habitat specific impairment
Evaluating the quality of a particular habitat, or the level of impairment from bottom trawling will be critical to the identification of baselines. Categorizing habitats based on level of impairment and evaluating not only what species are present but what should be present, will also be useful in prioritizing habitats for protection.
Phase I

3) Characterize the different gear type deployment and impact
Understanding the different gear type impacts on specific habitats will be critical to the development of appropriate management strategies and recommendations. Not all gear types impact benthic habitats in the same way or to the same degree.

Consulting the literature and local scientists to describe these effects is an important step in both understanding the problem and identifying potential solutions. This activity would include evaluating the impact of various footrope, mesh designs, and towing speed as well as excluder devices and potential new gear developments.

Phase 2

4) Promote study that addresses the effects of different gear types and gear type modifications on local community structure including mortality estimates of non-target species

The Sanctuary recognizes the need to perform research on the effects of trawling on the community and trophic structure of benthic habitat as well as at a broader level. This information will help the Sanctuary and managers identify impact indices and to consider effects outside of benthic habitats. Bycatch is a serious concern with bottom trawling. A study that examines the bycatch of all types of organisms as opposed to only managed species would give the Sanctuary and managers a clearer picture of what the ecosystem impacts of bottom trawling are. Adverse impacts on benthic habitats is largely a function of gear type. "Bottom trawling" is a general classification used to describe mobile gear that is dragged along the seabed. In reality there are many sub-classifications in this category. There is a need to distinguish the different effects of gear types on particular habitats. Studies have indicated that slight gear modifications can make a significant difference in the level of harmful impacts to the seabed. Additionally, these gear modifications may translate into negligible differences in catch per unit effort. The Sanctuary will seek to support the study of specific gear type impacts and means by which harmful effects can be mitigated through modification and deployment.

Phase 2

4) Promote study that addresses the cumulative effects of repeated trawling and the potential utility of rotating closures through post-regulatory monitoring

In order to evaluate the impacts of trawling and to asses the effectiveness of regulation at protecting and restoring the resource, there is a need to quickly establish baseline monitoring following closures. The Sanctuary could pursue a study that examines both pristine areas and those that are recovering after regulatory action was taken. Repeated trawling may have longer term effects than those caused by less frequently trawled areas. The difference in recovery dynamics would be useful information in recommending a system of rotating or seasonal closures. This study would investigate means to employ high resolution, real time, spatial and temporal adaptive management. It would involve exploring technologies and methods to incorporate more refined data into management and

research.

Phase 2

Project status: Pending
Potential partners: Regional research institutions, fishermen, NMFS, CDFG

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STRATEGY MB-BH6 – EVALUATE THE NEEED FOR MANAGEMENT RECOMMENDATIONS

After assessing the location and extent of impacts from trawling and consulting with fishermen, the Sanctuary will assess the need for recommending management measures to the relevant fishery management agency. The Sanctuary will develop any potential recommendations with an eye to facilitating use of the resource by small scale local participants.

Activity A: Work with socio-economists to generate a profile of the local trawl fishery and its participants.

This activity recognizes that the fisheries within the Sanctuary are a critical component of the region's economy and culture. Fishermen are facing loss of their livelihood and the Sanctuary could make recommendations that have impacts on trawl fishery participants. A socio-economic profile of the trawl fishery needs to be created and considered in any management action or recommendation. Understanding the socio-economic characteristics of the trawl fishery and fishermen is critical to the ability to appropriately consider the economic effects of regulation and impact mitigation measures. The study would consider potential future impacts, and the spatial and temporal distribution of markets and the relative value/impact of the market vs. regulations. The Sanctuary will also work with economists and fishermen to describe the effects that recent regulatory changes such as the groundfish closure have had.

Project status: Pending
Potential partners: Fishermen, NMFS, UCSC, PCFFA, Cindy Thompson (NMFS), Mike Dalton (CSUMB), UCSB - Bren School
Phase: 1

Activity B: After assessing the impacts of both trawling and existing regulations, the Sanctuary will develop criteria to assess the need for changes in management.

After defining the benthic habitats in need of protection the Sanctuary will consider the type of protection needed, and the expected benefits of that protection. The Sanctuary will develop criteria including, the impact of trawling on vulnerable habitats in the Sanctuary, the socio-economics of the local trawl fishery, protection afforded by existing management, and benefits of increased protection.

Project status: Pending
Partners: Regional research institutions, NMFS, PFMC, CDFG, Local trawlers

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Phase: 2

Activity C: The Sanctuary will explore possible changes to current regulations with fishermen, other stakeholders and fisheries management agencies.

The Sanctuary will partner with fishermen, researchers and agencies to evaluate the potential benefits, effectiveness, and costs of different management options including special marine protected areas.

Project status: Pending
Partners: Regional research institutions, NMFS, PFMC, CDFG, Local trawlers
Phase: 2

Activity D: Consider socioeconomic impacts of proposed management actions
If and when the Sanctuary finds that it should make management recommendations to fishery management agencies on trawling issues, it will consider the impact on fishery participants and the community.

Project status: Pending
Potential partners: Local trawlers, CDFG, PFMC, socio-economists
Phase: 2

Activity E: Recommend implementation of proposed management changes to appropriate agency.

The working group has identified strategies that could be appropriate given the outcome of the Sanctuary's biological and economic analysis. Once a suitable recommendation is identified, the Sanctuary will address the issue with fishery managers. Determining needs for recommended management will involve input from stakeholders and agencies. This strategy may also involve coordination with the Sanctuary working group addressing marine protected areas.

Project status: Pending
Partners: Regional research institutions, NMFS, PFMC, CDFG, Local trawlers
Phase: 2
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Activity F: Evaluate the utility of economic mitigation measures.
The Sanctuary recognizes that the trawling industry has been subject to strict regulation that has made it economically challenging for many participants. These fishermen are

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frequently heavily invested in the fishery and may find it difficult to find other employment. Mitigation measures such as buy-out programs, money required for gear changes, and re-education programs that are designed to ameliorate the economic condition of these fishermen are an option that the Sanctuary will consider endorsing and helping to pursue.

Project status: Pending
Potential partners: Congressional representatives, trawlers, PFMC
Phase: 2

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STRATEGY MB-BH 9 – DEVELOP AN EDUCATIONAL PROGRAM

Education and outreach will be a critical part of this plan's success. Fishermen, managers and researchers must be able to effectively communicate and share information with one another. All three of these groups have valuable information to share with the public at large. The Sanctuary has a separate action plan for incorporating fisheries issues into research and education. Activities specifically identified for this plan will likely fit into broader strategies identified by that group, and efforts will therefore be closely coordinated. The goal of this strategy is to educate the public regarding the impacts of bottom trawling and to facilitate and encourage information exchange between managers, researchers, and fishermen.

Activity A: Perform a needs assessment based on a determined target audience and synthesize and package the results of research, analysis and recommendations into an educational and outreach program

Project status: Pending
Partners: Regional research institutions, NMFS, Fishermen, CDFG, PFMC, Sea Studios, Monterey Bay Aquarium
Phase: 2

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