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Cruise Report

State Finfish Management Project
Fishery-Independent Trawl Survey in Monterey Bay

Prepared by
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Vessel: F/V *Cardinale I*

Dates: October 1-4, 2007

Location: Legislatively closed trawl area in northern Monterey Bay, central California

Purpose: Begin an annual monitoring program to assess changes in the halibut/associated species resource in the absence of trawling:

1. Collect life history data for California halibut, *Paralichthys californicus*, including length, weight, sex, and otoliths, within a legislatively closed trawl area.
2. Collect baseline data to monitor changes in species composition and relative abundance of shallow, soft-bottom finfishes
3. Tag and release sublegal-sized California halibut (less than 22 in., or 559 mm).

Procedures: Using Department trawl logbook data, the historical commercial trawling area in northern Monterey Bay was mapped using GIS. Tow start points within this area were chosen based on depth and the calculated distance the F/V *Cardinale I* could cover in 1 hr at tow speed. On each of the 4 cruise days, the contracted vessel embarked from Santa Cruz harbor between 0530 and 0630 with the captain, deck hand, and two State Finfish Management Project staff. All tows, using standard commercial trawl gear with 4.5-in. mesh, were made for at least 1 hr. On day 3, the decision was made to extend tow time to 1.5-2.0 hr. Trawl tracks were recorded using GPS. Trawl gear was redeployed before project staff took biological data from the catch.

All finfish captured were assessed for condition, measured to the nearest mm, and weighed to the nearest 0.1 lb, if possible. Legal-sized California halibut were retained, measured and weighed, and otoliths were removed. Sublegal-sized California halibut were assessed and healthy individuals were tagged and released. All dead sub-legal halibut and those near death were retained by project staff and processed for length, sex, and otoliths. Commercially marketable finfish species were retained while all other species were released. Invertebrates were counted by species or, in the case of cnidarians, weighed in aggregate. Echinoderms were separated into sun star (*Pycnopodia helianthoides*) and other sea star categories and weighed in aggregate.

Results: Eighteen tows were completed in 4 days. The first tow on day 1 was stopped and reset after 15 min due to the gear fishing incorrectly. The first tow on day 3 was released due to an estimated 2 mt of cnidarians in the net. Average tow speed was 2.4 k with average tow depths ranging from 14 to 41 fm.

In total, nine legal-sized California halibut with an aggregate weight of 103 lb were retained. Length range was 584 to 1000 mm with a mean of 751 mm. Six were male and three were female. Twenty-nine sub-legal California halibut were tagged and released and eight sub-legal California halibut were retained due to their condition upon landing. All species captured are summarized in Table 1.

The sublegal- to legal-sized California halibut ratio during this cruise was 37 to 9, suggesting that in these grounds at this time of year sublegal California halibut dominated the population. The most predominant associated finfish species were petrale sole (*Eopsetta jordani*), California skate (*Raja inornata*), and big skate (*Raja binoculata*). The most common associated invertebrate species included slender crab (*Cancer gracilis*), Dungeness crab (*Cancer magister*), and cnidarians.

Conclusions: The F/V *Cardinale I* is a 34-ft multi-purpose commercial fishing vessel. The trawl footrope measured 50 ft. Due to the size of the vessel and trawl gear, weather and oceanographic conditions greatly influenced tow direction and efficiency (see Figure 1). Short period wind waves appeared to have a greater affect on towing efficiency than swells. When the stern of the vessel rose and fell suddenly, a similar effect was transferred to the doors of the trawl net causing the footrope to lose contact with the substrate. This translated to a reduced catch. During the 4 days of the cruise, wind wave heights generally increased throughout the day, making the gear less effective usually by 1550 (see Figures 2, 3, 4, 5).

Current and swell direction also had an effect on vessel course. Trawl gear must set and fish either with or against the current and swell direction.

Attempting to trawl perpendicular to the current or swell resulted in the trawl doors being pushed over and loss of gear efficiency. Other directional considerations were the avoidance of navigational hazards such as buoys, hagfish pot floats, and surface kelp. During this cruise the vessel operator often needed to adjust the length of the deployed trawl cable. The vessel had recently been rigged with new cables, which may not have been accurately marked for length. During all 4 days, different lengths of scope were utilized until an effective length was found for a particular depth. Thus, the gear was not always operating at maximum efficiency.

Personnel:	Frank Cardinale	Vessel Captain, Commercial Fisherman
	James Brown	Deck Hand
	Travis Tanaka	CDFG Biologist-in-charge, Monterey
	Adrienne Vincent	CDFG Biologist, Belmont
	Lora Lyons	CDFG Scientific Aide
	Crystal Thornton	CDFG Scientific Aide

TABLES AND FIGURES

Table 1. Species composition summary for all survey days.

TRAWL SURVEY DATA--ALL SPECIES

SPECIES SCIENTIFIC NAME	SPECIES- COMMON NAME	NUMBER PRESENT	# TOWS PRESENT
Eopsetta jordani	petrale sole	129	14
Raja inornata	California skate	80	12
Raja binoculata	Big skate	55	13
Cancer gracilis	slender crab	51	2
Citharichthys sordidus	Pacific sanddab	39	8
Paralichthys californicus	California halibut sub-legal	37	10
Zalembius rosaceus	pink surfperch	25	9
Cancer magister	dungeness crab	22	6
Pleuronichthys decurrens	curlfin turbot	21	8
Platichthys stellatus	starry flounder	19	6
Pleuronichthys verticalis	hornyhead turbot	18	9
Genyonemus lineatus	white croaker	15	7
Loligo opalescens	market squid	15	5
Parophrys vetulus	English sole	13	8
Torpedo californica	Pacific electric ray	12	6
Zaniolepis latipinnis	longspine combfish	11	4
Chitonotus pugetensis	roughback sculpin	10	6
Paralichthys californicus	California halibut legal	9	3
Squalus acanthias	spiny dogfish	4	3
	Anemone	4	1
Cancer productus	red rock crab	2	2
Porichthys notatus	plainfin midshipman	2	2
Leptocottus armatus	staghorn sculpin	3	3
Raja clavata	thornback ray	3	3
Ophiodon elongatus	Lingcod	2	2
Flabellina iodinea	Spanish shawl	2	2
Peprilus simillimus	Pacific butterfish	2	2
Symphurus atricauda	California tongue fish	2	2
Chimaera monstrosa	rat fish	1	1
Synodus lucioceps	California lizard fish	1	1
Mursia gaudichaudii	calappid crab	1	1
	Cnidarians	**	12
	sea stars	**	7
Pycnododia helianthoides	sun star	**	4
Ptilosareus sp.	sea pens	*	2

* = presence noted, no count or weight
** = some were not counted or weighed due to broken individuals, too numerous to weigh, or drastic variation in scale reading

Figure 1. North Monterey Bay GIS map including actual trawl tracks and tow directions.

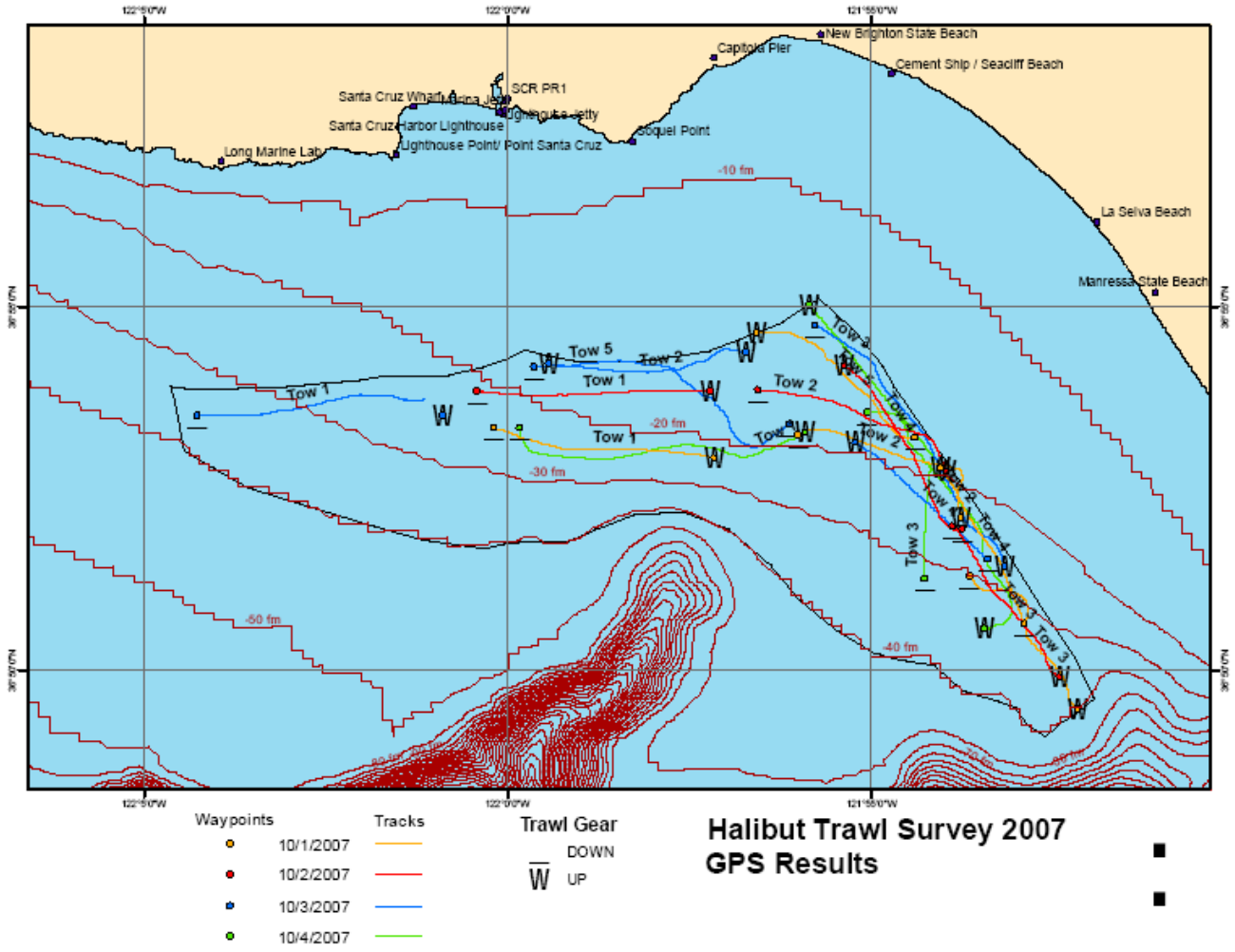

Figure 2. Weather summary from October 1, 2007 including time trawl gear was deployed. Data from 3-meter discus weather buoy, CA46042, located at 36.75N, -122.42W in figures 2, 3, 4, and 5.

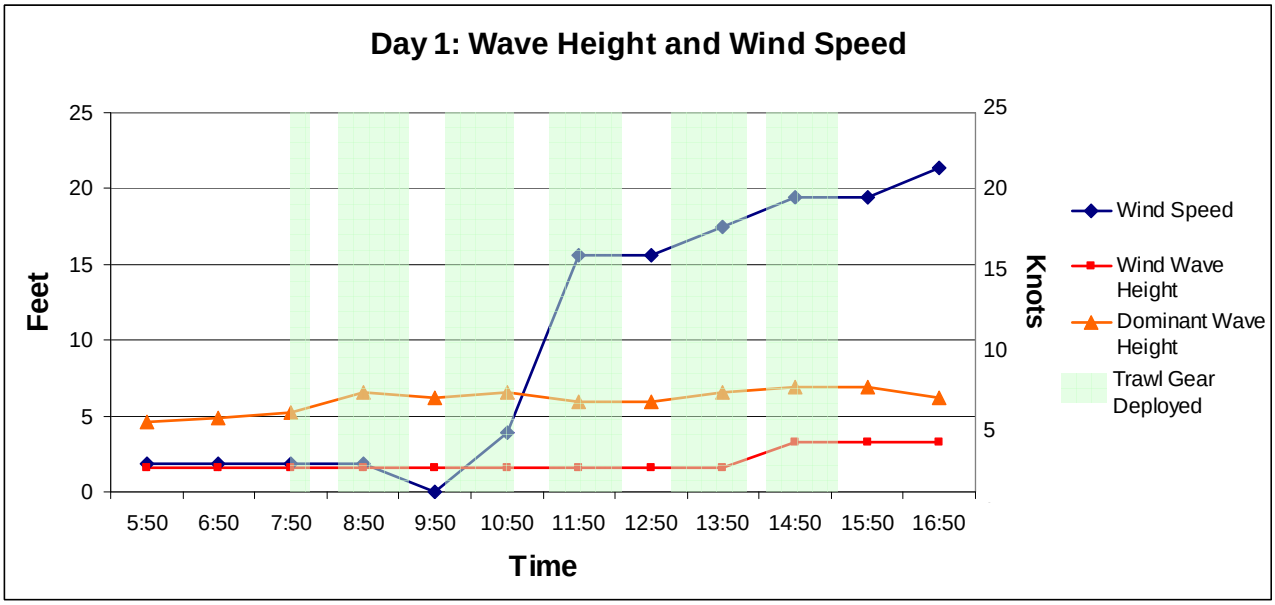

Figure 3. Weather summary for October 2, 2007 including time trawl gear was deployed.

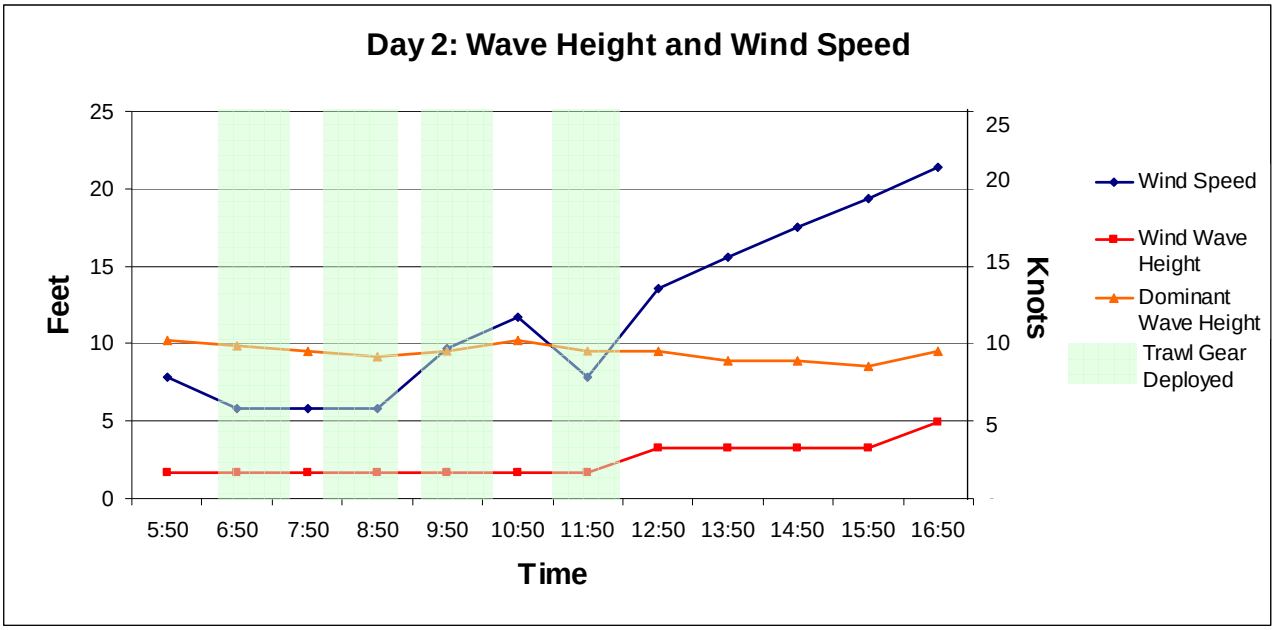

Figure 4. Weather summary for October 3, 2007 including time trawl gear was deployed.

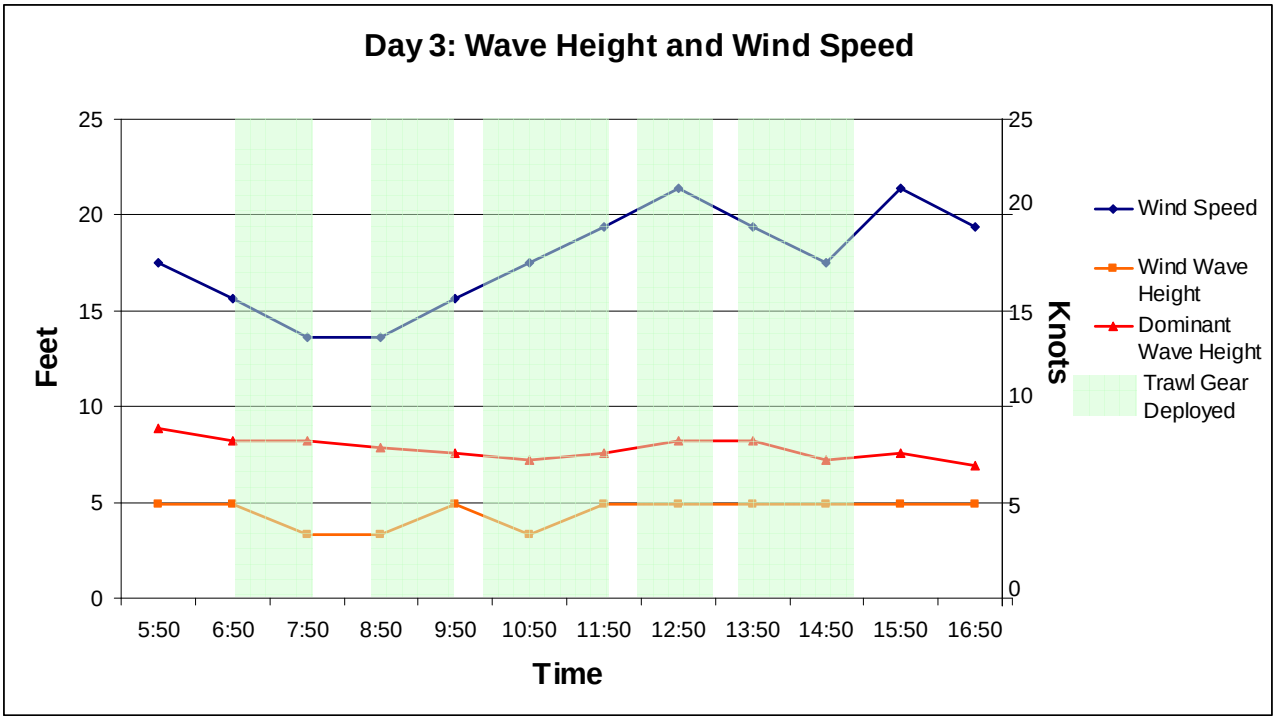

Figure 5. Weather summary for October 4, 2007 including time trawl gear was deployed.