The Status of Ten Fisheries
In the Santa Monica Bay

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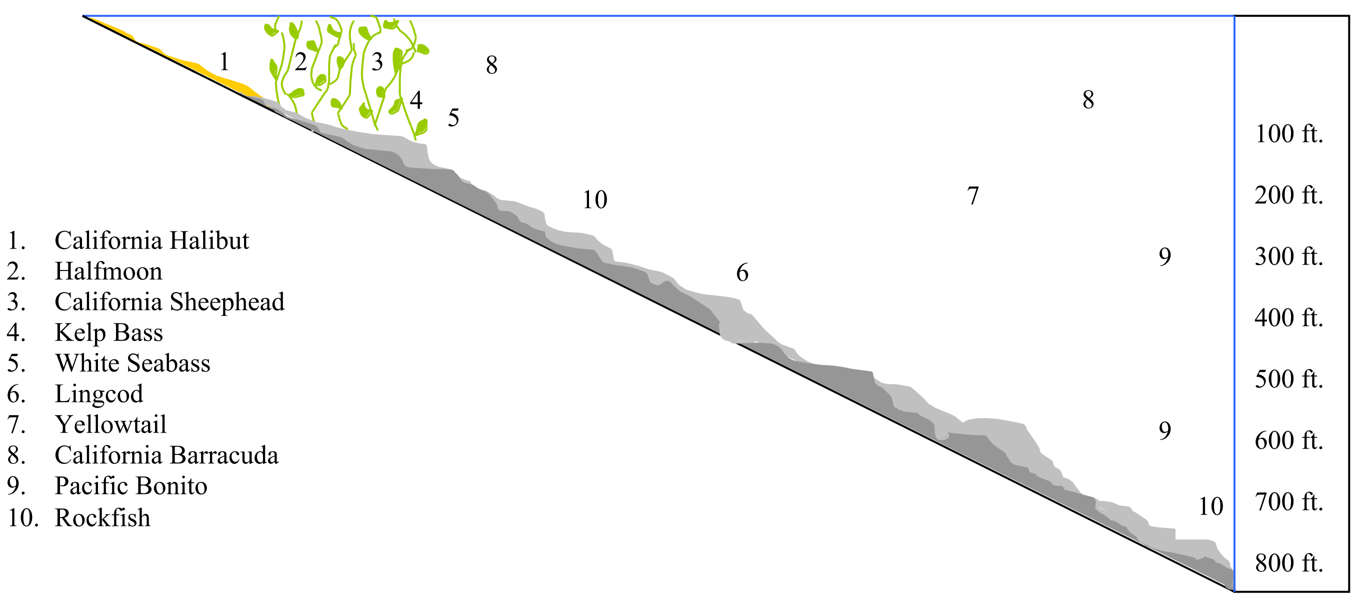
The graphs analyzed throughout this report were created using data obtained from the California Department of Fish and Game regarding recreational fish landings in the Santa Monica Bay from the years 1980 through 1999. These 10 fish graphs were chosen from the full set of 187 because they exhibited significant visible trends and therefore called for further investigation and explanation.

Many complicated factors, such as changing ocean temperatures and weather patterns, fishing pressures, and gear or take restrictions, can affect the number of fish caught in a specific area over a period of time. Consequently, the trends in landing data do not always signify accurate trends in fish abundance. Using information collected from interviews (with Joe Geever from American Oceans Campaign[1] and Captain Rick Oefinger from Marina del Rey Sportfishing[2]) and internet research, this report attempts to explain how these factors may have influenced the trends seen on each graph.

This representation illustrates the four major habitat zones inhabited by the various species discussed in this report. Where a number (representing a species) is shown more than once, the species is found in the large range between the numbers. For example, Pacific bonito (9) are found at depths from 300-600 feet (as illustrated by the two 9's on the picture).

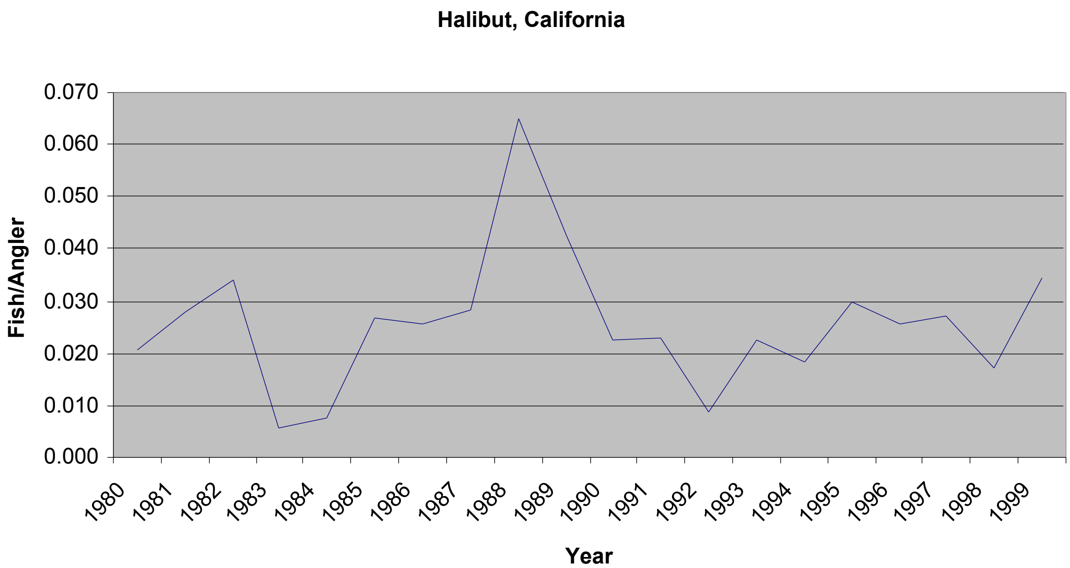
Habitats shown (from left to right, top to bottom) are:

- Shallow, sandy bottom
- Shallow, rocky bottom and kelp forest
- Pelagic (open ocean) zone
- Deep, rocky bottom



California Halibut- *Paralichthys californicus*

California halibut occur from Magdalena Bay, Baja California, to the Quillayute River, British Columbia.[3] They are found on sandy bottoms, usually at depths of 90 to 900 feet.[4] Although they are a marine species, California halibut are highly dependent on sheltered, inshore estuaries and wetlands for spawning, nursery, and feeding grounds.[5]



The graph for this species is fairly erratic, with several upward and downward spikes and no obvious overall trend. There are a wide variety of factors affecting California halibut, many of which can explain the short-term events seen on the graph. Furthermore, it is important to note that while this graph shows no obvious long-term trend, it is generally agreed that halibut have been seriously declining over the last 20 years (possibly even longer).[6] In his interview, Oefinger agreed that this species is continually declining in the Santa Monica Bay. Hence, this section will also discuss possible reasons for this decline, even though it is not readily visible on the graph.

The first event on the graph is a fairly sharp drop after 1982, where levels fall from approximately .035 to roughly .005 fish per angler. This is most likely attributed to a major El Nino event that occurred in 1982-83. According to Dr. Milton Love of the University of California at Santa Barbara, during this El Nino California halibut followed the warm waters from southern California into central California causing catches in the south to significantly decline.[7]

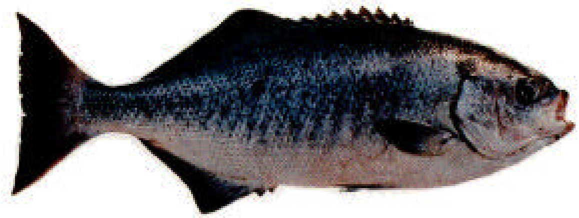
In the following years, catches seem to recover to pre-El Nino levels, when a sharp increase occurs in 1988. It is unclear what caused this upward spike, but one potential explanation may be the explosion in the live-fish market that began in 1988.[8] Live fish became extremely popular in Asian restaurants during this time, and California halibut was one of the main targeted species.[9] Although this market mainly affected commercial fisheries, it is possible that their increased popularity made these fish more attractive to recreational fishermen as well. Catches dropped again shortly afterward, back down to normal levels.

Catch levels seem to remain fairly steady through most of the 90's, with relatively small fluctuations. Some believe that the increase in 1994 was due to a commercial gillnet ban that was enacted Jan.1 of that same year, claiming that California halibut benefited greatly from this new restriction.[10] Although this ban would not have directly affected recreational fishing, it is likely that it enabled halibut populations to grow, in turn rewarding recreational fishermen. The small decrease in '98 might be attributed to another El Nino in 1997-98, causing similar effects as did the 1982-83 event. Again, these are small fluctuations with no definitive explanations; they may simply be natural yearly differences.

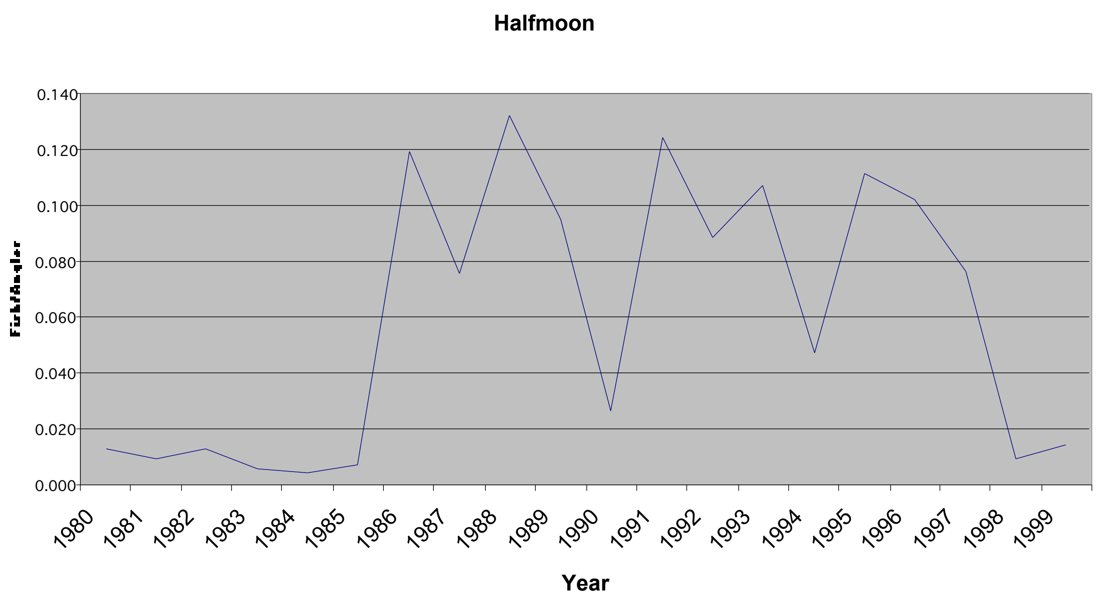
As explained earlier, most experts firmly believe that California halibut have been seriously declining over the last few decades, despite the fact that this trend is not easily visible on the graph. The most popular theory regarding this decline seems to blame the decrease on habitat loss. This species is extremely dependent on coastal wetlands and estuaries for spawning, nursery, and feeding grounds as well as for food. Unfortunately, most of California's wetlands have been severely degraded or destroyed due to human development; in the Santa Monica Bay alone, 95% of the historical wetlands have been destroyed due to draining and filling activities for agriculture, flood control, port and oil development, and urban expansion.[11] This loss of critical habitat has undoubtedly had a negative impact on population levels of the California halibut.[12] In fact, Chambers and Associates (a consulting firm specializing in the conservation of marine fish and their essential habitats) includes California halibut in a list of inshore-dependent fish species that are at or below their historic low levels of abundance.[13]

Not only have most wetlands been destroyed, but entire estuaries have been severely degraded by pollution. Because they live on sandy bottoms, halibut need clean, unspoiled sediments for optimum health. According to the American Oceans Campaign's report Estuaries on the Edge, local California halibut "depend upon the health of the Santa Monica Bay."[14] Unfortunately the Bay is severely degraded by pathogens, toxins, debris, and other pollutants, and this can greatly affect this and other fish species residing in its waters. In a study by the California State University at Long Beach, the incidence of parasites in California halibut in the Santa Monica Bay was 100%.[15] In another study by the Southern California Coastal Water Research Project, halibut living on contaminated sediments had a much lower survival rate than halibut living on clean sediments.[16] In conclusion, it seems very likely that pollution in the Santa Monica Bay may be partly to blame for the decline in this species.

Halfmoon- *Medialuna californiensis*



Halfmoon occur from the Gulf of California, Mexico, to the Klamath River, California, and are most common in Southern California, particularly around the Channel Islands. They occur in shallow rocky habitats and kelp beds in waters as deep as 130 feet, but are most often found within the 8 to 65 feet range.[17]



The graph for halfmoon shows an interesting trend with low levels during the early 80's and late 90's and higher levels in between. According to Oefinger, halfmoon have never been a targeted species therefore the fluctuations on the graph are probably not due to changing fishing pressures or overfishing. Rather, the trends for this species seem to be attributed to large fluctuations in kelp levels during major El Nino events.

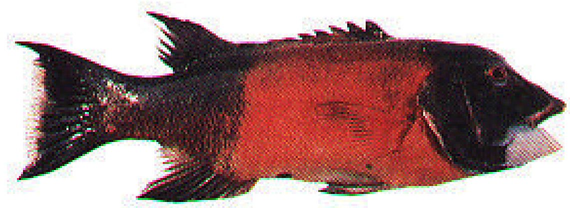
Kelp is extremely important to the survival of halfmoon, not only as its primary habitat but also as a main food source.[18] Two major El Nino events in 1982-83 and 1997-98 caused ocean temperatures to rise and nutrient levels to fall.[19] Kelp, which needs cool, nutrient-rich waters for survival and growth, suffered greatly during these events.[20] Kelp harvest data from the California Department of Fish and Game illustrates the severe depletion of kelp during these events:

> In 1980, kelp production peaked at 295 million pounds. After the 1982-83 El Nino decimated kelp beds along much of the California coast, production fell to a

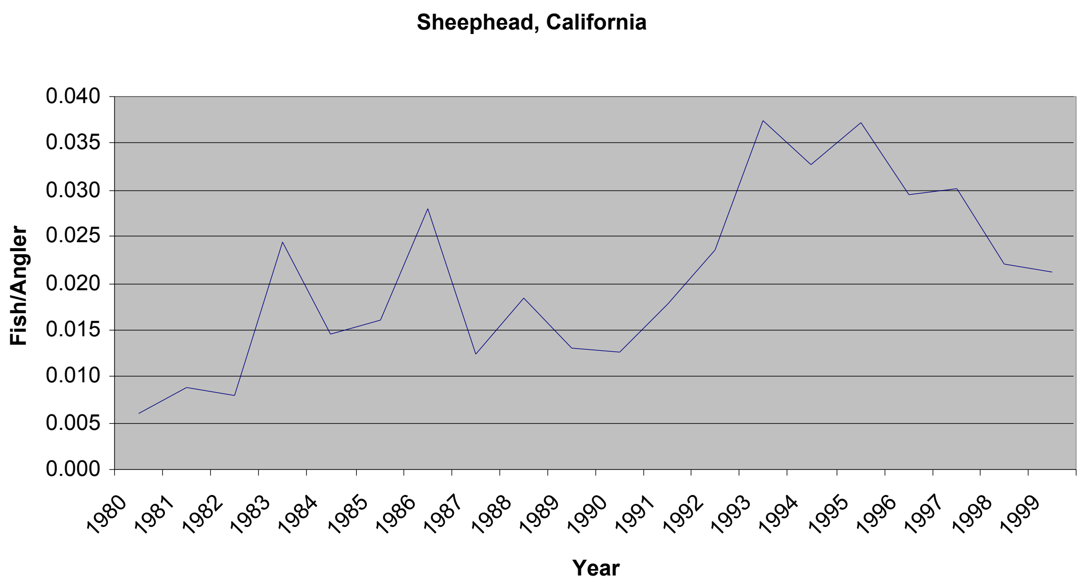
> mere 11 million pounds in 1984. In 1990, landings rose again to 303 million pounds, but the 1997-98 El Nino pushed the '98 harvest back down to only 56 million pounds.[21]

Clearly this widespread kelp damage would have significant effects on halfmoon, a species so completely dependent on kelp for both habitat and forage. Examination of the graph supports this theory overwhelmingly- halfmoon landings are low through the early 80's (when kelp was destroyed by El Nino) until 1986, when both kelp beds and halfmoon populations recovered. Overall, the landing levels remain relatively high until the 1997-98 El Nino, when kelp was again destroyed and halfmoon levels drop back down to their early 80's level.

California Sheephead- *Semicossyphus pulcher*



California sheephead occur from Cabo San Lucas, Baja California, to Monterey Bay, California, however the majority are found south of Point Conception. They are generally found in rocky kelp areas near shore, in water from 20 to 100 feet deep (occasionally deeper).[22]



The sheephead graph is somewhat erratic, but most interesting is the sharp increase in catch beginning in 1990. The levels remain high until 1995 then begin to decline, dropping sharply after 1997. The great increase can most likely be attributed to the explosion in the demand for live fish that began in 1989. Live fish became extremely popular in Asian restaurants during this time, and the market for the most popular species boomed. Sheephead are particularly popular in the live fish market for several reasons: they are particularly hardy, survive well in aquariums, and have red scales (red is considered a lucky color in many Asian cultures).[23] As a result of their popularity, more sheephead are caught for the live market than any other species in Southern California.[24] In fact, the number of sheephead taken in Southern California for the commercial market increased 92 percent between 1989 and 1995.[25] Although the data used in this study does not include commercial catch, it is likely that the increased popularity of these fish during that time had similar effects on recreational catch.

Demand in the live-fish market is primarily for smaller fish (about 12 inches long) because they can be prepared whole and served on a dinner plate as a single serving.[26]

Unfortunately, fish that are this size have not fully matured, and therefore have not had a chance to reproduce.[27] As a result, fish targeted in the live-fish market are very susceptible to over-harvesting; this may be the cause of the decline after the peak on the graph. An analogy by Richard Young illustrates the problems of harvesting immature resources:

> "If it takes 50 years to grow a marketable tree, we can harvest only one-fiftieth of the trees each year if we want to maintain the same size forest. If we harvest more, the forest gets smaller. If we harvest less, it gets larger. However, if it takes only 10 years to grow a marketable tree, we can harvest 10 percent of the trees every year without reducing the size of the forest. So, if it takes a species of rockfish ten years to reach maturity, we can take only a small number of them and maintain the same size population, even if they appear to be "so thick you can walk on them."[28]

Sheephead are particularly vulnerable to this manner of fishing, because they are hermaphroditic: born females until they become males around age 8.[29] Consequently, harvesting only young sheephead means taking females only- an extremely unsustainable practice that will obviously threaten population levels. This problem was recognized by the California Department of Fish and Game in a 1993 report regarding the live-fish trap fishery in southern California when it stated, "It is unlikely that local sheephead populations can continue to sustain this increase in fishing pressure."[30]

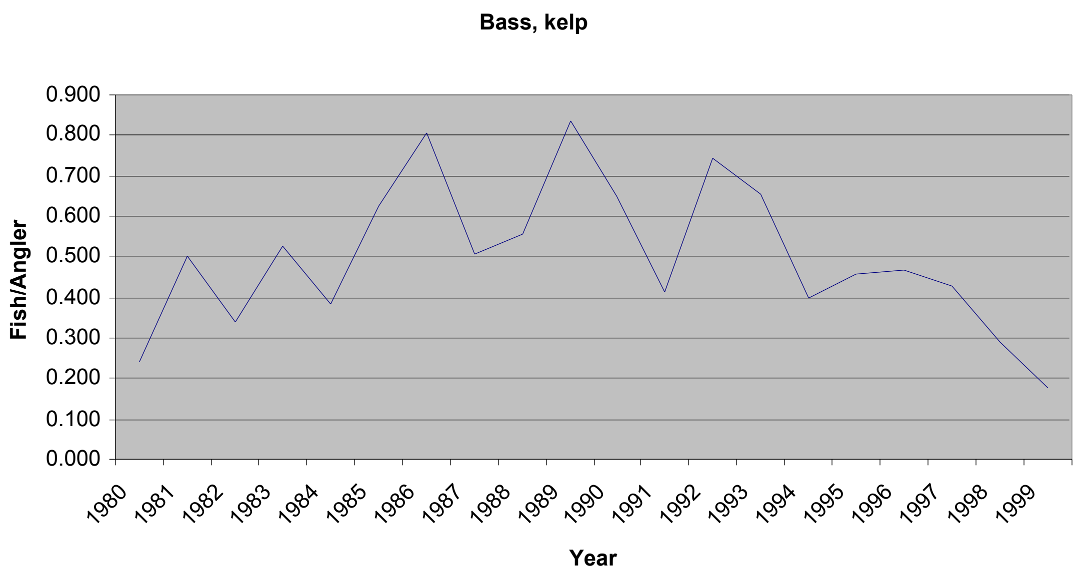
Sure enough, the graph shows a steady decline beginning in 1995, after five years of intense fishing pressure. The commercial sheephead fishery experienced a very similar trend during this time; commercial landings of California sheephead grew from 43,463 pounds in 1991 to a peak of 356,651 pounds in 1997 before falling to 126,771 pounds in 1999.[31] It is extremely important to note that these decreasing trends were occurring <u>despite the fact that demand for sheephead remained high and prices continued to increase during this time period.</u> This evidence undoubtedly signals unsustainable levels of fishing and declining populations of these fish.

It should also be noted that in 1995, some mild restrictions were enacted regarding trap construction, number of traps, and incidental catch for the live-fish trap fishery.[32] However, because no size limits or quotas were created, these were considered very minimal regulations[33] and probably did not have a significant effect on the number of fish caught.

Scientists are concerned not only for the health of California sheephead populations, but also for the health of kelp; sheephead are a primary predator of sea urchins, which graze on kelp and can virtually destroy entire kelp forests.[34] As sheephead populations decline, experts fear that outbreaks of purple sea urchins will increase, threatening California's precious kelp forests.[35]

Kelp Bass- *Paralabrax clathratus*

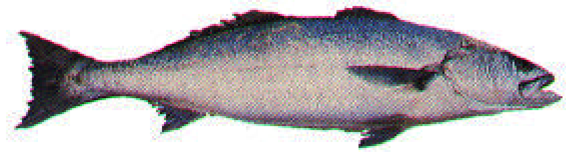
Kelp Bass, also known as Calico Bass, are found from Baja California to Washington State, but are most common south of Point Conception.[36] They are found to depths of 150 feet,[37] and are highly dependent on kelp forests as their natural breeding and habitat areas.[38]



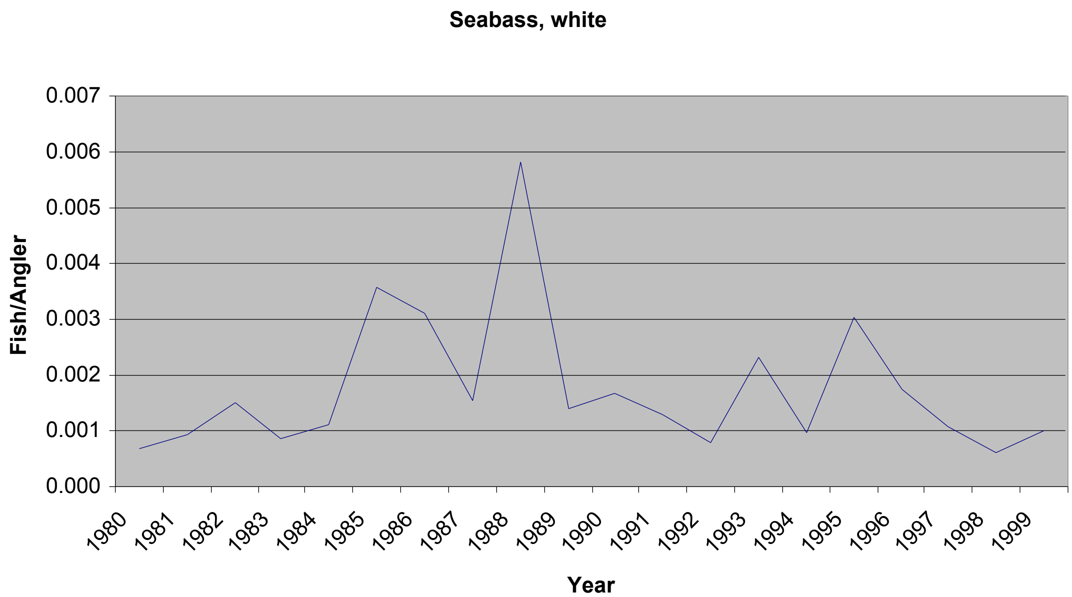
The graph for the kelp bass shows many year-to-year fluctuations, however the overall trend seems to show higher catch levels in the middle, with lower levels early and late in the period. According to Oefinger, kelp bass have long been very popular target fish therefore the trend is probably not attributable to changes in fishing efforts. Rather, this kelp-dependent species was probably greatly affected by fluctuations in kelp levels during this time. As discussed earlier (in the Halfmoon section), two major El Nino events in 1982-83 and 1997-98 decimated kelp beds along the California coast.
It is generally agreed that kelp bass are not migratory[39] and venture less than a mile from their home range[40] (however some studies have shown that they do sometimes move over fairly large areas[41]). Because they generally are not migratory, these fish have very limited adaptive capacity. Consequently, it is very probable that their populations were severely impacted by the great depletion of kelp during these two El Nino periods. Indeed, the low catch levels on the graph coincide very closely with the 1982-83 and 1997-98 events. Oefinger echoed this theory in his interview, stating that kelp bass populations are closely related to the health of local kelp beds. He believes that as

temperatures cool and kelp rebounds, so too will the populations of kelp bass. Oefinger also mentioned that kelp bass are very susceptible to overfishing, as they are a very popular target fish.

White Seabass- *Atractoscion, nobilis*



White seabass occur in deep rocky habitats from Magdalena Bay, Baja California, to Juneau, Alaska.[42] Like several other species discussed earlier, white seabass depend on estuaries for spawning, nursery, and feeding grounds.[43]



The graph for this fish does not show an obvious trend, yet historical data from the California Department of Fish and Game reveals longer-term trends that have occurred since 1947:[44]

> "The sport catch by commercial passenger fishing vessels (CPFVs) peaked in 1949 at about 64,000 fish and has declined steadily ever since. An all-time low of 284 fish was recorded in 1978. The relative angler success has shown an identical decline during the same period from 0.13 fish-per-angler in 1949 to 0.001 fish-per-angler in 1978. That is only one fish per every one thousand anglers! The sport catch from party boats averaged 1,400 fish per year from 1980 to 1991, which is only 2% of the 1949 peak in sport catch."

Upon reading this data, it seems that the more recent catch of white seabass is down substantially from its peak in 1949, but has risen somewhat since its all-time low in 1978. Furthermore, according to the Department of Fish and Game,[45] Oefinger, and many sportfishing enthusiasts,[46] white seabass have recently been recovering in southern California's waters.

The severe decline in white seabass after 1949 seems to be mostly attributed to overfishing, mostly by commercial gillnets.[47] In 1990 California voters approved

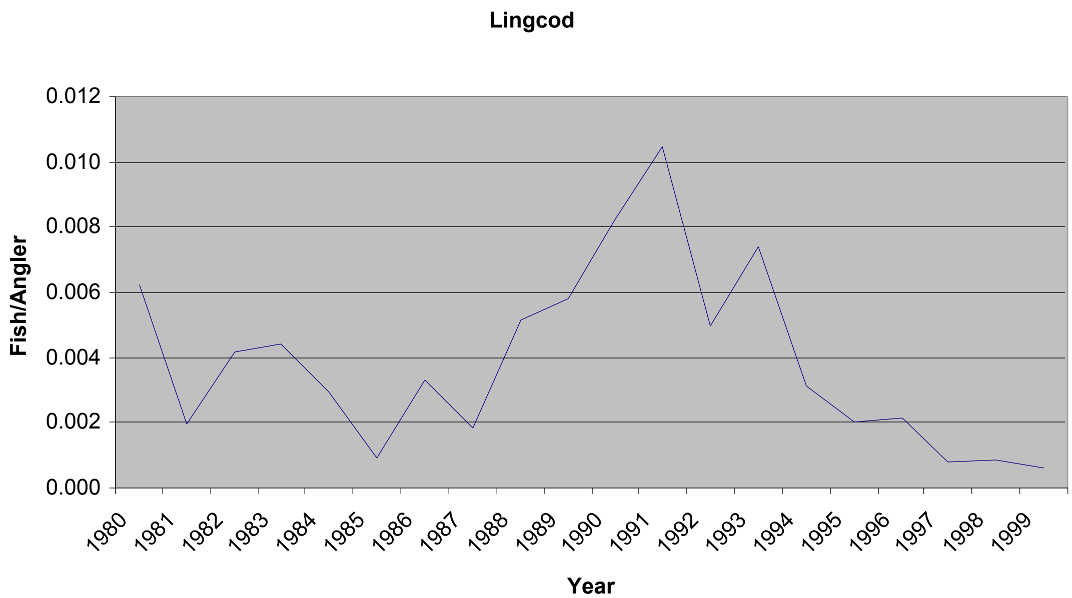
Proposition 132, which banned the use of this gear in all state waters south of Point Conception after January 1994.[48] This ban reduced commercial white seabass landings by 70%,[49] an action that Oefinger believes is mainly responsible for the recent recovery of this species.

The other factor that has contributed to this species' decline is habitat destruction.[50] Like halibut, white seabass depend on nearshore habitats in bays and estuaries for their juvenile life stages.[51] As mentioned earlier, 95% of the Santa Monica Bay's historic wetlands have been destroyed by human activities.[52] The constant destruction of these precious habitats will continue to affect populations of white seabass and other wetland-dependent species.

In addition to the gillnet ban in the early 90's, hatchery programs may have played a role in the recent growth of white seabass populations. In 1982, California legislation created the Ocean Resources Enhancement and Hatchery Program (OREHP) to help restock California's depleted marine fisheries.[53] In 1986 the first experimental release of 2,000 juvenile white seabass occurred in San Diego, and since then the program has released over 300,000 of these fish into southern California's waters.[54] Tagged fish released in San Diego have been found in the Santa Monica Bay after 5 years of their release,[55] leading many to believe that this program has been quite successful.[56] In 1991 another white seabass facility was built in Redondo Beach, which was recently enlarged to support an annual release capacity of 30,000 fish.[57]

Lingcod- *Ophiodon elongatus*

Lingcod occur between Point San Carlos, Baja California, and Kodiak Island, Alaska. They are found in deep rocky areas and kelp beds, usually to depths of about 350 feet, but have been caught to depths of 2,700 feet off of southern California.[58]



The graph seems to show decreasing levels through most of the 80's, then a large spike from 1987 to 91, after which levels again fall and gradually decrease to their lowest point in 1999. There are two suitable explanations for the great increase in landings from 87-91: natural population oscillations and the explosion of the live fish market.

According to historical data from Commercial Passenger Fishing Vessels (CPFV's), lingcod catches appear to fluctuate in roughly 10- year oscillations, with past peaks occurring in the early 70's, 80's, and 90's.[59] Assuming that fishing efforts remained relatively stable throughout this time, it seems probable that the oscillations represent natural population cycles. The most recent peak in the CPFV data occurs around 1990,[60] coinciding very closely with the highest point on our graph. Consequently, it is feasible that the large peak on our graph can be attributed to a natural population boom in lingcod during that time.

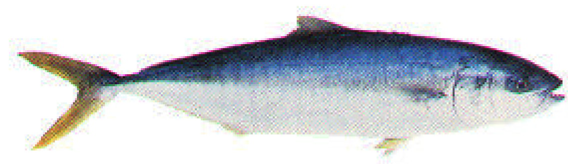
Another possible reason for the large peak in the early 90's was the boom in the live fish market (mentioned earlier in the halibut and sheephead sections). Again, this market exploded in 1988, and lingcod was another major target fish.[61]

Aside from the large peak in the center of the graph, it appears that there has been an overall decline in the abundance of lingcod throughout this twenty-year period. Even the periodic oscillations mentioned earlier from the CPFV data show gradually declining levels of this species.[62] There are several factors that have caused this long-term decline:

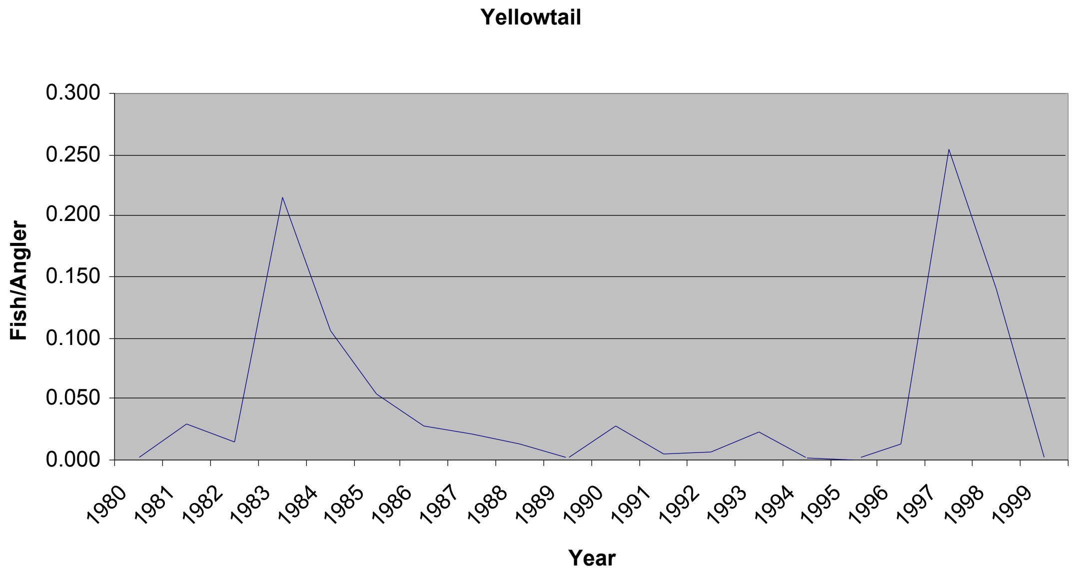
- Lingcod are slow-growing fish, and as a result they are very susceptible to overfishing.[63] This fact, combined with the increase in fishing pressure from the live-fish market, has definitely caused trouble for this species.
- Like the California halibut and white seabass, lingcod are dependent on estuaries for much of their juvenile lives.[64] The continued destruction and degradation of these habitats in the Santa Monica Bay has surely affected this species.
- Because they are not migratory, lingcod have very limited ability to adapt to changing environmental conditions.[65] A 21-year warm water trend that began in 1977 (discussed in detail later in the California barracuda section) impacted this species by greatly reducing reproduction.[66]

The combination of all of these factors has taken its toll on the west coast's lingcod populations, as they have been declared officially overfished by the Pacific Fishery Management Council[67] and the National Marine Fisheries Service.[68] Their dwindling numbers led the Department of Fish and Game to decrease bag limits and increase minimum size requirements for this species in 1998.[69]

Yellowtail- *Seriola lalandi*

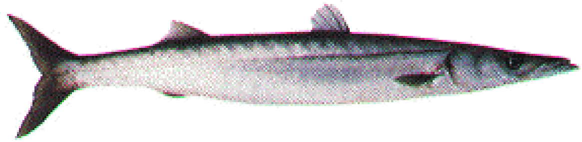


Yellowtail are pelagic, found from the water's surface to depths of 228 feet.[70] They occur from Chile to southern Washington including the Gulf of California, but prefer the warmer waters between these ranges.[71]

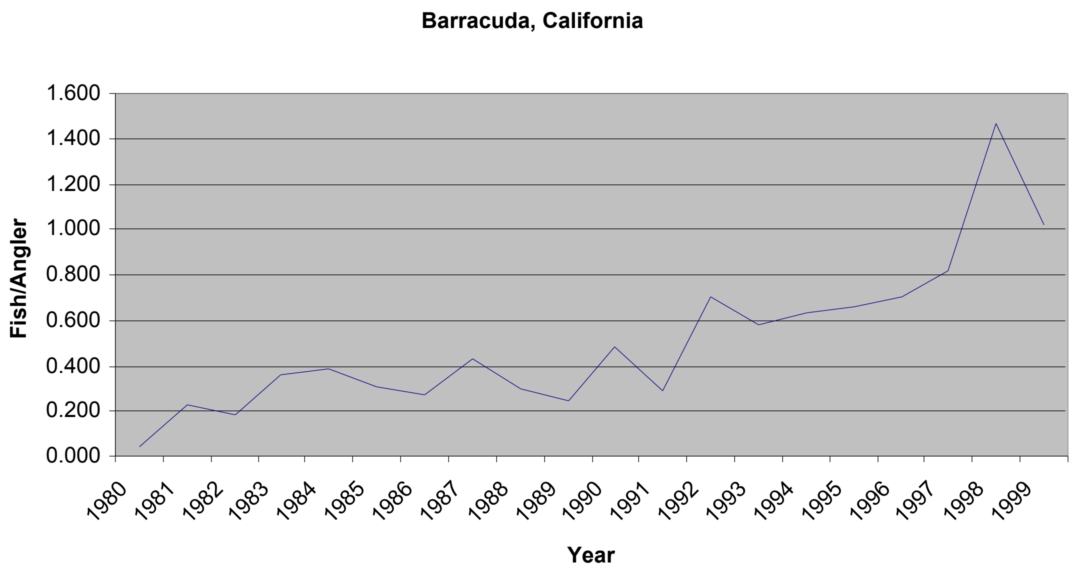


The yellowtail graph is a perfect example of how certain fish species can be profoundly affected by El Nino events. The graph shows relatively consistent levels for most years, until 1983-84 and 1997-98 where two dramatic spikes occur that coincide precisely with two major El Nino events. During an El Nino, large numbers of yellowtail will follow the warm waters, migrating hundreds of miles north from Mexico and into the waters of Southern California.[72] During these periods yellowtail are unusually abundant in the Santa Monica Bay; one manager of a sport fishing company in Marina del Rey estimated that during the 97-98 event, yellowtail catches increased from 4 or 5 to around 200 per day.[73] Oefinger confirmed this, saying that the yellowtail fishing during those times was remarkably successful. He also noted that aside from El Nino events, yellowtail fishing is usually very consistent.

California Barracuda- *Sphyraena argentea*



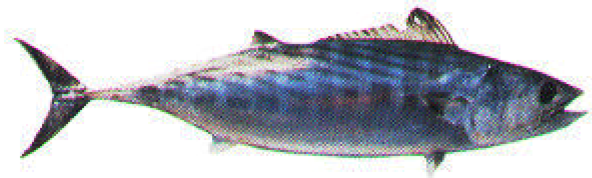
California barracuda are found from Cape San Lucas, Baja California, to Kodiak Island, Alaska, but are mostly found south of Point Conception and are especially concentrated in Baja California. This pelagic species is found from the surface to depths of 60 feet.[74]



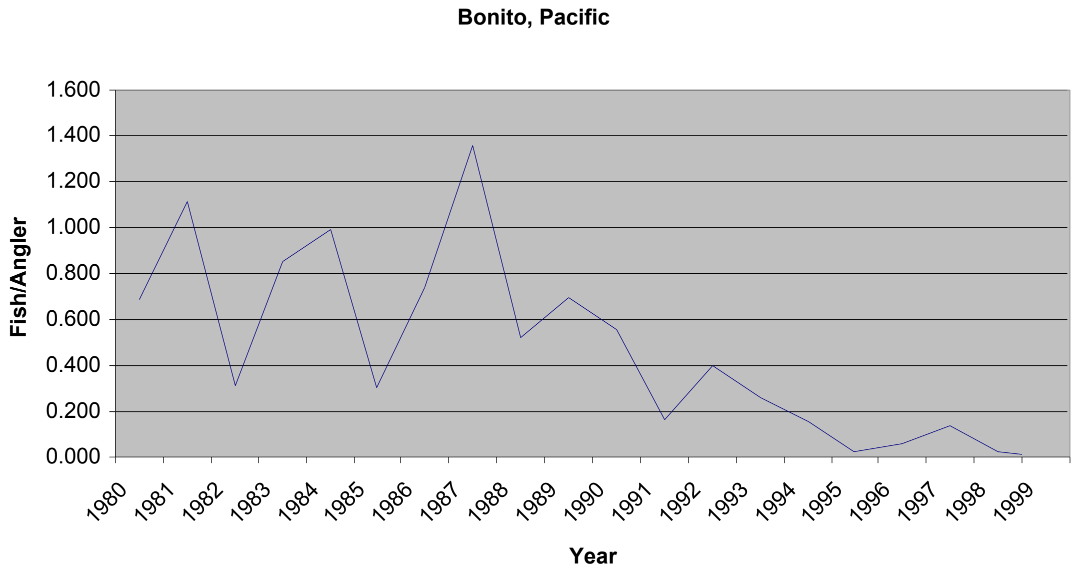
The graph for the barracuda shows a clear steady increase until 1997, where a sharp upward spike occurs through 1998, then levels return to normal in 1999. There are several factors that may have influenced these data. According to both Geever and Oefinger the California barracuda has always been a very popular target species for fishermen, therefore it is unlikely that the overall increase seen throughout this period was due to a growth in fishing efforts. Rather, the observed trend is probably the result of a 21-year warm water trend that occurred in southern California during this time period.[75] Scientists attest that in 1977, ocean temperatures jumped approximately 2°F and remained at that level through 1998.[76] Because the migratory California barracuda prefers warmer waters,[77] their populations flourish in this region during warm water periods (much to the delight of the local fishing community). This warm water effect becomes especially pronounced during El Nino events, which bring enormous amounts of barracuda and other warm water fish from Baja and into southern California.[78] This fact may explain the large upward spike seen in 1997-98, which coincides exactly with a major El Nino event.

The sharpest rise on the graph, which begins in the mid-90's, may be partly attributed to new fishing restrictions that were enacted around that time.[79] As mentioned earlier, gill and trammel nets, which are primary tools used for catching barracuda and other fish commercially, were banned in many coastal waters in 1994.[80] In addition, according to a report by the state Resources Agency, California barracuda have responded very positively to "take" restrictions such as size limits and quotas.[81] Together, these regulations may have allowed barracuda populations to grow, in turn rewarding recreational fishermen with increased catch. However, this would not explain the quick decrease that occurred after 1988.

Pacific Bonito- *Sarda chiliensis*



Pacific bonito occur from Chile to the Gulf of Alaska, but are most abundant in warm waters between Magdalena Bay, Baja California, and Point Conception, California.[82] They are pelagic fish, found mostly at depths between 300 and 600 feet.[83]



The graph for Pacific bonito shows an obvious downward trend, and other studies and surveys clearly show a decline in this species as well.[84] Unfortunately, there is very little information available to explain the reasons for this trend. Pacific bonito are very popular among California's recreational anglers: in 1997 they ranked in the top ten species across the state, 99% of them being caught in the southern California region.[85] Despite their popularity, extensive internet research found no mention of this species being overfished or threatened. Oefinger claims that bonito were extremely abundant in the Santa Monica Bay approximately 12 years ago (coinciding roughly with the highest peak on the graph), but have since undergone a rapid decline.

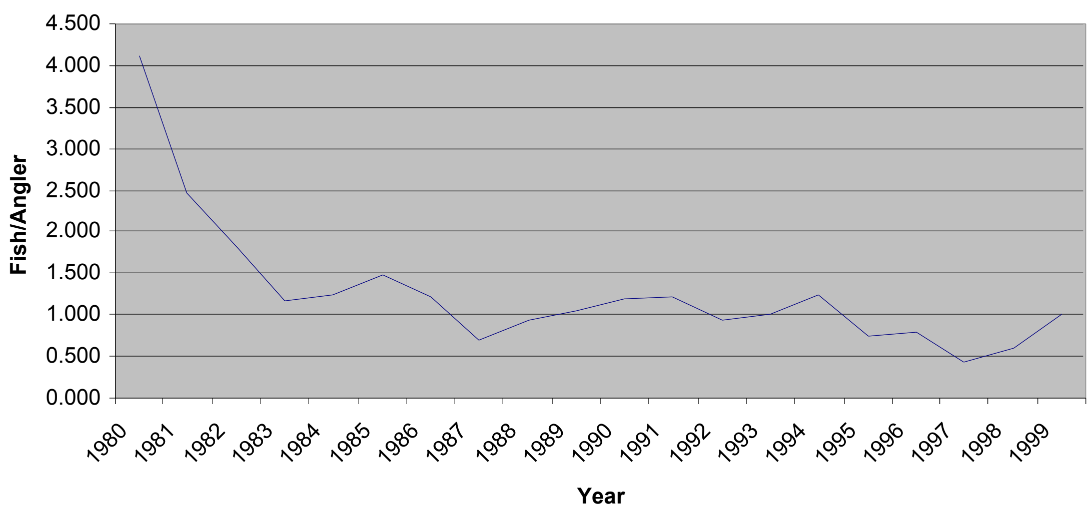
Oefinger has also noticed an inverse relationship between California barracuda and Pacific bonito, but is not sure why. In the earlier analysis of barracuda, it was determined that the overall increasing trend was most likely due to the 21-year warm water trend that occurred in this region. While the barracuda responded positively to the warmer temperatures, perhaps the bonito were not as receptive to the change. According to the Pacific Marine States Fisheries Commission, Pacific bonito made a pronounced shift north of Point Conception in the early 80's,[86] shortly after the warm water trend began. It seems likely, then, that the warmer water created unfavorable conditions for this species and they have remained in the northerly regions throughout the period on the graph.

Rockfish (total)- *Genus Sebastes*

Bocaccio

Cowcod

There are more than 80 species of rockfish inhabiting the rocky habitats of the California, Oregon, and Washington coasts. The species found in our landing data were black, black-and-yellow, blue, bocaccio, brown, chilipepper, China, copper, cowcod, grass, group red, olive, Pacific ocean perch, splitnose, treefish, vermilion, yellowtail, and large numbers of "unspecified" rockfish. In order to include the "unspecified" fish in this analysis, the graph was made using the total of all rockfish found in the data.



The graph for rockfish shows a very visible decline throughout the years that seems to be caused by two major factors. Rockfish, which live in both shallow and deep rocky habitats,[87] have many life history characteristics that make them very vulnerable to changing environmental conditions and fishing pressures.

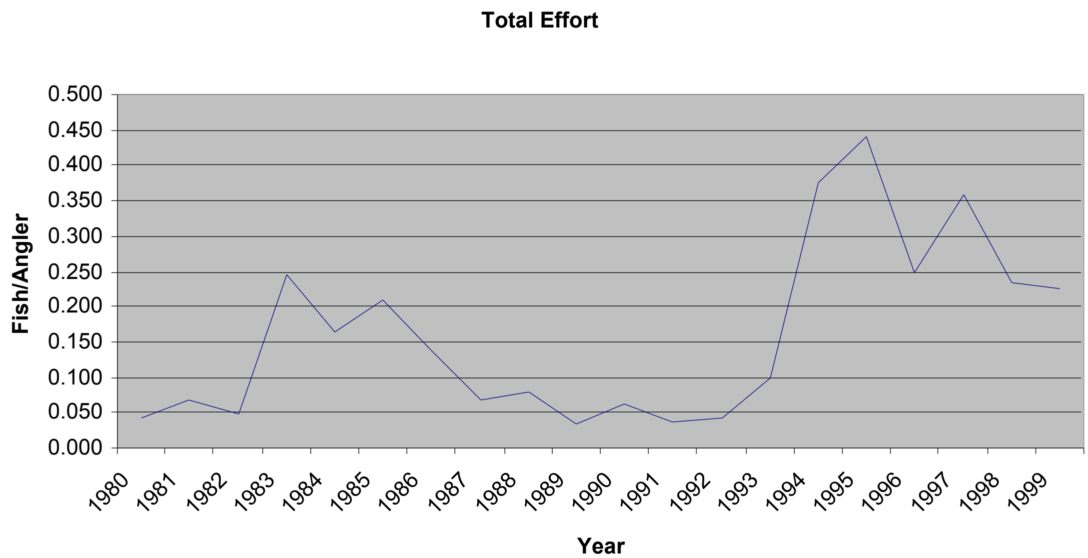
Rockfish are extremely popular in the live-fish market, earning anywhere from $2 to $7 per pound compared to $.50 to $.80 for dead fish.[88] As mentioned earlier the live-fish fishery boomed in the late 80's, and it is likely that the resulting popularity of rockfish affected not only the commercial catch but also the recreational effort. Again, this fishery targets small fish that fit on a plate as a single serving. Because rockfish have extremely long life spans and late maturation times,[89] the young fish being taken have not yet had a chance to reproduce.[90] This is an unsustainable practice that will obviously lead to depleted stocks.

Another factor that has contributed to the decline of rockfish is the warm water trend that began in 1977 (discussed in the California barracuda section). While the barracuda seem to have benefited from these warmer waters, rockfish have experienced the opposite effect. Rockfish are not migratory, and are therefore very sensitive to changing environmental conditions.[91] Because they favor cooler water for successful reproduction, the 21 years of warm water that occurred throughout this time period was detrimental to rockfish productivity.[92] In his interview, Oefinger agreed that this long period of warm water was one of the primary causes of rockfish decline in the Santa Monica Bay.

The combination of overfishing and warm water temperatures has severely decimated rockfish populations throughout the west coast.[93] According to data from the Pacific Fishery Management Council (PFMC), recreational catches of rockfish in California, Washington and Oregon have declined from 8000 mt (metric tons) in 1980 to 2000 mt in 1999.[94] Several species, including Pacific ocean perch, cowcod, canary, and bocaccio rockfish, have been declared overfished by the PFMC. Bocaccio rockfish, one of the hardest hit species, is at only 2% of its historic levels.[95]

Conclusion

This final graph shows the total catch of all ten species discussed in the report. Although it is difficult to make assumptions regarding the trends seen on this graph, it is interesting to note that the greatest increase in catch on the graph coincides with the commercial gillnet ban that occurred in the early 90's. Gillnets were gradually phased out from 1992 to 1995, and it is probable that this ban benefited many fish populations and in turn rewarded local recreational fishermen.



In general, it seems that the fish of the Santa Monica Bay are affected by a wide variety of factors, making it very difficult to determine accurate trends in overall abundance. While some species are being overfished, others appear to have benefited from regulations such as gear restrictions or size limits and quotas. Many are extremely vulnerable to changing ocean regimes such as temperature fluctuations and El Nino events, while others seem to be relatively unaffected by such changes. Environmental problems such as pollution and habitat loss are harming many species. Still, many of these fish may simply be experiencing natural fluctuations due to population cycles.

The following table summarizes the major external factors that are affecting these ten species. Please note that the table does not specify whether these factors have positive or negative impacts, nor does it implicate whether these factors actually affect population levels or simply catch levels. It is simply meant to show, in general, the major factors impacting these fisheries.

Major External Factors Affecting Santa Monica Bay Fisheries

Factors / Species	Kelp Health	El Nino Temperatures	Estuary Habitat Loss/ Degradation	Long-Term Warmer Waters	Fishing Pressures	Fishing Regulations
California Barracuda				♦		♦
Kelp Bass	♦				♦	
Pacific Bonito				♦		
Halfmoon	♦					
California Halibut		♦	♦		♦	♦
Lingcod			♦	♦	♦	
Rockfish				♦	♦	
White Seabass			♦		♦	♦
California Sheephead					♦	
Yellowtail		♦				

The lesson to be learned is that all species are very unique and are affected by a wide variety of factors. Life history, habitat needs, and adaptive capacity of each fish must be closely examined in order to create successful management strategies for all marine species and their ecosystems. Fishing regulations such as size limits, quotas, or gear restrictions do not take into account the complexity of marine ecosystems. For this reason, it is critical that decisionmakers always remember that all things are interconnected. In the famous words of John Muir, "Tug on anything at all and you'll find it connected to everything else in the universe."[96]

Before any management plans are created for any species, experts must thoroughly consider how any changes will affect the rest of the marine ecosystem so new problems are not accidentally created. It is for this reason that Marine Protected Areas are valuable tools for preserving stability; within them, marine ecosystems are allowed to maintain their natural balance without the outside influence of man.

Footnotes

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[7] Web site, California Seafood, http://www.ca-seafood.org/educate/effects.htm
[8] Web site, Secretariat of the Pacific Community, http://www.spc.org.nc/coastfish/News/lrf/2/7California.htm
[9] Ibid
[10] Web site, Go Boating America, http://goboatingamerica.com/sea_web/nov99/sc_focus_fishing.htm
[11] Web site, American Oceans Campaign, http://www.americanoceans.org/issues/pdf/samonica.pdf
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CA Department of Fish and Game, http://www.dfg.ca.gov/mrd/mspcont7.html#halfmoon
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[23] Web site, Earth & Sky, http://www.earthsky.com/2001/esmi010125.html
[24] Web site, Sacramento Bee, http://www.sacbee.com/news/projects/pacificblues/part2.html
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[26] Ibid
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[30] Web site, Fishy Fish, http://www.fishyfish.com/1993_Trap%20Analysis_DFG.html
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[58] Web site, CA Department of Fish and Game, http://www.dfg.ca.gov/mrd/mspcont7.html#lingcod
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http://www.psmfc.org/recfin/pub/kelp/no2/lingcod.htm
[60] Ibid
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[66] Web site, CA Department of Fish and Game, http://www.dfg.ca.gov/fg_comm/mlma/appendix/h.html
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[87] Web site, CA Department of Fish and Game, http://www.dfg.ca.gov/mrd/mspcont4.html
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*Fish Photos taken from the CA Department of Fish and Game Sportfish Identification Site:
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Suggestions for Further Research

(Suggestions were made by Brendan Reed at the Santa Monica BayKeeper, Jessie Altstatt at the Santa Barbara ChannelKeeper, Rob Wells at Environment Now)

- Discuss in detail the data itself: How is it collected? How are rec. numbers calculated? What are the inherent biases in the data? (Brendan)
- Include commercial fishing information: Data? Seasons? Gear Restrictions? Quotas? Perhaps a table could be drawn to illustrate all of this information, and perhaps a similar table could be made for the recreational data? (Brendan)
- Discuss/Illustrate various fishing areas in the Bay, such as "No Take Zones." (Brendan)
- Consider policy/management recommendations/examples from other states. Look at SMBRP's "State of the Bay" report. (Brendan)
- Look at other reports/websites with other valuable information that may be helpful: Sea Grant reports, UCSB's Love Lab website. (Jessie)
- Provide a graph of sea surface temperature by year. A good contact for this information is Prof. Jack Engle at UCSB, his email is engle@lifesci.ucsb.edu (Jessie)
- Create a table showing different types of fisheries and numbers of fishermen in each. (Jessie)
- In addition to the interviews already conducted, a resource manager (DFG, Park Service) should also be interviewed. (Jessie)
- Improve the figure on p.1 by showing the different areas that are targeted by different types of fishers (shore, small boats, party boats, spear fishers, live bait, lures, dead bait, traps, trawlers, etc.) (Jessie)
- Look into fishing pressures on white seabass by free divers and spear fishers- a small but active and efficient group. (Jessie)
- Discuss further the concept of Marine Protected Areas and the regulations within them. (Jessie, Rob)
- Provide a history of fishing restrictions in the Bay. (Rob)
- Include data on number of fishing trips, and number of fishermen. (Rob)