



DEPARTMENT OF FISH AND GAME

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California Department of Fish and Game
Marine Region

Cruise Report
State Finfish Management Project

**CALIFORNIA HALIBUT (*Paralichthys californicus*) TRAWL SURVEY OF
NORTH MONTEREY BAY**

Prepared by Travis Tanaka
15 September 2010

Vessel: F/V SAN GIOVANNI

Dates: 10-12 August 2010

Purpose: Continue a fishery-independent monitoring program that will assess associated changes in the California halibut (halibut)/other flatfish resource in Monterey Bay in the absence of commercial trawling since 2006. Accomplish the following objectives:

1. Collect necessary life history data for halibut including individual fish length, weight, sex, and otoliths.
2. Catalog associated incidental species.
3. Record ratio of sublegal- to legal-sized halibut.

Procedure: Embarked on F/V San Giovanni from Monterey harbor each morning at 0400. Using a GIS-produced map of previous commercial trawl tracks, conducted tows using a standard 4.5-inch commercial otter trawl net. All tows followed the bottom contour or followed the best possible course given tide and weather conditions. Tows were initially planned for one hour each but were extended to 90 minutes.

Legal-sized (legal) halibut were measured, weighed, sexed and had otoliths removed. Live sublegal-sized (sublegal) halibut in good condition were measured, assessed for condition, and tagged before release. All associated species were measured and weighed in aggregate. Associated species not retained were assessed and released live, when possible. Released fish initially were placed into a separate bin with fresh seawater to keep them alive before assessment and release.

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A total of 36 hours, including travel time to and from the harbor, was allotted for this work.

Results: Twelve tows at approximately 90 minutes per tow were completed over the 3 days (Figure 1). Tow time was increased from the planned 60 to 90 minutes after discussing catch rates and ability to pull the net without losing catch. Typically halibut trawlers not targeting halibut for the live fish market will tow for 3-5 hours. The extended tow time allows for the fish to tire out, causing them to end up deeper into the net. Halibut near the entrance or throat of the net will swim out when the boat stops to pull the gear. Therefore, extending tow time by 30 minutes may aid in capture without causing excessive damage to the fish. Average tow speed was approximately 2.4 to 2.7 knots. Weather for the cruise was excellent with very little wind or swell.

There were 138 legal halibut caught and retained with an additional 76 sublegal halibut caught. Of the 76, 12 were unable to be released and were retained for life history information. Most released halibut had split caudal fins and all halibut had some degree of bruising on the blind side. Many of the released halibut, despite minor bruising and split fins, were very lively and swam away immediately upon release. Retained sublegals were either gilled in the mesh of the net, crushed while the net was being hauled aboard, or battered by larger fish while in the bag of the net. One sublegal died due to asphyxiation from the large quantity of fish from the cod end placed on the deck and was not found in time during the sorting process. Out of the 150 halibut that were measured, weighed, and sexed, 130 otoliths were extracted.

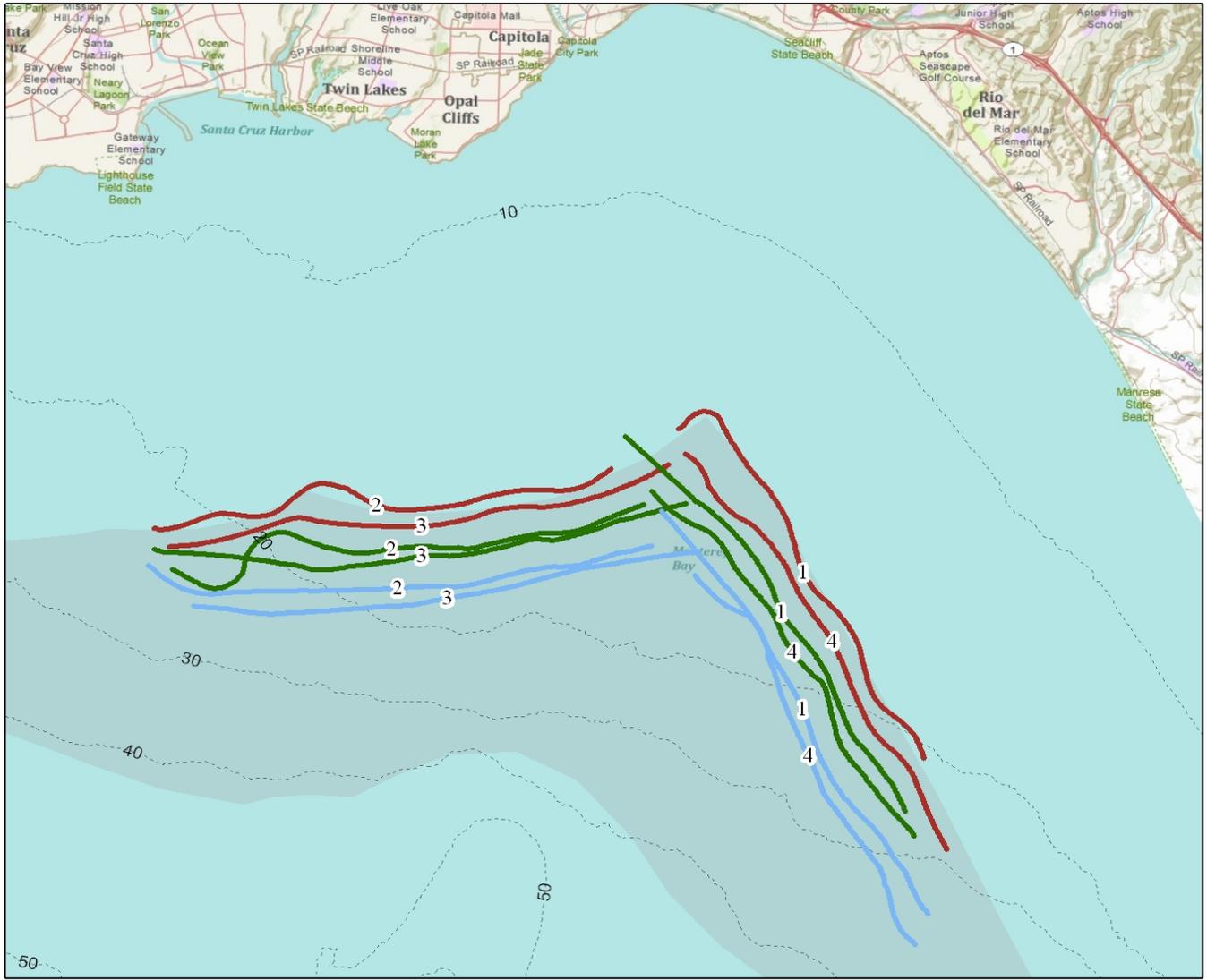
For all retained halibut (legal and sublegal), the sex ratio was 76 female: 69 male. The largest legal female was 1,042 mm total length and weighed 13.38 kg. The range of length and weight for legal females was 545–1,042 mm and 1.72–13.38 kg. The largest legal male was 885 mm and weighed 7.94 kg. The range of length and weight for legal males was 540–885 mm and 1.41–7.94 kg. Commercial halibut are considered legal if the fish, while in nature repose, is 559 mm or greater. Fish and Game Code allows for sweeping or fanning of the tail to reach this measurement. Our measurements were made without a tail sweep or fan.

In addition to halibut, there were 30 incidentally caught species (Table 1). The top three vertebrate species by count were starry flounder (*Platichthys stellatus*, 270), Pacific sanddab (*Citharichthys sordidus*, 231), and sand sole (*Psettichthys melanostictus*, 204). The most abundant invertebrate species was Dungeness crab (*Cancer magister*, 174). Brown jellyfish (*Chrysaora hyoscella*) were present in all tows. The greater the amount of jellyfish, the presence and amount of smaller (<125 mm) incidental catch increased. The jellyfish would plug the mesh, preventing the smaller fish and invertebrates from passing through the net.

The F/V San Giovanni is a 59-ft, 40-ton groundfish trawler. This is significantly larger than the vessel used in a previous survey of the same area in October 2007. The size and power of the F/V San Giovanni provided for more consistent transects, allowing for better replication. The calm weather conditions and presence of market squid improved the availability of halibut and their resultant catch. Market squid were present in the bay in high numbers. Halibut had been actively feeding on squid as indicated through stomach content analysis and by observing several halibut regurgitating semi-digested squid.

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Figure 1. California halibut trawl survey tow tracks for 2010 California Department of Fish and Game fishery-independent trawl survey in north Monterey Bay.



Legend

- 08/10/10
- 08/11/10
- 08/12/10
- Halibut Trawl Survey Area

0 0.250.5 1 Nautical Miles
depth in fathoms



Table 1. Species by number captured and number of tows present in California Department of Fish and Game 2010 north Monterey Bay fishery-independent trawl survey.

TRAWL SURVEY DATA-ALL SPECIES

SCIENTIFIC NAME	COMMON NAME	NUMBER PRESENT	# TOWS PRESENT
<i>Platichthys stellatus</i>	starry flounder	270	12
<i>Citharichthys sordidus</i>	Pacific sanddab	231	12
<i>Psettichthys melanostictus</i>	sand sole	204	11
<i>Cancer magister</i>	Dungeness Crab	174	12
<i>Paralichthys californicus</i>	CAHB-Legal	138	12
<i>Eopsetta jordani</i>	petrale sole	116	12
<i>Paralichthys californicus</i>	CAHB-Sublegal	76	12
<i>Sebastes goodei</i>	chilipepper RF-Juv	35	8
<i>Pleuronichthys verticalis</i>	hornyhead turbot	25	9
<i>Loligo opalescens</i>	CA market squid	17	5
<i>Raja binoculata</i>	big skate	17	10
<i>Raja inornata</i>	CA skate	16	8
<i>Torpedo californica</i>	Pacific electric ray	15	8
<i>Pleuronichthys decurrens</i>	curlfin turbot	13	6
<i>Genyonemus lineatus</i>	white croaker	12	5
<i>Parophrys vetulus</i>	English sole	10	6
<i>Hydrolagus colliei</i>	ratfish	9	3
<i>Ophiodon elongatus</i>	lingcod-Juv	8	4
<i>Cancer gracilis</i>	slender crab	7	5
<i>Pycnopodia helianthoides</i>	sunflower star	5	4
<i>Peprilus simillimus</i>	Pacific butterfish	5	3
	Sea star spp.	4	3
<i>Clupea pallasii</i>	Pacific Herring	3	3
<i>Spirinchus starksi</i>	night smelt	3	2
<i>Ptilosareus sp.</i>	Sea pens	3	1
<i>Squalus acanthias</i>	Spiny dogfish	2	2
<i>Myliobatis californica</i>	bat ray	1	1
<i>Mola mola</i>	ocean sunfish	1	1
<i>Chitonotus pugetensis</i>	roughback sculpin	1	1
<i>Anoplopoma fimbria</i>	sable fish	1	1
<i>Sebastes saxicola</i>	stripetail RF-Juv	1	1
<i>Sebastes semicinctus</i>	halfbanded RF-Juv	1	1