CALIFORNIA DEPARTMENT OF FISH AND GAME
AGENCY REPORT OF CALIFORNIA GROUNDFISH FISHERIES AND INVESTIGATIONS IN 2002

PREPARED FOR THE
TECHNICAL SUB-COMMITTEE (TSC)
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A. AGENCY OVERVIEW

During 2002, The California Department of Fish and Game (CDFG) continued the process of implementing the Marine Life Management Act of 1998 (MLMA; AB 1241, Keeley), which greatly affects the way that marine fisheries will be managed in the state. The MLMA has provisions that affect nearshore fisheries management, and also change the way that future regulations will be developed. The intent is to move regulatory authority for marine fisheries from the state legislature to the California Fish and Game Commission, where management will be accomplished through the adoption of FMP's for state regulated fisheries. The most significant development was that the California Fish and Game Commission adopted the Nearshore FMP, which will form the framework for a new era of fisheries management in California. The FMP provides explicit mechanisms and harvest control rules that will phase in ecosystem-based concepts into the management decision process, as the data become available. An ambitious collaborative research program called Cooperative Research and Assessment of Nearshore Ecosystems (CRANE) was initiated to develop the necessary information for the ecosystem based management approach.

Considerable progress was made by CDFG during 2002 to develop a plan for establishing networks of marine protected areas in California waters to protect habitats and preserve ecosystem integrity, among other things. The following information describes the process and work accomplished to date.

Assembly Bill 993 (Shelley), the Marine Life Protection Act (MLPA), was introduced in February 1999 and chaptered in October 1999. The language is now included in Chapter 10.5 of the California Fish and Game Code, Sections 2850 to 2863. Sponsored by the Natural Resources Defense Council, the bill was supported by conservation, diving, scientific and educational groups. The purpose of the MLPA is to improve the array of Marine Protected Areas (MPAs) existing in California waters through the adoption of a Marine Life Protection Program and a comprehensive master plan. Section 2851 refers to the lack of a clearly defined purpose and scientific guidelines when existing MPAs were established. The MLPA states that "marine life reserves" (defined as no-take areas) are essential elements of an MPA system because they "protect habitat and ecosystems, conserve biological diversity, provide a sanctuary for fish and other sea life, enhance recreational and educational opportunities, provide a reference point against which scientists can measure changes elsewhere in the marine environment, and may help rebuild depleted fisheries." The master plan requires that recommendations be made for a preferred alternative network of MPAs with "an improved marine life reserve component." The MLPA further states that "it is necessary to modify the existing collection of MPAs to ensure that they are designed and managed according to clear, conservation-based goals and guidelines that take full advantage of the multiple benefits that can be derived from the establishment of marine life reserves." The California Department of Fish and Game (CDFG) is the lead agency charged with implementing the provisions of the MLPA.

1. 2003 State Management Measures Affecting Groundfish

In order to achieve the lower catches necessary to rebuild lingcod, cowcod, bocaccio, and canary rockfish, several new regulations were imposed on the recreational fishery for 2003, and a number of other recent restrictions were continued:

- All bottom fishing opportunities for rockfish and lingcod were closed over the continental shelf and slope for state waters south of Cape Mendocino. For this purpose, the continental shelf and slope was defined as waters greater than 20 fathoms in depth.
- Shelf and slope bottom fishing north of Cape Mendocino is allowed year-round, providing the canary rockfish OY is not exceeded. Within the ten-fish rockfish bag limit north of Cape Mendocino, all may be of the same species of rockfish except as provided for bocaccio which is two, cowcod which is zero, yelloweye rockfish which is one, (but no more than two per vessel) and canary rockfish which is one.
- Nearshore fishing for rockfish and lingcod was limited to an open season of July-December, in waters south of Point Conception.
- The overall combined daily bag limit for rockfish, greenling and cabezon was set at 10 fish, with sub-limits for certain species and species groups.
- The lingcod minimum size limit remained at 24 inches.
- Retention of bocaccio, canary rockfish and cowcod are prohibited.
- No more than one line and 2 hooks may be used when fishing for rockfish and lingcod.
- Several new Marine Protected Areas (MPAs) and reserves were established around the Channel Islands. Both recreational and commercial fishing is prohibited within the boundaries of the new areas.

Contributed by Tom Barnes (858.546.7167)

2. Nearshore Management

<u>Nearshore Fishery Management Plan</u>

Nineteen nearshore finfish species that are common to rocky reef habitats will be managed under the Nearshore Fishery Management Plan (NFMP). The Plan is based on a framework management approach that gives the California Fish and Game Commission (Commission) a comprehensive management strategy to prevent overfishing, rebuild depressed stocks, ensure conservation, promote habitat protection and provide for non-consumptive uses. Species included under the plan are:

Cabezon.....	*Scorpaenichthys marmoratus**
California scorpionfish.....	*Scorpaena guttata**
California sheephead.....	*Semicossyphus pulcher**
Monkeyface prickleback ...	*Cebidichthys violaceus*
Greenlings	
Kelp greenling.....	*Hexagrammos decagrammus**
Rock greenling	*Hexagrammos superciliosus**
Rockfishes	
Black	*Sebastes melanops*
Black-and-yellow	*Sebastes chrysomelas**
Blue	*Sebastes mystinus*
Brown.....	*Sebastes auriculatus*
Calico	*Sebastes dalli*
China.....	*Sebastes nebulosus**
Copper.....	*Sebastes caurinus*
Gopher.....	*Sebastes carnatus**
Grass	*Sebastes rastrelliger**
Kelp.....	*Sebastes atrovirens**
Olive.....	*Sebastes serranoides*
Quillback.....	*Sebastes maliger*
Treefish	*Sebastes serriceps*

** Requires a Nearshore Commercial Finfish Permit under the Restricted Access program*

The Commission adopted the NFMP in October 2002, which was revised after extensive public and peer review comments, taking the first step toward long term sustainability. The final plan is an integration of 5 management measures that together, over time, meet the goals and objectives of the Marine Life Management Act (MLMA) and provide sustainability for the nearshore fisheries and ecosystem. These management measures are:

- Fishery Control Rule (FCR): the primary mechanism for achieving sustainable use and preventing overfishing. The FCR formula sets the Total Allowable Catch (TAC) for each species or species group under various stages of fishery information;

- Regional Management: the establishment of 4 management zones along the California coast to allow for localized fishery planning and policy. Boundaries separating the regions are Cape Mendocino (Humboldt) County; Año Nuevo (San Mateo County), and Point Conception (Santa Barbara County);

- Resource Allocation: the fair and equitable distribution of resources between recreational and commercial fishing sectors within each of the management zones. The plan requires an approach based on historical participation in the fishery, until regional management is fully implemented and a regional constituent involvement process is in place;

- Marine Protected Areas: the inclusion of reserves, conservation areas and parks within the nearshore ecosystem under the process of the Marine Life Protection Act;

- Restricted Access: the reduction of the commercial fishery fleet to match available marine resources.

The 2002 revisions to the NFMP provide the framework through which the Commission can build specific, localized, management measures that respond to changes in knowledge about the nearshore ecosystem without the need to amend the plan.

In December of 2002 the Commission adopted a Restricted Access program for 10 of the species covered by the NFMP including five shallow nearshore rockfish species and California scorpionfish that are currently under federal management. The Restricted Access program will help spread effort geographically and limit allowable gears to traps or hook-and-line; permits are region-based and have gear endorsements.

Identification of key habitat for the 19 species under the plan has been an ongoing process for CDFG Marine Region GIS staff. Habitat mapping efforts, as well as data acquisition from outside sources, continue to build a comprehensive baseline of information for California's coastline. This process compliments the Nearshore Fishery Independent assessment work, which

is developing long term strategies for collection of essential fishery information.

Contributed by Deb Wilson-Vandenberg (831.649.2892)

Restricted Access for Nearshore Fisheries

California regulations require a Nearshore Fishery Permit for the take of the following nearshore fish species: cabezon, California scorpionfish, California sheephead, kelp and rock greenling, black-and-yellow rockfish, China rockfish, gopher rockfish, grass rockfish, and kelp rockfish; and a moratorium on the issuance of new permits. A restricted access program for the California shallow nearshore fishery was adopted by the Fish and Game Commission (Commission) at their December 20, 2002 meeting in Monterey for these species. The program reduces the number of permitees by 65% and their potential catch by 35%.

A regional management approach to allocating fish was adopted in light of considerable differences in northern populations of nearshore fishes relative to populations found in southern California. Nearshore landings (total allowable catches) have been established for each of four regional areas to be distributed by trip limits to qualifying permits. The qualifying criteria result in the following:

- North Coast Region (Oregon border - Cape Mendocino) - 35 permits, no gear endorsements.
- North-Central Coast Region (Cape Mendocino - Point Año Nuevo) - 22 permits, six trap gear endorsements.
- South-Central Coast Region (Point Año Nuevo - Point Conception) - 60 permits, 13 trap endorsements.
- South Coast Region (Point Conception - US/Mexico border) - 57 permits, 39 trap gear endorsements.

Note: Within each region are limited gear requirements and in-season fishing trip limits.

Permittees are allowed only one permit to fish in a single region. The fishery is limited to line gear, unless the permit holder has a trap gear endorsement. Criteria for initial permit issuance (transferable permits), for non-transferable permits for 20-year commercial fishermen and for gear endorsements were established. A 2-for-1 permit transfer system was adopted that requires new entrants to purchase two permits from the same region, permanently retire one permit and use the other to fish. Additionally, a Nearshore Bycatch Permit was adopted for trawl and gill net fishermen that have had a Nearshore Fishery Permit in previous years. Other provisions include

annual renewal of permits, fees for permits and permit transfers, how to appeal denial of a permit or transfer, and conditions under which a permit can be revoked.

In addition to the permitted species above, a separate restricted access program is being developed, with its own qualifying criteria, for nine additional "deeper nearshore" species. At their February 7, 2003 meeting in Sacramento, the Fish and Game Commission adopted new permit requirements for the deeper nearshore segment of the commercial nearshore fishery for the 2003-04 fishing season. The Deeper Nearshore Species Fishery Permit (DNSFP) covers the following species: black rockfish, blue rockfish, brown rockfish, calico rockfish, copper rockfish, olive rockfish, quillback rockfish, treefish rockfish, and monkeyface prickleback.

To qualify for a DNSFP, an applicant must have made landings that cumulatively total 200 pounds of any of the eight species listed above from January 1, 1994 through December 31, 1999.

For more information, go to *www.dfg.ca.gov/mrd/restricted_access.html* or *www.dfg.ca.gov/news/news03/03022.html* or the Commission's Web site at *www.dfg.ca.gov/fg_comm//proposedregs02.html*.

Contributed by Traci Bishop (805.568.1323)

Cooperative Research and Assessment of Nearshore Ecosystems (CRANE)

In 2001, the CDFG and more than 15 universities and governmental agencies began to plan a cooperative sampling effort to provide information for managing California's nearshore rocky reef fish and invertebrate populations as well as information that can be used to evaluate rocky reef ecosystems as a whole. Specifically, the objectives of the sampling are: 1) to estimate the density of nearshore fish and invertebrates that are subject to fisheries, 2) to measure the size structure of these populations, and 3) to measure habitat and ecosystem components that can be associated with changes in density and size distributions over space and time. The goal is to sample approximately 90 sites in California from Oregon to the Mexican border. Divers will survey depths from 6 to 20m. If techniques for taking measurements with Remotely Operated Vehicles (ROVs) are validated, a subset of the sites will be surveyed to a depth of 100 m.

In 2002, the CDFG focused on technique development and validation for the surveys. To measure the variability of diver estimates and the power of the sampling to detect changes over space and time, repeated sampling was conducted over a period of 4 to 6 weeks at two sites. A draft report on the results of this work will be issued in June 2003. For ROVs, we are developing automated techniques for measuring transect length and width in order to reduce post-processing costs. We are also measuring the precision of estimates of fish size and density.

At the present time, we are working to integrate the CRANE effort with the monitoring program for the newly established Marine Protected Areas in the northern Channel Islands. In addition, the CDFG has received a grant from the California Impact Assistance Program for SCUBA and ROV surveys to compare nearshore fish and invertebrate densities and habitats in reserve and non-reserve areas. We are now finalizing the sampling program. Depending on budgetary constraints, the sampling will be conducted either in the fall of 2003 or 2004.

Contributed by Mary Bergen (805.649.5207)

3. Marine Protected Areas

The Marine Life Protection Act

The Marine Life Protection Act (MLPA) requires the CDFG to develop a master plan for Marine Protected Areas (MPAs) in California. This plan must include information on specific site recommendations, implementation and phasing, funding, monitoring, enforcement and management. The MLPA contains specific goals for MPAs including, but not limited to, protecting ecosystems, representing habitats, helping sustain populations, improving the existing array of MPAs, and ensuring that the new system functions, to the extent possible, as a network.

In late June 2001, the CDFG introduced Initial Draft Concepts for MPAs to meet the MLPA goals and requirements. These Concepts were developed with the assistance of a Master Plan Team (MPT) as required by the MLPA. While some public input was acquired prior to the release of the Concepts, they were intended as a starting point to gather more public input and develop the final master plan. Ten public workshops were held in July 2001 to begin this public input process.

One of the most frequent and important comments given at these meetings was that the CDFG had not effectively involved the public in early planning, and that future drafts needed to have significant levels of constituent input. In an effort to address these concerns, the CDFG held informal small group meetings with various constituent groups in the fall of 2001, and established seven Regional Working Groups in 2002. The small group meetings were used to inform constituents of the MLPA process and time line, gather information on general concerns, and discuss potential processes to complete the MLPA master plan, as well as specific alternatives for MPA siting.

The facilitated Regional Working Groups began meeting in July 2002. These groups provide a more formal forum for constituent input. The groups include representatives from recreational and commercial fishing, diving, environmental, and ecotourism interests, harbor districts,

scientists, and research/education and military organizations.

The Working Groups will make recommendations for a range of alternative proposals for MPAs to the CDFG. These recommendations must be guided by the goals and objectives listed in the MLPA. The input received from the Working Groups will be presented to the Director without changes from the CDFG. However, this does not mean that all Working Group recommendations will necessarily be incorporated in the final Master Plan.

The Working Group process will be supported by input from the Master Plan Team. The Working Groups will develop information on how each potential MPA addresses various MLPA goals as well as rationale for the MPAs creation. The Master Plan Team scientists will provide analyses of each site and descriptions of their potential ecological, fisheries, and socioeconomic impacts.

As a starting point, the Regional Working Groups were asked to review the MLPA goals and objectives. The Working Groups will apply these broad programmatic goals and objectives to their local regions to develop regional marine resource objectives or "visions for the future" of marine resources. Recommendations can then be made on how the existing array of MPAs can be improved to meet these marine resource objectives. The final result will be recommendations for a range of alternative MPAs.

Once recommendations for alternative MPAs are developed, the Regional Working Groups will look at other factors such as funding, management, monitoring, and enforcement that may effect the implementation of MPAs. The Master Plan can include suggestions for MPA implementation phasing and the Working Groups can provide input on how phasing may assist with implementation.

A draft Master Plan is due to the Fish and Game Commission no later than January 1, 2005. This plan will be reviewed and revised and a final plan with regulations must be adopted no later than December 1, 2005.

Further information can be found at MLPA Web site, at: www.dfg.ca.gov/mrd/mlpa/index.html

Contributed by John Ugoretz (805.560.6758)

Channel Islands Marine Protected Areas

The new Channel Islands Marine Protected Areas are now in effect. These were derived from recommendations originally provided to the California Fish and Game Commission (Commission) in April 1998 to create marine reserves, or no-take zones, around the northern

Channel Islands. This recommendation suggested closing 20% of the shoreline outward to 1 nautical mile to all fishing. The recommendation led to nearly one year of public discussion of the issue in the Commission forum. In response to the proposal and the need for an open constituent-based process, the Channel Islands National Marine Sanctuary (Sanctuary) and the CDFG developed a joint federal and state partnership to consider the establishment of marine reserves in the Sanctuary. The Commission endorsed this process at its March 4, 1999 meeting.

The Channel Islands National Marine Sanctuary Advisory Council (SAC), an advisory body to the Sanctuary Manager, created a stakeholder based community group called the Marine Reserves Working Group (MRWG) in July, 1999. This constituent panel was comprised of 17 members representing State and federal agencies, conservation interests, consumptive recreational and commercial groups, the public at large, and the California Sea Grant program. The MRWG met 24 times between July 1999 and June 2001 to discuss issues surrounding the potential establishment of new MPAs and try to come to consensus on a recommendation on marine reserves at the Channel Islands.

While the MRWG did not reach consensus on a specific recommendation for the spatial placement of Marine Protected Areas, they did agree on a mission statement, problem statement, goals and objectives. The MRWG's goals stated the following:

> Ecosystem Biodiversity Goal: To protect representative and unique marine habitats, ecological processes, and populations of interest.
>
> Socio-Economic Goal: To maintain long-term socioeconomic viability while minimizing short-term socioeconomic losses to all users and dependent parties.
>
> Sustainable Fisheries Goal: To achieve sustainable fisheries by integrating marine reserves into fisheries management.
>
> Natural and Cultural Heritage Goal: To maintain areas for visitor, spiritual, and recreational opportunities which include cultural and ecological features and their associated values.
>
> Education Goal: To foster stewardship of the marine environment by providing educational opportunities to increase awareness and encourage responsible use of resources.

The information and recommendations developed in the MRWG process led to a CDFG recommendation for MPAs in the region. This recommendation, along with a range of alternatives, was presented to the Commission in August 2001. The Commission requested that the CDFG develop proposed regulations for the range of alternatives. The alternatives ranged

from about 12% of State waters within the Sanctuary to more than 30% of State waters within the Sanctuary. A no-project alternative (which would leave the existing regulations in place) and an alternative to defer decision to the MLPA process were also included.

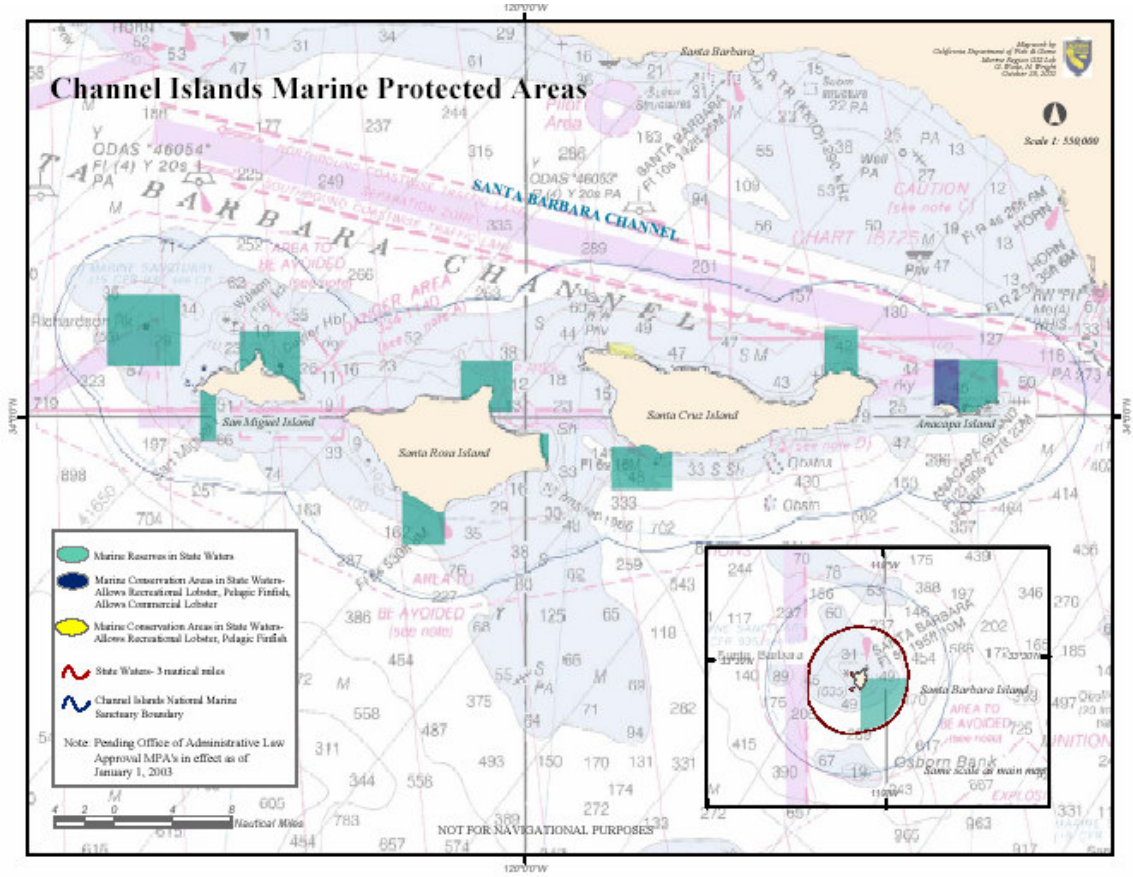
As a part of the regulatory process the CDFG also prepared a Draft Environmental Document (DED) to meet California Environmental Quality Act (CEQA) requirements. This document detailed the potential environmental impacts of each MPA alternative. The DED included information on potential impacts to both the natural environment and the human environment in the Channel Islands area. The human environment includes potential socioeconomic impacts to both consumptive and non-consumptive user groups.

The DED was available for public comment during a 94 day period between May 30 and September 1, 2002. Public comments were responded to in a revised Final Environmental Document. The Commission held a special meeting on October 23, 2002 to make a decision on the matter. At this meeting they certified the Final ED and adopted the CDFG's preferred alternative for Channel Islands MPAs.

The newly adopted MPAs were implemented on April 9, 2003. They consist of 12 individual areas encompassing approximately 142 square nautical miles of State waters around the Channel Islands. Ten of the areas are State Marine Reserves where take of living, cultural, and geological resources is prohibited without a special permit. These ten areas encompass 132 square nautical miles. Two of the areas are State Marine Conservation Areas. One allows the commercial take of spiny lobster and the recreational take of lobster and pelagic finfish. The other allows only the recreational take of lobster and pelagic finifish.

An important part of the management of these new MPAs will be monitoring. With that in mind, the CDFG has taken several steps to ensure that the biological, social, and economic effects of the MPAs are measured over time. A comprehensive list of existing biological monitoring programs has been compiled and is available on the CDFG's Marine Region Web site. In March, the Deaprtment held a workshop to receive input on potential monitoring programs. More than 100 representatives from the scientific, fishing, and environmental communities joined the CDFG and other agency staff at the workshop. Participants split into focused groups discussing biological, social, and economic monitoring. Their input is being used to draft a preliminary monitoring plan for the region.

A map of the new MPAs is provided below:



More information on the Channel Islands MPA process, including detailed descriptions and maps of the new MPAs is available on the CDFG web site:
www.dfg.ca.gov/mrd/channel_islands/index.html

Contributed by John Ugoretz (805.560.6758)

B. 2002 CALIFORNIA FISHERY REVIEW

The 2002 California commercial groundfish harvest (Table 1), was approximately 12.3 thousand metric tons (27.1 million pounds), with an ex-vessel value of $16.1 million. Total harvest and revenue were slightly higher than those in 2001 and represent a slight reversal of the downward trend evident in recent years. For 2001, landings dropped 25% from 2000 while the total revenue decline was about 13 percent. In contrast, total groundfish landings as late as 1994 were nearly 25 thousand metric tons (55 million pounds) worth approximately $25 million.

In 2002, 89% of the groundfish landed was taken by bottom and mid-water trawl gear, a

slight increase from the 86% observed in 2001. Line gear accounted for the second largest amount at 9.5%, a slight decrease from 11% observed in 2001. The line gear contribution was at a recent peak in 1992 at 18%. Trap gear dropped slightly to 1.5 % from 2% in 2001. Gill and trammel net landings have dropped to near zero because of increasingly restrictive State and Federal regulations. The major reduction in there use to harvest groundfish occurred between in the mid-1990's. Their contributions dropped from 5% in 1993 to 1% by 1996.

Dover sole, thornyheads, sablefish, and Pacific whiting dominated California's 2002 groundfish harvest. Landings of Dover sole and thornyheads experienced increases relative to 2001 while landings of sablefish, lingcod and other rockfish declined sharply. These declines reflect more restrictive landing limitations adopted by Pacific Fishery Management Council in November 2001 and during 2002, which were designed to reduce the harvest of depleted rockfish and lingcod stocks. Shore-side landings of Pacific whiting remained relatively low in 2002 compared to recent years.

Contributed by Dave Thomas (510.581.7358).

California 2002 Commercial Groundfish Landings (Metric Tons)

	2002	2001	2002 % Change From 2001	1991	2002 %Change From 1991
FLATFISH	4,972	4,559	9	10,766	-54
Dover sole	3,131	2,399	31	7,721	-59
English sole	375	419	-11	812	-54
Petrale sole	479	555	-14	734	-35
Rex sole	287	235	22	621	-54
Sanddabs	560	788	-29	559	
Other flatfish	140	163	-14	319	-56
ROCKFISH	2,737	2,401	14	13,830	-80
Thornyheads	1,589	847	88	2,871	-45
Widow rockfish	44	332	-87	1,304	-97
Chillipepper	160	343	-53	3,116	-95
Bocaccio	22	23	-4	1,314	-98
Canary	11	9	22	271	-96
Darkblotched	44	71	-38	341	-87
Splitnose rockfish	52	95	-45	488	-89
Other rockfish	815	681	8	4,125	-80
ROUNDFISH	4,230	3,998	1	11,046	-62
Lingcod	81	62	31	787	-90
Sablefish	1,318	1,547	-15	3,353	-61
Pacific whiting	2,773	2,306	20	6,893	-60
Kelp Greenling	9	11	-18	6	50
Cabezon	51	72	-29	7	628
OTHER GROUNDFISH	336	904	-52	193	162
TOTAL	12,277	11,862	4	35,835	-66

C. MULTISPECIES STUDIES

1. Central California Refugia Study

Reserve Studies

Due to changes in mandates and project focus, studies conducted previously at Big Creek Ecological Reserve (BCER) and Point Lobos Ecological Reserve (PLER), were not pursued in 2002 or the beginning of 2003

2. Nearshore Reef Fish Tagging Project (Northern California)

Between 1995 and 1998, our catch, tag and release program headquartered in Fort Bragg captured 12,293 fish, of which 11,275 were tagged and released. A reward program was established to entice fishers to bring in tagged fish, offering rewards worth up to $1000. Currently, the percentage of fish tags returned ranges from 1% to 7%, dependent on species. Analysis of this still-growing volume of data is currently under way. Preliminary results from tag returns suggest a high degree of residentiality (staying close to a 'home' territory) for gopher rockfish, china rockfish, black-and-yellow rockfish, kelp greenling and cabezon. Long-distance movement has been documented for black rockfish, yellowtail rockfish, canary rockfish (northward), vermilion rockfish (southward) and lingcod (north and south, as well as nearshore-offshore). Results also indicate that rockfish survive over the long term after having their swim bladders punctured. Puncturing rockfish swim bladders relieves overinflation, which occurs when the are brought rapidly to the surface. Additional studies are needed to isolate tagging, hooking, and other causes of mortality for all species of concern, and to determine degree-of-movement for species such as cabezon, black rockfish and gopher rockfish.

Contributed by Kon Karpov (707.964.7298)

3. Punta Gorda Resource Inventory and other ROV Based Assessments

A quantitative inventory of habitat and species of management concern at Punta Gorda Ecological Reserve was completed (Karpov et al 2002). ROV, SCUBA, and side-scan sonar mapping were combined in this GIS based study. In addition a red abalone DNA study was also completed as part of this work.

In November of 2002 a ROV research cruise was completed using the patrol vessel *(PV) Bluefin* as a research platform off Monterey California. During this one month cruise we addressed two major questions:

a) What is the precision of virtual strip transects (length and width) produced using "state of the art" sonar and GPS tracking methodologies. We used various methods including a fixed 70 meter line deployed by divers, ROV based sonar, Track II navigation, WAS GPS, and multi-beam bathymetry and habitat maps, multiple sets of parallel sonar, to both improve and test spatial accuracy and tracking precision. Precision estimates are needed to quantify error in density estimates of finfish and invertebrates using ROV and comparable submersible methods, including comparisons to SCUBA based survey off fixed transect lines.

b) Do densities of major finfish encountered vary over time and depth. During this one month survey we repeated a 2x720 m virtual transects line across a depth range of 20-45 m on multiple survey days. Navigational skill and tracking accuracy for both the *PV Bluefin* and ROV allowed us to replicate the same 3.5 km of track within a ±10 meter targeted band. We are applying precision estimates and methods developed in (a) to examine variation in density differences.

Contributed by Kon Karpov (707.964.7298)

4. Fishery Monitoring

*S*tatistical and biological data from landings are continually collected and routinely analyzed by CDFG to provide current information on groundfish fisheries and the status of the stocks. Outside funding also enables California fishery data to be routinely incorporated into regional databases such as PacFIN, RecFIN and MRFSS.

Contact Dave Thomas for more information (510.581.7358).

In-season Monitoring

The California Fish and Game Commission (Commission) and the CDFG have the authority to manage nearshore species as defined by the Marine Life Management Act and the Nearshore Fisheries Management Act. Four of those species are cabezon, California sheephead, kelp greenling, and rock greenling. Within the scope of management methods, annual optimum yields (OY) were established by the Commission in December 2000 for these species with separate allocation limits for the recreation and commercial sectors. In the summer and fall of 2001, the Commission had to exercise its emergency regulatory powers to close the commercial nearshore fisheries for these species when the OYs were expected to be reached and possibly exceeded. Emergency action was necessary because the regulations did not establish the OY or a

mechanism for closing the fisheries in the event an allocation was reached. Furthermore, due to the time lag of reported landings entering the computerized system and the necessary time it took to carry out the emergency closure procedures, these OYs were exceeded. To prevent this from happening again and to improve the in-season monitoring of these fisheries, the Commission gave authority to the CDFG to take action as a routine management measure to close either or both recreational and commercial sectors of the cabezon, California sheephead, and greenling fisheries upon projected attainment of the established OYs and fishery allocations. This action took place in April 2002. Currently, in-season monitoring is or will be used to track landings against statewide total allowable catches (TACs), statewide and/or regional allocations, and trip limits.

CDFG personnel were assigned the task of in-season monitoring of these fisheries. To accomplish the task, three methods were developed to acquire the commercial data as quickly as possible. On a weekly basis, the CDFG's Commercial Fisheries Information System (CFIS) is accessed and the most current landings data on the system are extracted and downloaded. Summary status reports are then generated from these data and forwarded to appropriate CDFG personnel. One drawback to this method is that there is a normal time lag of approximately six to eight weeks between the time commercial dealer receipts are competed at the time of landings and the time those data are actually entered into CFIS and are accessible by CDFG personnel. A second method was developed to improve on this time lag. Since 1985, Pacific States Marine Fisheries Commission (PSMFC) fishery technicians have collected commercial landings data for selected federally managed groundfish species at landings sites. This has been done on a weekly basis and has been coordinated with the CDFG's statewide Groundfish Coordinator. Summary forms of these data are transferred to the federal database system called the Pacific Fisheries Information Network (PacFIN) for inclusion in a special system called the Quota Species Management (QSM) subsystem. Reports are then generated to detail the estimated cumulative catches of these species. The lag time for this process is somewhat shorter, at approximately two to three weeks. In 2002, a cooperative agreement was made with the CDFG's statewide Groundfish Coordinator to have the PSMFC fishery technicians collect additional landings data for the four state-managed nearshore species for inclusion in the PacFIN/QSM systems. These data are also transferred to CDFG personnel for summary and analysis. This second method thusly reduces the overall lag time to approximately two to three weeks and improves the CDFG's ability to manage those commercially landed nearshore species. The third method involves the cooperative effort of office staff, specifically at the CDFG's San Diego office. Dealer receipts are required by law to be submitted to the local Department of Fish and Game office twice monthly (part of the above-described CFIS data entry process). At the San Diego office, one of the support staff manually pulls out those receipts, records the appropriate landings, and then forwards those landings data to the nearshore groundfish project – all before those receipts are forwarded to the Los Alamitos office for entry into the commercial landings database. This shortens the usual delay time of six-to-eight weeks down to three-to-four weeks.

Contributed by Bob Leos (831.649.2889)

5. Ageing Work

Production Ageing

In recent years, CDFG has production-aged three species of groundfish by reading otoliths for annuli; Dover sole, chilipepper rockfish, and bocaccio rockfish. During 2001, 3,000 Dover sole, from the Monterey and Eureka INPFC areas, and 3,000 chilipepper rockfish, coastwide, were aged. During 2002, 2,848 Dover sole, from the Monterey and Eureka INPFC areas, and 3,221 chilipepper rockfish, coastwide, were aged.

Contributed by Brenda Erwin (650.631.6740).

6. Spot Prawn Trawl Bycatch

In February 2003 the California Fish and Game Commission took action to prohibit the take of spot prawns using trawl nets. The new regulations became effective April 1, 2003. This action was largely due to the Commission's concern with groundfish bycatch in this fishery, in particular bocaccio, cowcod, and darkblotched rockfishes. The CDFG had estimated total finfish bycatch by species in the California spot prawn trawl fishery for a one-year period in 2000-01, based on an onboard observer program in which 86 trawl tows were observed. A report was provided to the Commission summarizing the results of that study.

When the Commission prohibited spot prawn trawling, it directed the CDFG to begin working on a plan to convert spot prawn trawl permits to spot prawn trap permits. The spot prawn trap fishery is presently a two-tiered, restricted access fishery with only 21 permits. Adding new vessels will require development of a new capacity goal and possibly a restructuring of the permit system and implementing fishing area restrictions. The existing trap fishermen are concerned about the gear congestion on the traditional trapping grounds that a conversion program may cause. It is also not known how many of the spot prawn trawl fishermen will be willing and/or able to convert to trap fishing. It is unlikely that a conversion program will be implemented before the 2004-2005 fishing season due to staff work loads.

Contributed by Paul Reilly (831.649.2879) and Kristine Barsky (805.985.3114)

7. California Shelf Flatfish Trawl Fishery EFP

This Exempted Fishing Permit (EFP) implemented a cooperative program between the National Marine Fisheries Service (NMFS) and the CDFG where state-sponsored and NMFS trained observers are placed aboard six limited entry trawl vessels targeting shelf flatfish with legal small footrope trawl gear (including Scottish seine) in the EEZ off the state of California, in order to monitor fishing strategies, collect catch and incidental catch data, and observe the retention of rockfish. This project was funded with federal/state Groundfish Disaster Relief funds and was contracted through the Pacific States Marine Fisheries Commission (PSMFC).

Vessels fishing under this EFP were required to retain all rockfish (*Sebastes sp*. and *Sebastolobus sp.*); therefore, EFP provisions were made to allow the retention of rockfish in excess of published trip limits for limited entry small footrope trawl vessels south of 40^{O} 10' N. latitude. The retention of all rockfish was expected to provide information to evaluate the broader application of a full retention program in the groundfish fleet. Proceeds from the sale of rockfish that were in excess of limited entry small footrope trawl trip limits published in the Federal Register were forfeited to the CDFG. This EFP contained provisions that allowed up to 70,000 lb per month of shelf flatfish, no more than 40,000 lb of which could be a species other than Pacific sanddabs and of the 40,000 lb no more than 15,000 lb of which could be petrale sole, to be taken in federal waters (seaward of three miles) that are adjacent to the state of California and shoreward of the 70 fathom depth contour, to be sold for profit. All other species incidentally caught by vessels fishing under this EFP were counted against the individual vessel's trip limits as published in the Federal Register. The permit was valid only for landings made at processing plants that had been specifically designated by the CDFG as participants in this program. EFP fishing was further constrained by the incidental catch of bocaccio, cowcod, canary, and yelloweye rockfish. An individual vessel was not permitted to take more than 100 lb each of bocaccio, canary, and yelloweye rockfish per fishing month. Additionally, an individual vessel was not permitted to take more than 50 lb of cowcod rockfish. If either the 100 lb threshold for bocaccio, canary, or yelloweye rockfish or the 50 lb threshold for cowcod rockfish was reached by an individual vessel, then all EFP fishing by that vessel would be terminated for the balance of the month. The cumulative amount harvested by all participants fishing under this EFP of any one of the following rockfish species, bocaccio, canary, or yelloweye, could not exceed 500 lb in a fishing month. If the 500 lb threshold was reached for any one of these species, all EFP fishing would be terminated for the remaining days of the month, but could resume the following month. The cumulative amount harvested by all participants fishing under this EFP of any one of the above named rockfish species could not exceed 1,000 lb at any time. Additionally, the cumulative amount of cowcod rockfish could not exceed 250 lb at any time. If either the 1,000 lb threshold for bocaccio, canary, or yelloweye rockfish or the 250 lb threshold for cowcod rockfish was reached, then all EFP fishing would be terminated for the remainder of the year. Each calendar month, during the effective dates of this permit was divided into two EFP periods. The first period was the first of the month through the fifteenth, and the second period was the sixteenth through the last day of the month. The CDFG assigned individual vessels to one period per month.

The permitted period ran from October 18 through December 31, 2002. Two state observers and two federal observers were employed to conduct the field observations. Each observer was responsible for two boats. When the Flatfish Study began two State observers were assigned to it and the third observer was supplied by the West Coast Groundfish Observer Program as they were already observing two of the permitted flatfish boats.

The six flatfish EFP boats made 30 trips from October 20, 2002 to the end of the study on December 31, 2002. The PSMFC port fisheries technicians sampled 33.3 % (10 trips) of the trips and took 29 samples. During the study, 24 lb of bocaccio, 7 lb of canary, 31 lb of cowcod and no yelloweye were caught for a total of 62 lb of trigger species (Table 1), far below the threshold level for closing the fishery. Rockfish caught totaled 4,589 lb which was 2.7 % of the landings and 2.2 % of the total catch (landings + discards). Chilipepper rockfish made up 79 % (36,459 lb) of the rockfish caught. Almost all of the Chilipepper rockfish was caught by the two vessels fishing out of Monterey Bay and a little over 1/3 of that was caught in one tow. Pacific sanddabs were the primary target of the fishery and constituted 78.2 % of the landings. Discards for all trips totaled 36,456 lb (Table 2) which amounted to 6,076 lb per boat or 1,215 lb per trip. The average poundage of discards per trip ranged from a low of 301 for the F/V Kincheloe to a high of 4,244 for the F/V Anna Marie. The number 1 discard at 9,315 lb was Dungeness crab followed by skates at 7,216 lb and then batrays with 4,660 lb.

A shelf flatfish EFP experiment is planned for July 1 to October 31, 2003, to evaluate modified trawl nets in waters deeper than provided for in the 2002 study. The completed 2002 EFP employed the use of traditional, unmodified shelf trawl gear to a depth of 70 fathoms. However, the second study phase will evaluate experimental shelf trawl gear modified to function as a rockfish excluder device while allowing the take of more productive flatfish stocks. Gear configuration requirements are similar to modified trawl gear utilized in research and EFP experiments through Oregon Department of Fish and Wildlife. This EFP expands possible application of the modified trawl net to the California coastline. An expansion of the EFP to a depth of 100 fathoms will allow evaluation of modified trawl gear over deeper rockfish grounds where the encounter with overfished rockfish species, such as bocaccio, increases.

Contributed by Patrick Collier (707.441.5756) and Susan Ashcraft (650.631.6786)

D. BY SPECIES

1. Shoreside Whiting

General Whiting Season

California shore-based landings of Pacific whiting (*Merluccius productus*) totaled 2,771 metric tons (MT) in 2002, 6.2% of the 44,906 MT US shore-based quota. Landings in 2002 represented a 17% decrease from the 2,305 metric tons landed in 2001.

Three vessels targeted Pacific whiting during the 2002 primary season. The early California season started April 1, 2002 from 40° 30' N. lat to 42° 00' N. lat. with the first delivery on April 5, 2002. For areas south of 40° 30' N. lat in California, the season opened April 15, 2002. The general coastwide (Washington, Oregon and California) season started June 15, 2002 and ended September 1, 2002. The last California landings occurred on July 16, 2002.

Shorside Whiting EFP Fishery

The shoreside whiting EFP was conducted again in 2002 in California.
Three midwater trawlers landed 2,732 MT of unsorted whiting at three designated processing plants during 2002. The trawlers fished under the provisions of an exempted fishing permit (EFP), allowing them to land unsorted whiting catches at designated processing plants without penalty for taking prohibited species or exceeding trip limits, but requiring full retention of all prohibited species and all groundfish species. The EFP implements a cooperative state/federal/industry program to monitor and quantify the bycatch of salmon and groundfish in the shore-based Pacific whiting fishery.

Fishery technicians observed eight of 71 EFP deliveries in California (an 11.3% observation rate). The observed landings included 320 MT of whiting, 1.1 MT of groundfish, and 9 Chinook salmon weighing 39 pounds. The bycatch rate for the observed EFP deliveries was .03 salmon per MT, and 7.4 pounds groundfish per MT of whiting (br=0.35%)

The total bycatch for all EFP whiting vessels weighed 2.2 MT. The bycatch included 36 Chinook salmon (189 pounds total) for a harvest rate of 0.01 salmon per MT of whiting. The rockfish bycatch amounted to 1.9 MT (4,384 lbs) with a harvest rate of 1.6 lbs of rockfish per metric ton of whiting (br=0.6). The rockfish bycatch included widow rockfish (1.3 MT, br=0.4), bocaccio (0.5 MT, br=0.16), darkblotched rockfish (22 lbs), chilipepper rockfish (8 lbs), and miscellaneous shelf rockfish (180 lbs). The combined bycatch of other fish, including spiny dogfish shark, jack mackerel, and lingcod weighed 334 pounds.

Though the shoreside whiting EFP is being conducted in 2003, the Pacific Fishery Management Council intends to discontinue this EFP in 2004.

Contributed by Patrick Collier (707.441.5756) and Mike Fukushima (707.441.5756)

E. GEOGRAPHIC INFORMATION SYSTEM (GIS) APPLICATIONS

The CDFG provide a wide range of GIS services and products to its biologists, managers, and the public. These activities include the collection, maintenance, and distribution of spatial data relevant to marine and fishery resources. These data include bathymetric, biological, hydrological, oceanographic, topological and administrative boundaries. Resolution of these data sets varies. For example, two hundred meter resolution bathymetry is available from the nearshore out to 200 miles, and 1-meter resolution multibeam bathymetry is available for select portions of the coast.

DFG's GIS database includes terrestrial and oceanographic base data sets. Terrestrial data sets include major rivers, lakes and watersheds. These data sets are primarily used to show sources and locations of coastal runoff. Oceanographic data include submarine features, coastal upwelling, and sea surface temperature. Coastal points, rocks, coastline and several other topological datasets are frequently used.

GIS data sets of management boundaries include marine protected areas, restricted fishing areas, administrative fishing blocks, administrative districts, jurisdictional and kelp administrative boundaries. Management basemaps are used for proximity analysis and geographic representations.

One major biological data set DFG actively collects, processes and distributes is a coast wide estimation of macro algae canopy coverages. These coverages are estimated with mutispectral digital photos taken from elevation of 11,000 ft. Aerial images are geographically corrected and area estimations are taken with GIS software. It is the goal of DFG to produce seasonal digital imagery of the coast wide extent of kelp. Completed kelp data are available from 1989 and 1999 aerial surveys. For 2002, most of the coast was photographed during August and October. Based on weather conditions, sites surveyed for the 2002 season include Channel Islands, most of the Southern California Bight, all of central California, and a small portion of the Northern California Region. Kelp distribution data are used as a proxy for the location of rocky substrate and fishery habitat assessment.

With existing base maps and current data, the Marine Region GIS Lab has been able to provide GIS services and products in a wide array of applications. Recent applications include: socio-economic GIS development, spatial documentation of recreational and commercial fishery landing in time series, life history documentation of species' ranges, a summary of recreation fishery regulations for the public, ongoing collection of bathymetric substrate and habitat classification data, site selection of marine projected areas in working group meetings, and management boundary generation of rockfish conservation areas. In addition, the Lab has provided GIS and remote sensing support for fishery-independent SCUBA and ROV (Remotely Operated Vehicle) surveys of the nearshore ecosystem. These services include database design and management, survey site selection, remotely sensed data collection, and GIS project development.

Nancy Wright and the Marine Region GIS Lab have also initiated interdepartmental and interagency cooperation through the establishment of the Marine Mapping Users Group (MMUG) in 2000. MUGG was created to facilitate communication, exchange data and ideas between academic, state and federal organizations involved in GIS. Since its inception, a full time position has been dedicated to develop and coordinate its activities through workshops and A MMUG web site. Meetings are held regularly to share ideas, and guest speakers are invited to present the latest in research and technology relating to GIS and/or remote sensing.

Current MUGG members include the California Coastal Commission, California Coastal Conservancy, Southern California Coastal Water Research Project, Channel Islands National Marine Sanctuary, National Oceanic and Atmospheric Administration, Monterey Bay National Marine Sanctuary, SIMON, United States Geological Society, National Marine Fisheries Service, Naval Facilities Engineering Service Center, University of California, Santa Cruz, California State University, Monterey Bay, Moss Landing Marine Laboratories, University of California, Santa Barbara, Oregon State University, Boston University, Woods Hole, University of California, Davis, Bodega Bay Marine Laboratories, Monterey Peninsula College, University of California, San Diego, California State University, Monterey Bay, Ocean Imaging, Inc., Tahoe Maps, Inc. and Environmental Systems Research Institute, Inc.

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F. ONGOING AND FUTURE RESEARCH AND ASSESSMENT ACTIVITIES

Collaborative Cowcod Rockfish Survey in Cowcod Conservation Area (CCA)

The Northern Cowcod Conservation Area (CCA) is a large fishing area closure that protects the overfished cowcod rockfish, in addition to other overfished species such as bocaccio. Located off Southern California, all forms of bottom fishing are banned in the area, including the much smaller Southern CCA. Thus, the need exists for the use of non-intrusive sampling techniques in order to monitor the recovery of overfished rockfish species in the areas. CDFG conducted two collaborative ROV survey cruises during 2002 with John Butler, NMFS, La Jolla. Cruise dates were during mid-September, and during the mid-November. The research platforms were the CDFG research vessel *Mako*, and a chartered CPFV vessel *Outer Limits*.

This project provided baseline inventory data for use in monitoring the recovery of cowcod and bocaccio. The data were collected as part of a continuation of a three-year study that was initiated by in 2001 by NMFS and CDFG. The additional transects that were surveyed as a result of this

phase increased the precision of the findings from the ongoing study.

In addition, in the 2000-2002 Research and Data Needs, the PFMC specifically called for "increased monitoring of marine reserves and other areas of restricted fishing in order to gain information on current reserves that might be extrapolated to evaluate the creation of additional reserves on the West Coast." Results from this study are anticipated to be applicable to other species and other areas.

The surveys were conducted using a habitat based block design where the number of transects will be higher in blocks with the most suitable habitat for cowcod. The NMFS Phantom ROV was used, and equipped with paired lasers to measure distance covered and fish size. On-board software provided exact GPS positioning of ROV transects and sited individuals. All species of rockfishes were identified and measured using a laser calibrated field of view. Video cameras mounted on the ROV recorded all transect observations on high-resolution videotape for post-cruise analysis. The primary use of these ROV surveys is to provide non-destructive information on the size composition of the cowcod, and an estimate of the minimum number of cowcod and other species in the CCA. Size composition is important for interpreting the state of the recovery since it is a proxy for potential reproductive output. The surveys were carried out systematically so they could also provide an imprecise index of adult abundance.

All finfish were identified in the videotapes and habitat associations were recorded. Size composition was determined from parallel lasers. Using track logs from the GPS software, the area searched was determined. The exact locality of target species was recorded. All information is being entered into electronic databases, and the data will be edited for errors. Key sites identified during a 2001 NMFS/CDFG cruise were revisited to determine site fidelity of target species.

Preliminary results

The first cruise consisted of five days of operations with the *R/V Mako*, in which eight ROV survey dives were completed. Three dives were conducted within the Cowcod Conservation Area and five were conducted outside the CCA. All dives were located in known cowcod habitat based on both geological and southern California rockfish fishery information. During the eight dives approximately 50 cowcod were observed with the average size ranging from 22-88 cm, with a mean of about 59.7cm. The dives covered approximately 18,995 meters of transect at an average depth of 120 meters.

The second cruise used the chartered CPFV vessel *Outer Limits* as a platform for conducting the survey. This cruise consisted of eight days of ROV operations during which twenty-seven dives were completed. Twelve dives were performed within the CCA, while fifteen were performed outside the CCA. During the twenty-seven dives approximately 139 cowcod were observed.

Total transect distance covered during this second cruise was approximately 34,412 meters with an average depth 150 meters.

Planned ROV survey operations for 2003

This project is expected to be continued during the upcoming year, with two cruises planned, both using the *Outer Limits.* The first cruise is scheduled for May, and the second is scheduled for October.

Contributed by Tom Barnes (858.546.7167)

Southern California Nearshore Groundfish Tagging Project

Data are sparse on natural and fishing mortality rates and coastal movements of southern California nearshore fish stocks, including rockfish (*Sebastes*), California scorpionfish and California sheephead. This project aims to improve our understanding of these parameters, particularly as they relate to the sustainable use of these resources. The project was launched in November 2002, continued into the Spring of 2003, and will be repeated during the same time frame in 2003-04. Various southern California charterboats are contracted to carry volunteer fishermen to catch, tag and release all species of marine fin-fishes that are frequently caught when fishing in waters less than 20 fathoms in depth throughout the southern California bight. The emphasis is on nearshore fish stocks, but other species are tagged as well (e.g., lingcod, cabezon, etc.).

Contact Ed Roberts (562.342.7199

CDFG Publications 2002*

Karpov, K.A., D. Sweetnam, M. Prall, , V. Kirby, A. Lauermann, J. DeMartini, R. Villa, D.A. Powers, D. P. Albin, M. Patyten., P. Iampietero, R. Kvitek, C.K. Bretz, F. Shaughnessy, P. Buttolph" P. Veisze, and J. Geibel. 2002. Quantitative inventory of habitat and species of management importance at Punta Gorda Ecological Reserve. MERRP Sea Grant Report. Proj. PG-l, Marine Eco. Reser. Res. Prog (Available format - CD).

Veisze, P. and K. Karpov. 2002. Geopositioning a remotely operated vehicle for marine species and habitat analysis. In Undersea With GIS. D. J. Wright, ed. Redlands California USA: ESRI Press, 105-115.

** Publications list will be available in June 2003 in CalCOFI proceedings.*

WEBSITES:

http://www.dfg.ca.gov/mrd California DFG Marine Region Homepage

http://www.dfg.ca.gov/mrd/newsletter/index.html Marine Management Newsletter

http://www.dfg.ca.gov/mrd/status/index.html California's Living Marine Resources: A Status Report

http://www.dfg.ca.gov/mrd/groundfish_drp/ Groundfish Disaster Relief Program in California

http://tao.atmos.washington.edu/PNWimpacts/Seminars/2002_Seminars/1 The California Rockfish Conservation Area: Climate Fluctuations and Groundfish Trawlers at Moss Landing Harbor

http://www.oceancommission.gov/meetings/apr18_19_02/bunn_testimony.pdf Marine Life Management Issues presented by David Bunn, Deputy Director, California Department of Fish and Game before the U.S. Ocean Commission, April 19, 2002

http://www.dfg.ca.gov/mrd/index_regs.html Website contains links at bottom of page to Title 14 California Code of Regulations & California Fish and Game Code

http://www.dfg.ca.gov/mrd/fishid.html Includes:
Fish Identification Guides:

- 2002 Guide to California Marine Fish Identification: Oregon Border to Pt. Conception
- 2002 Guide to California Marine Fish Identification: Point Conception to the Mexican Border (also available in Spanish)
- California Marine Sportfish
- Life History Information for Selected California Marine Fishes
- Nearshore Finfish Profiles
- Selected Nearshore Fishes of California
- Shelf Rockfish Found off the California Coast
- Slope Rockfish Found off the California Coast

Publications of the California Department of Fish and Game:

- Life History Information for Selected California Marine Fishes
- Nearshore Finfish Profiles