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LOGBOOK PILOT PROGRAM FOR CALIFORNIA'S NEARSHORE GROUNDFISH FISHERY: RESULTS AND LESSONS LEARNED

Cynthia Thomson
David VenTresca
David Colpo

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U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southwest Fisheries Science Center

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[1]Cynthia Thomson
[2]David VenTresca
[3]David Colpo

[1]National Marine Fisheries Service, NOAA
Southwest Fisheries Science Center
110 Shaffer Road
Santa Cruz, CA 95060

[2]California Department of Fish and Game
Marine Region
Monterey, California

[3]Pacific States Marine Fisheries Commission
Portland, Oregon

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IN MEMORIAM

DAVID VEN TRESCA
December 26, 1944 - December 5, 2007

David's dedicated and successful career as a biologist was enriched and informed by his love of the ocean and his high regard for the fishermen who earned their living from it. He lived his life with great energy and generosity of spirit, and saw and sought the good in everyone he met. It was an honor to have known and worked with him.

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We thank the fishermen who participated in planning and implementation of the nearshore groundfish logbook pilot project. We are particularly appreciative of their input in development and pretesting the logbook form and their time-consuming efforts to fill out the logbook over the course of a fishing season. We thank NOAA Fisheries, Office of Science and Technology, Economics and Social Science Division in Silver Spring, Maryland for funding this pilot study. We are also grateful for the valuable advice provided by Bob Leos and Deb Wilson-Vandenberg (California Department of Fish and Game) over the course of the project.

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Abstract

This report describes results of a pilot study to evaluate the feasibility of a logbook program for California's nearshore commercial groundfish fishery. The pilot study was designed to address the need for: (i) more refined area-specific estimates of kept and released fish (by species) and effort (by gear type), and (ii) economic data. Because only a small number of fishermen participated in the pilot study, results should not be viewed as representative of the fishery. However, the study did yield a number of concrete recommendations that may be useful, should the logbook be taken beyond the pilot stage. Rewording suggestions are provided to address ambiguities in the logbook form that became apparent over the course of the pilot study. Strategies are discussed for ensuring accurate and consistent entry of logbook data into the database (e.g., range checks, lookup tables). Suggestions are made for matching of logbook data to landings receipts and calibrating logbook hailed weights to landing receipt weights. Some general conclusions: (i) Input from fishermen is essential for developing logbook forms that reasonably reflect the nature of fishing operations and for streamlining data entry (e.g., through use of working logbook forms). (ii) The quality and consistency of data obtained in the pilot study suggest that a logbook program is feasible for this fishery. (iii) Voluntary logbook participation by motivated individuals may provide greater assurance of data quality than a mandatory program. However, a voluntary program raises issues of representativeness and precision of logbook data and incentives for participation that should be considered prior to implementation.

I. Introduction

California's Nearshore Fishery Management Plan (FMP) was adopted by the California Fish and Game Commission in 2002. The FMP covers 19 finfish species that are targeted in nearshore commercial and/or recreational fisheries.[1] Sixteen of these 19 species (cabezon, scorpionfish, kelp greenling and the 13 *Sebastes* species) are also managed under the Pacific Fishery Management Council's Groundfish FMP.

An important component of nearshore harvest is the live fish fishery, which developed in the late 1980s to serve ethnic Asian markets in the San Francisco and Los Angeles areas. The high prices and low investment needed to enter this fishery prompted a rapid increase in live fish harvest during the 1990s. Total live fish harvests, which peaked at 452 mt in 1998, have been severely restricted in recent years to protect nearshore stocks.[2] The CFG Commission imposed a moratorium on entry into the nearshore fishery in 2000, and established a restricted access program in 2003 that drastically reduced the number of fishery participants to 224.[3] Restricted access permits were issued on a regional basis - 29 on the north coast, 38 on the north-central coast, 83 on the south-central coast and 74 on the south coast (Bob Leos, CDFG, pers. comm.).

The Nearshore FMP provides a framework for managing the nearshore fishery that emphasizes regional management. To meet regional management requirements, the FMP notes that "...there is a clear need to accurately determine fishing patterns and indexes of abundance on both temporal and spatial scales".[4] However, lack of data make it difficult to devise meaningful management measures that reflect differences in fishing behavior among areas or to predict the biological and economic implications of such measures. For instance:

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[1] Cabezon (*Scorpaenichthys marmoratus*), California sheephead (*Semicossyphus pulcher*), kelp greenling (*Hexagrammos decagrammus*), rock greenling (*Hexagrammos lagocephalus*), black rockfish (*Sebastes melanops*), black-and-yellow rockfish (*Sebastes chrysomelas*), blue rockfish (*Sebastes mystinus*), brown rockfish (*Sebastes auriculatus*), calico rockfish (*Sebastes dallii*), China rockfish (*Sebastes nebulosus*), copper rockfish (*Sebastes caurinus*), gopher rockfish (*Sebastes carnatus*), grass rockfish (*Sebastes rastrelliger*), kelp rockfish (*Sebastes atrovirens*), olive rockfish (*Sebastes serranoides*), quillback rockfish (*Sebastes maliger*), treefish (*Sebastes serriceps*), California scorpionfish (*Scorpaena guttata*), monkeyface prickleback (*Cebidichthys viiolaceus*).

[2] California Department of Fish and Game. 2002. Review of some California fisheries for 2001: market squid, sea urchin, Dungeness crab, lobster, prawn, abalone, groundfish, swordfish and shark, coastal pelagic finfish, ocean salmon, nearshore live-fish, Pacific herring, white seabass and kelp. *CalCOFI Rep*. 43:13-30.

[3] By contrast, 1,130 individuals held nearshore fishery permits during the 1999-2000 permit year.

[4] California Department of Fish and Game. 2002. *Nearshore Fishery Management Plan*, p. 27. CDFG Marine Region

- **$** Some of the variables reported on the landings receipts are not sufficiently refined or accurate to be useful for management. For instance, area of catch is reported at a fairly coarse geographic scale and is generally not deemed reliable. Disposition of catch is not consistently reported, making it difficult to distinguish live from dead landings - a particularly important consideration in the nearshore fishery. Gear categories are not sufficiently refined to distinguish stick gear from hook-and-line gear - limiting the ability of fishery managers to differentiate the effects of gear on fish stocks.

- **$** More precise estimates of the numbers and species composition of released fish are needed. NOAA's National Marine Fisheries Service (NMFS), Northwest Fisheries Science Center administers an observer program that focuses on estimating released fish in the groundfish fishery. However, coverage of the nearshore fishery is limited and not necessarily representative, as many nearshore vessels are too small to accommodate an onboard observer.

- **$** In terms of economic data, landings receipts provide useful information on number of active vessels and ex-vessel value of landings. However, data on trip length, crew size and trip costs are not collected. This limits the ability of fishery managers to devise management alternatives that reflect the economic realities of the fishery – as well as the ability of economists to develop analyses and models that provide insights into the economic effects of regulations.

Filling these data gaps would help address a number of management needs: (i) provide an eventual long-term time series of gear- and area-specific estimates of catch-per-unit-effort (CPUE) that could be used in conjunction with other indices in stock assessments, (ii) provide spatially explicit information on fishing behavior (e.g., effort, retained and released catch, harvesting costs) that could be used to refine current regulations and better understand the economic effects of regulations, and (iii) provide an opportunity to collaborate with nearshore fishermen and benefit from their unique knowledge.

In 2004, the NMFS Southwest Fisheries Science Center, the California Department of Fish and Game (CDFG) and the Pacific States Marine Fisheries Commission (PSMFC) began preparations for a pilot study to evaluate the feasibility of a nearshore groundfish logbook program that could be used to fill some of the data gaps identified above. The pilot study was implemented in the 2005 fishing season. Section II describes logbook content, Section III discusses logbook pilot results, Section IV focuses on data issues, and Section V provides some general observations regarding participation incentives and other issues that would need to be addressed should a long-term nearshore logbook be implemented statewide. Throughout this report, bold italicized text is used to highlight specific recommendations relevant to logbook program establishment.

II. Logbook Format and Content

The nearshore logbook includes four types of forms: (i) an instruction sheet, (ii) a trip form for information on the fishing trip, (iii) one or more catch/effort forms for each trip, depending on the number of locations fished during the trip, and (iv) a working logbook form.

- **$** Trip form: The trip form provides information on the name and license number of the logbook participant and the name and registration number of the vessel associated with the trip, as well as characteristics of the trip itself (e.g., date, duration, presence of observer, crew size, trip costs, market destination of catch). To facilitate reporting of market destination, a map is provided that depicts each of the possible eight destinations indicated on the form. The form also provides landings receipt number(s) associated with each trip. Space is provided for multiple landings receipts, to allow for the possibility of deliveries to multiple receivers or allocation of catch among multiple nearshore permit holders on a given trip.

- **$** Catch/effort forms: The nearshore fishery is typically conducted on small boats involving 1-2 people. The pace and complexity of fishing activity - which involves deployment of multiple units of gear (sticks, traps, lines, rod and reels) and frequent set and retrieval of gear - makes it difficult for fishermen to track and record the amount of fish caught per set. Thus instead of focusing on each set (as is customary in many commercial fishery logbooks), the nearshore log asks fishermen to fill out a separate catch/effort form for each location fished on a trip. For purposes of determining location, respondents are provided with maps devised by CDFG that subdivide the coast into standardized 10'x10' blocks and subdivide each block into 100 1'x1' microblocks. All catch and effort occurring in either (i) a single block or (ii) two or more adjacent blocks on the same trip are treated as occurring at the same location and reported on the same catch/effort form. Location is reported on the form in terms of block and microblock numbers (taken from relevant maps), and average depth of catch is also provided for each location. Catch is reported in terms of (i) pounds of fish kept - by species and disposition (live, dead), and (ii) numbers of fished released - by species and reason for release. Depending on the gear type, effort is variously reported in terms of number of gear units, number of hooks per gear unit (if the gear is stick, line, or rod and reel), and soak time. For trap, stick and line gear - which are set and retrieved at fairly regular intervals - the logbook asks for average soak time per set. For rod and reel gear - which are pulled at erratic intervals (i.e., when a bite is detected on the line) - soak time per set tends to be more difficult to estimate; instead the logbook asks for total soak time.

- **$** Working logbook form: The working log is an abbreviated version of the catch/effort form. Fishermen were provided with this optional form (photostated on waterproof paper) and an aluminum clipboard to facilitate their ability to take notes at sea regarding number of sets, fishing location (microblock/s), depth range, number and species of fish kept and released, reason/s for releasing fish, and weather and ocean conditions.

Fishermen using this log would transfer information from this form to the catch/effort form at the end of the fishing trip.

The logbook - including the instruction sheet, trip form, catch/effort form, market destination map, and working logbook form - is provided in Appendix A. Appendix B provides an example of a block/microblock map (Santa Cruz county). Due to the sheer quantity of maps needed to cover the California coast, each logbook respondent was provided only with those maps that included his own fishing locations.

III. Logbook Results

This section describes results of the pilot program, based on data for trips made from May 6, 2005 through October 31, 2005.[5]

III.A. Pilot Program Participants

Seven fishermen participated in the pilot logbook program. Logbook reporting was highly variable among participants, with three of the fishermen accounting for 109 of the 119 trips reported in the logs. Given the small, nonrandom nature of the sample, the logbook results cannot be construed as representative of the population of nearshore permit holders. However, the pilot program has been quite instructive in terms of revealing quality control issues relevant to logbook content and format, data entry, and matching of logbook data to landings receipts. These issues will warrant further consideration, should plans be made to establish a long-term logbook program.

III.B. Fishing Trips and Trip Characteristics

Logbook respondents were asked to identify the name/license number of the fisherman making the trip. For two of the logbook trips, a respondent provided notes indicating that he was accompanied by another fisherman on the trip. ***The logbook should be re-formatted to explicitly allow for identification of multiple fishermen on a trip.***

Logbook respondents were asked to identify the type of vessel associated with each trip: (i) boat with cabin, (ii) boat without cabin, (iii) kayak, and (iv) other. Of the 119 trips reported in the logs, 116 occurred on a "boat without cabin" and 3 on a "boat with cabin". One respondent checked "other" and (by explanation) described his boat as an "aluminum skiff". No one reported fishing from a kayak. ***The vessel typology used in the logbook appears somewhat ambiguous (e.g., "kayak" could be interpreted as a subset of "boat without cabin") and does not provide an obvious category for skiffs. The typology should be revisited to better ensure that the vessel categories are mutually exclusive and accurately reflect the more common vessel types used in the nearshore fishery.***

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[5] Logs submitted by one fisherman after October 31, 2005 continue to be added to be database but are not reflected in this report.

Three respondents reported carrying an observer on 7 of the 119 trips. ***Flagging of observer-covered trips is important as a means of facilitating comparison of logbook and observer data.***

San Francisco Bay area was reported as the market destination of catch for 106 of the 112 trips for which a response to this question was provided. No southern California destinations were reported - a not surprising result given that all of the pilot study participants fished in central/northern California.

Vessel length and trip duration (calculated on the basis of departure date/time and return date/time) exhibited a wide range (Table 1). While almost all the trips in the logbook sample were completed well within a single day, a small number of multi-day trips was also reported. The reporting of multi-day trips was instructive in terms of reflecting the variability in vessel size, trip length and trip-level catch, effort and expenses that can occur in this fishery.

Table 1. Summary statistics on vessel length and trip duration.

	Mean	Std Dev	n	Min-Max
Vessel length (ft)	20.12	6.44	110	10-43
Trip duration (hrs)	10.25	7.10	117	2.00-60.00

Respondents were asked about the number of crew on each trip (excluding skipper). Crew size was reported for only five trips, with crew size = 1 on all five trips - suggesting that participation in this fishery is a largely solitary activity. However, this conclusion is somewhat ambiguous, as it assumes that non-reporting of crew size implies zero crew. ***The logbook should be modified to ensure consistent and unambiguous reporting of zero as well as non-zero crew sizes. For instance, respondents could be asked whether the trip was made alone (with yes/no checkboxes) and, if "no", how many crew were aboard other than the skipper.***

For purposes of estimating trip costs, respondents were asked to distinguish between trips made aboard owner-operated versus non-owner-operated boats. For owner-operated trips, respondents were asked to estimate crew share and owner-operator share. For non-owner-operated trips, respondents were asked to estimate crew share, skipper share and boat share. All but one of the trips reported in the logs was made on an owner-operated vessel. Table 2 provides statistics on how revenue was shared for these trips. The small sample size for crew share (n=4) reflects the small number of trips involving crew. Also, for two of the owner-operated trips, the respondent deviated from the logbook format by providing a boat share instead of an owner/operator share. ***This deviation suggests a need to include a boat share (return to capital) as well as owner-operator and crew shares (return to labor) in the logbook for owner-operated trips. Another option would be to ask respondents to estimate boat and owner-operator shares combined, should owner-operators find it too difficult to estimate how much of their non-crew revenue is attributable to their labor versus their boat.***

Table 2. Summary statistics on labor/boat share per trip, as reported for trips made on owner-operated boats.

	Mean	***Std Dev***	***n***	***Min-Max***
Trips Aboard Owner-Operated Boats				
Crew Share	$ 995.96	273.56	4	$ 715.40-$1,304.61
Owner/Operator Share	$ 499.77	536.56	112	$ 59.40-$5,218.44
Boat Share	$3,576.78	---	2	$2,702.60-$4,450.95

Respondents were asked to report non-labor trip costs including (i) fuel, (ii) tackle, (iii) bait, (iv) groceries, (v) transportation of catch, (vi) boat maintenance (<$100), and (vii) other - along with a request to describe what they are including in "other". Respondents were instructed to report "$ spent in prep for trip, even if all purchases not used up on this trip". This instruction was based on the assumption that it would be easier for respondents to track expenses as they are made than to estimate expenses associated with goods/services actually used during each trip. (For instance, respondents could report fuel expenses as they were incurred rather than have to keep track of the cost of fuel actually consumed on each trip.)

Variability in trip costs was evident even at the individual respondent level, suggesting that fishermen put some thought into making the costs trip-specific rather than reporting some average over all trips. Some observations on non-labor trip costs (Table 3) are as follows:

- Differences in sample size provide a rough idea of differences in the incidence of various costs. For instance, fuel and bait costs are incurred much more routinely than costs associated with transportation of catch. (Note, however, that transportation can be a significant expense when it does occur - particularly given current gasoline prices.)

- Although respondents were asked to report only minor boat maintenance costs (<$100), the mean value of this variable exceeded $100 and ranged as high as $800. This high end reporting reflects a number of possibilities. For instance: (i) respondents may have interpreted the <$100 provision to mean <$100 for each individual maintenance item, or (ii) respondents may have ignored the <$100 provision in the interest of ensuring that all of their costs were captured in the logbook.

- Respondents who reported "other" costs included a wide range of items in that category - e.g., new aerator, aerator batteries, Plus Airstone, new anchor, reel, fish tank latches, bridge toll, insurance (monthly), "towed in".

Table 3. Summary statistics on non-labor trip costs.

Cost Category	*Mean*	*Std Dev*	*n*	*Min-Max*
Fuel	$ 44.48	105.43	110	$ 3.00-$675.00
Tackle	$ 10.70	15.76	71	$ 0.50-$100.00
Bait	$ 12.64	36.05	117	$ 2.00-$260.00
Groceries	$ 9.61	21.63	92	$ 2.00-$120.00
Transportation of Catch	$ 31.67	5.61	31	$15.00-$ 43.00
Boat Maintenance (<$100)	$173.88	255.22	13	$ 4.50-$800.00
Other [1]	$ 99.00	190.56	9	$ 3.00-$600.00

[1] Itemized items included on the logs included new aerator, aerator batteries, Plus Airstone, new anchor, reel, fish tank latches, bridge toll, insurance (monthly), and "towed in".

The logbook cost categories were originally intended to cover only trip costs, with the expectation that fixed costs (i.e., insurance, boat repair and other costs that are not easily attributable to individual trips) would be covered in a separate NMFS economic survey. However, due to budget and other issues, NMFS plans to conduct rotating economic surveys that cover different fisheries in different years - meaning that the nearshore groundfish fishery would be surveyed only every 3-5 years. ***Given this situation, it may make more sense to cover all costs (not just trip-related expenses) in the nearshore logbook, should a long-term logbook program be established.***

The logbook cost categories will need to be revised to more comprehensively cover all fishing costs. Revised cost categories could include:

- $ ***Boat fuel***
- $ ***Tackle and gear (including traps, sticks, rods/reels, hooks)[Note: This would replace the "Tackle" category currently in the logbook.]***
- $ ***Bait***
- $ ***Groceries***
- $ ***Transportation of catch***
- $ ***Maintenance and repair of boat, equipment and tank [Note: This would replace the "Boat Maintenance (<$100)" category currently in the logbook and would cover all maintenance costs. Aerators, aerator batteries, anchors, and fish tank latches reported as "other" expenses by pilot logbook participants would belong in this category.]***
- $ ***Boat payments, insurance, bookkeeping***
- $ ***Other***

One complication of expanding the logbook to include all fishing costs is that some nearshore fishermen may use their boats in multiple fisheries, in which case non-trip costs (e.g., maintenance and repair, boat payments/insurance/bookkeeping) may not be fully

attributable to the nearshore fishery. One method of allocating such costs among fisheries would be to analyze all landings receipts for the boats reported in the logs to determine the extent of multi-fishery activity and allocate the non-trip costs in proportion to the number of landings in each fishery. If this approach is adopted, it would be helpful if the software used to match logbook-reported landings receipts to actual landings receipts were to include a tool to facilitate (i) downloading of all landings receipts for boats reported in the logbooks, and (ii) determination of the number of landings attributable to nearshore groundfish.

III.C. Effort and Catch

As indicated in Section II, respondents were asked to provide landing receipt numbers associated with each trip. No receipts were reported for five of the logbook trips. Of the remaining 114 trips, 109 trips could be matched to landings receipts (Table 4). For these 109 trips, the mean number of landings receipts per trip was 1.13=123/109 - suggesting that multiple receipts is an uncommon but not unheard of occurrence in this fishery. Eight of the 11 landings receipt numbers reported for the remaining five trips could not be matched[6] - making the three receipts that could be matched essentially unusable.

Table 4. Number of logbook trips and landing receipts reported in the logbooks which could and could not be matched to PacFIN landings receipts, and number of logbook trips for which no landings receipts were reported.

	# Logbook Trips	***# Landings Receipts***
Logbook Trips That Could Be Matched to Landings Receipts:		
One-landings receipt trips	97	97
Two-landings receipts trips	13	26
Three-landings receipts trips	0	0
Match Subtotal	109	123
Logbook Trips that Could Not Be Matched to Landings Receipts:		
One-landings receipt trips	0	0
Two-landings receipt trips	4	8
Three-landings receipts	1	3
No Match Subtotal	5	11
No Landings Receipt Reported in Logbook	5	0
Total	119	134

[6] Landings receipt numbers reported in the logbooks that could not be matched were: 0300726, 0300727, 0300732, 0300733, 0300736, 0300737, D403558, D421416.

Respondents were asked to describe each location fished on each trip using block and microblock numbers. Location information was provided for 116 of the 119 trips reported on the logs. The vast majority (113) of these trips involved one location (Table 5), so mean number of locations per trip was quite low (1.03 = 120/116). Based on this result, requiring logbook respondents to report catch and effort by location appears to be only slightly more burdensome than reporting catch and effort for the trip as a whole. ***Of the 120 fishing locations reported, 113 involved one block, four locations involved two blocks, and three locations involved three blocks - confirming the utility of accommodating multiple blocks on the logbook form to describe location.***

Table 5. Number of logbook trips for which one, two and three fishing locations were reported.

# Locations Per Trip	***Number of Trips***	***Total Locations***
One Location	113	113
Two Locations	2	4
Three Locations	1	3
Total	116	120

Gear usage was reported for 123 of the logbook locations - one gear type in 116 locations and two gear types in seven locations (Table 6). Catch-per–unit-effort (CPUE) for stock assessment is best estimated with location-specific catch data associated with the same gear type. ***The use of logbook data to estimate CPUE for a given gear type would be facilitated by the apparently large proportion of one-gear fishing locations (94%). On the other hand, the diversity of gear types used in this fishery suggests that the number of location observations would need to be sufficiently large to ensure an adequate sample for any one gear type.***

Table 6. Number of locations associated with each gear type.

Gear Types Reported	***Number of Locations***
One Gear Per Location	
Trap	3
Hardstick	5
Vertical Longline	22
Rod and Reel	86
One Gear Subtotal	116
Two Gears Per Location	
Trap & Hardstick	3
Trap & Rod/Reel	1
Hardstick & Rod/Reel	3
Two Gear Subtotal	7
Total	123

Table 7 provides information on gear usage reported in the logbooks. Rod and reel (RR) was the predominant gear - used at 89 of the 123 logbook locations. Respondents were able to provide information on hooks per RR and total soak time; however, the number of RR pulls was reported for only 34 of the 89 locations. The large number of missing values may be due to the difficulty of keeping track of the number of pulls, as RR gear is pulled at erratic intervals (i.e., when a bite is detected on the line). Fishing effort is amenable to aggregation for most gear types (e.g., trap hours = # trap pulls * avg soak time, hook hours [for stick gear] = # stick pulls * hooks per stick * avg soak time, hook hours [for line gear] = # line pulls * hooks per line * avg soak time). ***However, effort aggregation for RR gear is more problematic. For instance, while total soak time reflects RR effort to some extent, effort is also affected by how much gear is deployed during that time. One option would be to ask for "# RRs" rather than "# RR pulls" and use [# RRs * total soak time] as an index of RR effort. Resolving this issue will be important, particularly if RR use is as prevalent in the nearshore fishery as it is in the logbook sample.***

Table 7. Gear statistics, by gear type.

Gear Statistics	*Mean*	*Std Dev*	*n*	*Min-Max*
Trap Gear - per location				
# trap pulls	105.71	140.90	7	6-405
Avg soak time (hrs)	1.36	0.39	7	.83-2.00
Avg bottom depth (ft)	22.14	8.59	7	10-35
Stick Gear - per location [1]				
# stick pulls	151.10	195.76	10	22-660
Hooks per stick	4.33	0.71	9	3-5
Avg soak time (hrs)	0.37	0.13	9	0.20-0.50
Avg bottom depth (ft)	26.10	11.39	10	15-42
Line Gear - per location [2]				
# line pulls	54.52	20.05	23	20-94
Hooks per line	4.00	0.00	23	4-4
Avg soak time (hrs)	0.51	0.09	23	0.42-0.75
Avg bottom depth (ft)	49.47	4.38	19	40-55
Rod&Reel Gear - per location				
# RR pulls	40.56	48.02	34	1-127
Hooks per RR	5.16	4.64	88	1-22
Total soak time (hrs)	7.09	2.3	89	0.08-11.50
Avg bottom depth (ft)	43.08	16.60	88	10-80

[1] All hard stick. No cable stick reported.
[2] All vertical H&L. No set longline reported.

For purposes of reporting kept and released fish, the logbook form included 21 individual species, as well as space to add other species. Column 1 of Table 8 lists the 21 species, column 2 identifies which of these species were reported kept or released in the pilot study (as well as identities of the "other" species written in by logbook respondents), and column 3 identifies the market categories appearing on the PacFIN landings receipts reported in the logbooks. Some observations about columns 2 and 3:

- Species reported in the "other" category (column 2) include: (i) common names of species targeted in the nearshore fishery (e.g., bolina - aka brown rockfish), (ii) rockfishes not explicitly included on the logbook form (e.g., yellowtail RF), and (iii) species released during the trip (e.g., goldeneye, rock greenling, surfperch, wolfeel).

- Many of the species reported in the logbooks (column 2) can be easily matched to the PacFIN market categories reported on the associated landings receipts (column 3). In other cases, the match is ambiguous and not necessarily one-to-one - e.g., RCK4 (unspecified reds) may refer to canary and/or vermilion rockfish. Also, some species reported on the landings receipts do not appear in the logbooks, and vice versa.

Table 8. Crosswalk for species appearing on the logbook form, reported in the logbook pilot study, and appearing on the PacFIN landings receipts reported in the logbooks.

Logbook Form	***Logbook Pilot***	***PacFIN Market Category (landings receipt matches)***
Black Rockfish (RF)	Black Rockfish (RF)	BLK1
Black-and-yellow RF	Black-and-yellow RF	BYL1
Blue RF	Blue RF	BLU1
Brown RF	Brown RF Other: Bolina [1, 2]	BRW1
Cabezon	Cabezon	CBZ1
Calico RF	*Absent*	*Absent*
CA Scorpionfish	*Absent*	*Absent*
CA Sheephead	CA Sheephead	*Absent*
China RF	China RF	CHN1
Copper RF	Copper RF	COP1
Gopher RF	Gopher RF	GPH1 RCK7 (unsp gopher rockfish)
Grass RF	Grass RF	GRS1
Kelp Greenling	Kelp Greenling	KGL1

Kelp RF	Kelp RF	KLP1
Olive RF	Olive RF	OLV1
Quillback RF	Quillback RF	QLB1
Treefish	Treefish	TRE1
Lingcod	Lingcod	LCD1
Bocaccio	*Absent*	*Absent*
Canary RF	*Absent*	*Absent*
Vermilion RF	Vermilion RF	VRM1
Other	Other: Goldeneye [3]	
	Other: Rock greenling [3]	
	Other: Sculpin [4]	SCLP (unsp sculpin)
	Other: Surfperch [3]	
	Other: Wolfeel [3]	
	Other: Yellowtail RF [4]	
		OCRK (other croaker)
		PNK1 (unsp pink rockfish)
		RCK4 (unsp reds rockfish) [5]
		SMLT (unsp smelt)
		THDS (thornyheads mixed)

[1] Common name for brown RF.
[2] Taken only.
[3] Released only.
[4] Taken and released.
[5] RCK4 typically includes vermilion and sometimes canary RF.

Should the logbook program be implemented, a lookup table will need to be created that provides a crosswalk between PacFIN market categories or CDFG species codes (depending on whether the logbook species are matched to PacFIN or CDFG landings receipts) and the species explicitly listed in the logbook. "Other" species that show up in the logbook as write-ins (e.g., wolfeel, surfperch) should be added to the lookup table and assigned a species code the first time they occur. This will allow them to be coded in a standardized manner in subsequent occurrences.

Catches are reported in the logbook by location, with locations defined in terms of standardized blocks and microblocks. Figure 1 identifies the blocks in which fish were reported kept and/or released by logbook respondents.[7] ***Aggregate summaries of fish kept and released by species and microblock would be useful outputs, should a logbook program be established. Since catches in adjacent blocks are combined for purposes of logbook reporting (see p. 5), a standard protocol will be needed for allocating such catches among individual blocks/microblocks. For an equal allocation protocol, it would be helpful if logbook software provided a count of the numbers of blocks and microblocks per location, to facilitate estimation of mean catch per block/microblock. Catch, effort and block/microblock data should also be preserved in their raw form, to provide the user with the flexibility to pursue alternative spatial allocation methods as desired.***

[7] Specific quantities kept and released by species and microblock are not provided in this report to protect the confidentiality of individual respondent data

Figure 1. Blocks in which fish were reported kept and/or released by logbook respondents.

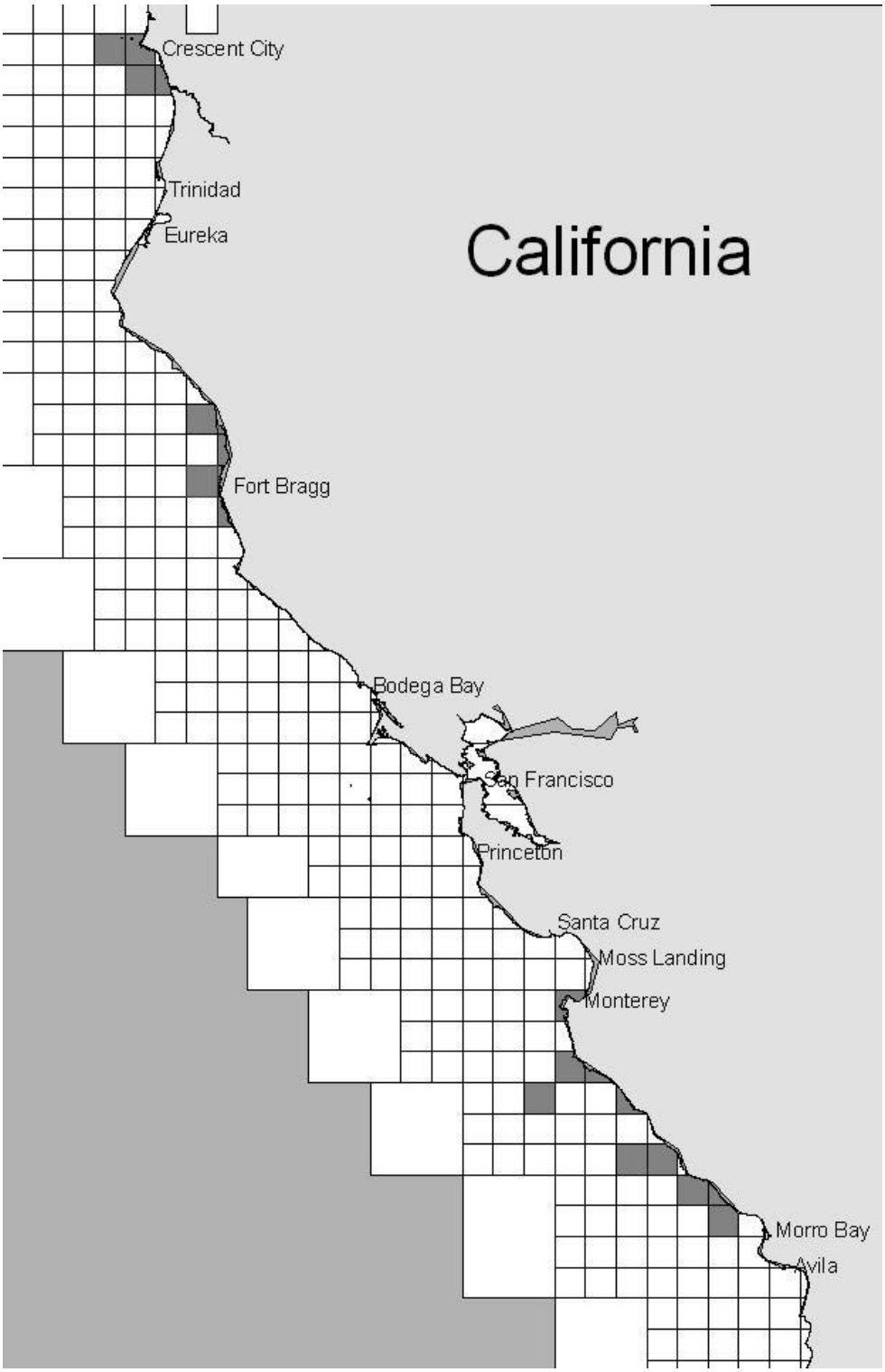


Table 9 summarizes landings reported for (i) all logbook trips, (ii) the subset of logbook trips that could be matched to PacFIN landings receipts, and (iii) landings receipts that could be matched to logbook trips. Comparison of species-specific landings in columns 3 and 5 (totaling 21,945 and 21,487 pounds respectively) indicate a close correlation between hailed weights from the logbooks and measured weights from the landings receipts. The low volume of landed catch (averaging 202 pounds per logbook trip) - combined with fisherman proficiency at weight estimation - may at least partially account for this close correlation. The correlation may also be due to post-trip data entry in the logbook to match the poundages reported on the associated landings receipt.

Table 9. Kept fish (lbs) by species and disposition (live, dead), as reported for all logbook trips, logbook trips matched to landings receipts, and landings receipts matched to logbook trips.

Logbook Species	***Kept Fish (Lbs, Live+Dead)***		***PacFIN Market Category***	***Kept Fish (Lbs)***
	All Logbook Trips	***Logbook Trips Matched to Landings Receipts***		***Landings Receipts Matched to Logbook Trips***
Black Rockfish (RF)	11,168=10,644+524	11,154=10,632+522	BLK1	10,512
Black-and-yellow RF	1,123=995 +128	1,111=983+128	BYL1	790
Blue RF	1,878=244 +1,634	1,870=236+1,634	BLU1	1,761
(Brown RF)+ (Other: Bolina)	21=(0 +16) + (5+0)	21=(0 +16) + (5+0)	BRW1	8
Cabezon	2,718=2,707 +11	1,916=1,909+7	CBZ1	2,073
CA Sheephead	4=4 +0	4=4+0	*Absent*	0
China RF	389=380+9	377=371+6	CHN1	427
Copper RF	90=83+7	90=83+7	COP1	88
Gopher RF	1,115=1,091+24	844=826+18	GPH1+RCK7	1,104=1,086+18
Grass RF	895=887+8	266=259+7	GRS1	221
Kelp	226=226+0	124=124+0	KGL1	159
Kelp RF	319=309+10	319=309+10	KLP1	314
Olive RF	66=24+42	24+42	OLV1	56
Quillback RF	121=112+9	121=112+9	QLB1	159
Treefish	56=56+0	56=56+0	TRE1	7

Lingcod	3,017=2,992+25	2,789=2,764+25	LCD1	2,875
Canary RF	69=69+0	69=69+0	*Absent*	0
Vermilion RF	781=735+46	739=693+46	VRM1	787
Other: Sculpin	6=6+0	6=6+0		
Other: Yellowtail RF	6=6+0	6=6+0		
			OCRK	4
			PNK1	44
			RCK4	11
			SMLT	6
			THDS	26
Total Lbs	24,067	21,945	Total Lbs	21,487

According to the logbooks, an average of 46 fish were released per trip. Table 10 describes the total number of released fish reported in the logbooks, by species and reason for release. Of the 5,428 fish released, the predominant species were blue rockfish (25%), lingcod (20%), cabezon (16%), and kelp greenling (11%). Major reasons for release were fishery closure (25%), too small (24%), size limit (21%) and undesirable species (13%).

One fisherman attributed much of his released catch to "Fishery Closure" and provided comments explaining this attribution (e.g., "I have caught my 300 pounds quota for September. Therefore the lingcod fishery is closed to me till October."). His comments highlight an ambiguity in the logbook with regard to reason for release. Specifically, "Trip Limit" was intended to pertain to fish released because the fisherman's bimonthly species limit for that species had been exhausted, and "Fishery Closure" was intended to pertain to fish released because the species was encountered during a period when its retention was prohibited to all fishermen. Given the ambiguity of the logbook in this regard, Table 10 should be interpreted with caution as some of the released fish reported under "Fishery Closure" may actually belong under "Trip Limit". ***"Trip Limit" is a poor choice of words for what was intended and should be replaced by "Bimonthly Limit" to better allow fishermen to distinguish between personal catch limits and general fishery closure as reasons for release.***

Table 10. Total number of released fish reported in logbooks, by species and reason for release.

Species	*Regulations*			*Fisherman's Preference*			*Other*
	Size Limit	*Trip Limit*	*Fishery Closure*	*Too Small*	*Too Big*	*Undesirable Species*	
Black Rockfish (RF)	6	0	0	220	1	75	4
Black-and-yellow RF	208	0	0	39	0	58	18
Blue RF	0	0	0	675	0	520	182
Brown RF	1	0	0	5	0	21	0
Cabezon	327	169	31	2	337	2	15
CA Sheephead	0	0	0	0	0	0	0
China RF	77	0	0	0	0	0	0
Copper RF	4	0	0	2	0	0	9
Gopher RF	152	0	0	15	0	0	2
Grass RF	89	0	2	0	21	0	0
Kelp Greenling	10	105	431	47	0	0	0
Kelp RF	8	0	1	0	0	1	0
Olive RF	0	0	0	0	0	0	0
Quillback RF	1	0	0	0	0	0	0
Treefish	7	0	0	0	0	0	0
Lingcod	241	3	577	244	0	8	1
Canary RF	0	0	281	0	0	16	0
Vermillion RF	0	34	0	1	0	0	1
Other: Goldeneye	0	0	15	0	0	0	0
Other:RockGreenling	27	0	0	0	0	0	0
Other: Sculpin	0	0	0	1	0	0	0
Other: Surfperch	0	0	1	0	0	0	0
Other: Wolfeel	0	0	0	0	0	19	0
Other: Yellowtail RF	0	0	0	58	0	0	0
Total Fish	1,158	311	1,339	1,309	359	720	232

Calibration methods will need to be developed to allocate the measured weights from the landings receipts among the logbook locations reported for the same trip. Some possibilities: For species that appear in both logbook and landings receipt, the landings receipt weight could be allocated among logbook locations in proportion to the hailed weight per location for that species. For species that appear in the landings receipt but not the logbook, the landed weight can be allocated equally among all logbook locations (or at least all locations that fall within the depth range for that species). Species that appear in the logbook but not the landings receipt could be disregarded.

IV. Other Data Issues

The logbook database included some implausible entries, inconsistencies in data entry, and missing data. These problems can be variously attributed to logbook data entry errors and coding errors in the logbook database. For example:

- For one trip, boat length was implausibly coded as two feet (coding error). Other trips reported for the same boat indicated that length was actually 22 feet.

- One of the block numbers entered in the database is nonexistent (block 108 erroneously coded as block 197).

- For one trip, the trip return date was coded in the database as ten days later than the departure and landings dates (coding error).

- One respondent's last name was entered in the database with three different spellings (coding error).

- While landings receipt numbers follow a standard format (one letter followed by six numbers), six of the landings receipt numbers reported in the logbooks were coded as a sequence of seven numbers. The first number on all six of these receipts was coded as zero but was probably the letter "O".

- Vessel ID was not reported for 18 trips, although it could be inferred based on the vessel ID reported by the same respondents for other trips (assuming that fishermen used the same vessel for all their trips). One of these 18 trips did not include a landing date. Missing vessel IDs in the logbook database are largely due to nonreporting on the logbook form. Some fishermen may have considered it superfluous to provide the vessel ID for each trip, particularly if they use the same vessel for all their trips.

To minimize data entry errors, range checks should be built into data entry software to flag out-of-range or illogical values. For instance, block numbers reported in the logbooks should be flagged as inaccurate if they fall outside the range of actual CDFG-designated block numbers. The plausible range of block numbers can be further customized to individual fisherman, as nearshore permits are issued on a region-specific basis. The trip return date should be flagged as inaccurate if it is reported to occur before the trip departure date, and the landing date should be similarly flagged if it is reported to occur before the trip return date. Landings receipt numbers should be flagged if they do not follow the standard format, i.e., a CDFG-designated letter followed by six numbers. Lookup tables should be created to ensure consistent entry of (i) each fisherman's name and corresponding license number, and (ii) each vessel ID and corresponding vessel length.

The landings receipt numbers reported in the logs are intended to facilitate matching of logbook trips to CDFG or PacFIN landings receipts. For purposes of this report, PacFIN landings receipts were used. ***However, given the need for species-to-species match for purposes of weight calibration, it may be preferable to use CDFG landings receipts as CDFG species codes tend to be more specific than PacFIN market categories.*** Accurate reporting of vessel ID and landing date in the logbook is important, as these two variables provide an alternative way to match logbook trips to landing receipts when landings receipts are not reported in the logbooks or - when reported - cannot be matched to landings receipts due to logbook data entry errors or coding errors in the logbook or landings receipt databases.

Some observations regarding landings receipt numbers, vessel IDs and landing dates:

- Landings receipt numbers (which consist of a letter followed by six numbers) were coded in the format L-123456 in the logbook database but are formatted as L123456 in the PacFIN landings receipt database.

- Each vessel is identified in the logbooks and the CDFG landings receipt database by its six-digit CDFG vessel registration number. Each vessel is identified in the PacFIN landings receipts database in terms of (i) a numeric Coast Guard vessel registration number, or (ii) a vessel plate number provided by the California Department of Motor Vehicles ("CF" followed by four numbers and two letters) - with the plate number used for vessels not registered with the Coast Guard.

- Dates of landing were coded as xx-xx-2005 in the logbook database but as xx-xx-05 in the PacFIN landings receipt database.

To facilitate the match of logbook trips to landings receipts, variables that are common to both logbooks and receipts should be similarly coded. Given the differences in how some variables are coded in the CDFG and PacFIN landings receipt databases, the coding of these same variables in the logbooks should be based on a prior understanding regarding whether the logbook trips will be matched to CDFG or PacFIN landings receipts.

To avoid redundancy, logbook respondents were not asked to provide port of landing, as that information is reported on the landings receipts. ***However, port of landing is an easy variable for respondents to provide and may be a useful addition to the logbook - in conjunction with vessel ID and landing date - for matching logbook trips to landings receipts when a match cannot otherwise be obtained.***

V. General Observations and Recommendations

Preparations for the logbook pilot included solicitation of input from fishermen regarding logbook content and format, one-on-one discussions with logbook participants regarding how to fill out the log, and provision of various items to facilitate data entry (e.g., clipboards, waterproof working logbook forms). The logbook required dedicated time and careful attention to record keeping, and the fishermen who provided logs showed considerable competence at filling them out. However, not all nearshore fishery participants will be similarly motivated to provide high quality logbook data - particularly given their preoccupation with other activities at sea (e.g., setting/retrieving gear) and their tendency to fish alone (limiting their ability to share logbook data entry duties with someone else).

Should the logbook program be continued, a voluntary rather than mandatory program may provide greater assurance of quality data. However, implementing a voluntary program poses issues related to management needs, scope of the program, quality of estimates derived from the data, and incentives for participation.

Management needs: The logbook pilot study was limited to central and northern California as we were not successful in obtaining participation from southern California fishermen. ***If the logbook is to be used for management, it is important to consider in advance how the data will be used and whether the utility of the data is contingent on logbook participation in all nearshore management regions. Regional participation will be encouraged to the extent that regional logbook data can serve as a basis for regional management.***

Scope of program: The logbook can be conducted as a stand-alone program or as part of a larger cooperative research program with fishermen working as co-investigators with scientists. If the logbook is implemented as a component of cooperative research, fishermen could potentially serve as biological samplers as well as logbook participants. For instance, fishermen could collect data on fish lengths, with data standardization and quality control achieved through appropriate instruction in length measurement methods (e.g., measuring boards for dead catch, visual observation methods for live catch). However, combining logbook reporting with biological sampling would have to be carefully considered, as it could overburden logbook participants and compromise the collection of catch and effort data. Cooperative research could also involve fishery-independent surveys, using sampling protocols that may differ from customary patterns of fishing activity. ***Given the observational and record-keeping skills demonstrated by logbook participants and the relevance of these same skills to collection of research-related data, it may make sense to give logbook participants first priority as collaborators in biological sampling or fishery-independent surveys.***

Quality of estimates: Voluntary surveys of any type raise questions regarding the representativeness of the data and whether statistics derived from the data can be estimated with a level of precision acceptable to data users.

- $ Representativeness: ***Landings receipt data can be used to evaluate whether logbook participants differ from nearshore participants as a whole and to develop bias-correction factors, should the differences be statistically significant. The larger the logbook sample, the greater will be our ability to statistically detect such differences.***

- $ Precision of estimates: Fishing trips made by the same individual are not independent occurrences, as such trips are likely to reflect the individual's fishing skills, preferences, and ability/willingness to fish in different locations and in different types of weather. In order to distinguish fisherman effects from other factors that affect CPUE, trip costs, etc., it is preferable to sample trips from a number of individuals than to sample many trips from a few individuals. One rule of thumb (Steve Ralston, NMFS/SWFSC, pers. comm.) would be to sample at least 10% of the population. Given that there are 224 nearshore permit holders, this would imply a target sample of 22 logbook participants. ***This rough guideline suggests 5-6 participants per nearshore management region as a starting point for a logbook program. Once the program is underway and sufficient data are collected,a power analysis could be conducted to further refine sample size requirements.***[8]

Incentives for participation: As indicated above, ***logbook participation is not a small commitment and incentives of some type will likely be required to encourage participation if a long-term program is implemented on a voluntary basis.*** Several potential compensation methods are discusses below. These methods should not be considered exhaustive or necessarily mutually exclusive.

- $ ***Monetary compensation is the most straightforward incentive and would probably be a welcome supplement to the declining revenues experienced by nearshore fishermen in recent years. One issue is whether such compensation would be considered precedent-setting, given that participation in other State logbook programs is mandatory and uncompensated. Also, the conditions attached to monetary compensation are important, as they can encourage certain patterns of behavior that may or may not be desired.*** For instance, a flat compensation rate (regardless of the number of trips) may be viewed as inequitable, as it does not reflect the time and effort put into the logs. Flat rate compensation also skews the data toward marginal fishermen rather than highliners (which may or may not be desirable, depending on whether the objective is to obtain coverage of many fishermen or many trips). Per trip compensation is more likely to yield a representative sample of trips. However, it may also alter fishermen behavior by

[8] Power analysis is useful for determining the sample size needed to ensure that a given statistic can be estimated at a given significance level with a specific margin of error.

providing an incentive for fishermen to make their bimonthly catch limits "last" for more trips - a behavior that is more likely to occur if the compensation for logbook participation more than makes up for the associated decrease in catch-related revenue per trip.

- ***A portion of overall nearshore species quotas could be set aside for logbook participants, with revenues derived from such "logbook quotas" serving as a form of compensation.***

- If the logbook is part of a cooperative research program involving fishery-independent surveys, a portion of overall nearshore species quotas could be set aside for research. Funding will be needed to compensate fishermen for use of their labor and capital (e.g., vessel, gear) and to ensure standardization of the gear used for research if that is deemed desirable.[9] It is not advisable to compensate fishermen with the individual revenues they generate from research quotas, as this creates an incentive for them to fish in areas associated with abundant or high valued species rather than follow the research sampling protocol. ***This is not to say that landed catch associated with research quotas should not be marketed as a source of funds for research surveys - just that fisherman compensation should not be based on what they catch during such surveys.***

- A potential incentive for logbook participation (discussed during planning for the logbook pilot) would be to provide fishermen with software that allows them to enter and keep track of their own catch, effort and expenses (or at least download this information from the web). While such a tool - in and of itself - may not be sufficient to motivate participation in a long-term logbook program, it would be a welcome addition to other incentives. ***This software has not yet been developed but should be if a long-term logbook program is implemented.***

[9] NMFS funding for the nearshore logbook pilot study came from monies earmarked for economic data collection and is therefore not a potential funding source for fishery-independent surveys.

APPENDIX A

LOGBOOK FORM

INSTRUCTIONS FOR NEARSHORE LOGBOOK FORM (V6)

NOTE: All data provided are CONFIDENTIAL. Consistent and accurate reporting is critical for achieving conservation and management objectives for this fishery.

- Use #2 pencil or ballpoint pen (press firmly).
- The forms are two-sided. Fill out the front page of one form for each trip. Fill out the back page of the same form for the first location fished on that trip. If needed, fill out the back page of additional forms for additional locations fished on the same trip. (The method used to define fishing locations is described below under "Effort & Catch by Microblock" .)
- By the 10th of each month, send a copy of all completed forms for the preceding month in the stamped, pre-addressed envelopes provided by the Pacific States Marine Fisheries Commission.

FISHERMAN INFORMATION: Enter your name and commercial fishing license number. Check the type(s) of nearshore permits that you have.

VESSEL INFORMATION: Enter F&G vessel registration number that appears on the landings receipt(s) for this trip. Enter vessel type and length.

TRIP INFORMATION: Enter date (month/day/year) and time (am or pm) you departed from and returned to port. Check whether or not you carried an observer on this trip. Enter landings date (month/day/year) and landings receipt number(s) on which this trip's catch is reported.

Labor/Boat Shares - Enter number of persons paid as crew on this trip (excluding the skipper). If vessel is owner-operated, enter payments to crew and owner/operator for this trip, in dollars. If vessel is not owner-operated, enter payments to crew, skipper and boat owner, in dollars.

Non-Labor Costs – Enter amount spent for fuel, tackle, bait, groceries, transportation of catch and minor boat maintenance (<$100) in preparation for this trip. For instance, if you'll be using fuel for this trip that was purchased on a previous trip, enter zero fuel cost for this trip. Conversely, if you purchased fuel for this trip that may last you for several trips, attribute the entire amount spent for fuel to this trip. The same applies to the other expense categories.

Check market destination of catch, if you know this information – see map 1.

Trip Notes – Optional. Record swell, wind and water temperature, only if you would like to keep this information for your own records.

EFFORT & CATCH BY MICROBLOCK: *Note* - For purposes of the logbook, a fishing location is defined as a microblock or group of adjacent microblocks where fishing occurred - see map 2. If you fished in more than one microblock/microblock group on the same trip, fill out the back side of a separate logbook form for each additional microblock/microblock group fished on the trip. Provide information for each microblock/microblock group fished, regardless of whether you caught any fish.

Enter your last name and landing date (month/day/year) for this trip. Enter the F&G block number and the numbers of all adjacent microblocks within that block that comprise your fishing location. In cases where adjacent microblocks cross multiple F&G blocks, provide microblock information for each relevant block.

Gear Type - If "Stick" gear was used in this location, check type of stick gear used. If "Line" gear was used, check type of line gear used.

Gear Quantity - For each gear used, record number of times the gear was pulled in this location. For instance, if you pulled 10 sticks twice in the same location, # sticks pulled would be 20.

Soak Time - For trap, stick, line, and "other" gear, enter <u>average</u> soak time for <u>each piece of gear pulled</u>. For rod & reel, enter <u>total</u> soak time for <u>all gear pulled</u>. For hookah, Thus for instance, if you pulled rod & reel gear 6 times in one location and the gear was in the water an average of 3 minutes, total soak time would be 18 minutes.

Bottom Depth - For each gear type, enter average bottom depth of the area where the gear was pulled.

Catch Information – For all catch made in the same location, enter:

- <u>total weight (in pounds)</u> of fish landed, live and dead
- <u>total number</u> of fish released, according to reason for release.

NEARSHORE FISHERY LOGBOOK (V6)

SERIAL # _____ (OMB # 0648-0369, Exp. Date: May 31, 2006)

Fill out this page once for each trip. Fill out the back page for the first microblock or microblock group where you fished on this trip. Use back page of additional forms for additional microblocks/microblock groups fished on the same trip. Fill out a form for every microblock/microblock group fished, regardless of whether you caught any fish.

FISHERMAN INFORMATION	
Fisherman's Name: _____ Fisherman's License #: L_____	□ Nearshore Fishery Permit □ Deeper Nearshore Fishery Permit

VESSEL INFORMATION
DFG Vessel # on Landing Receipt (if applicable): _____ Vessel Type: □Boat with cabin □Boat without cabin □Kayak □Other Vessel Length (feet): _____

TRIP INFORMATION	
Departure Date (mo/day/yr): _____ Departure Time: _____□am □pm Return Date (mo/day/yr): _____ Return Time: _____□am □pm Carried Observer? □No □Yes	Landing Date (mo/day/yr): _____ Landings Receipt #(s): _____ _____ _____
Labor/Boat Shares # Crew (excluding skipper): _____ Owner Operated? □Yes ⇒ Crew Share $_____ Owner/operator share $_____ □No ⇒ Crew Share $_____ Skipper share $_____ Boat share $_____	*Non-Labor Costs ($ spent in prep for trip, even if all purchases not used up on this trip)* Fuel $_____ Tackle $_____ Bait $_____ Groceries $_____ Transportation of Catch $_____ Boat Maintenance (<$100) $_____ Other (specify:_____) $_____
Market Destination of Catch (check one, if known – see map 1): □ Northern CA (1) □ South Central Coast (4) □ San Diego Area (7) □ Sacramento Area (2) □ South Central Inland (5) □ Out of State (8) □ San Francisco Bay (3) □ Los Angeles Area (6)	
Trip Notes (optional, provide only if you want to retain for your own records) Swell: _____feet; Wind: _____mph; Water Temperature: ____degrees	
Other:	

Last Name _____; Landing Date (mo/day/yr) _____

EFFORT & CATCH BY MICROBLOCK/ADJACENT MICROBLOCK GROUPS

Fishing Location - see map 2 (enter 2nd F&G block only if adjacent microblocks cross F&G blocks)
F&G Block # _____ ; Associated Microblock(s) _____ _____ _____ _____ _____ _____
F&G Block # _____ ; Associated Microblock(s) _____ _____ _____ _____ _____ _____

Gear Type	Gear Quantity	Soak Time	Bottom Depth
Trap	# Traps Pulled _____	Avg Time Per Set: _____hrs, _____min	Avg Depth _____ feet
Stick: □ Hard Stick □ Cable Stick	# Sticks Pulled _____ Avg # Hooks Per Stick _____	Avg Time Per Set: _____hrs, _____min	Avg Depth _____ feet
Line: □ Set Longline □ Vertical H&L	# Lines Pulled _____ Avg # Hooks Per Line _____	Avg Time Per Set: _____hrs, _____min	Avg Depth _____ feet
Rod & Reel (R&R)	# R&R Gear Pulled _____ Avg # Hooks Per R&R _____	Total Time All Sets: _____hrs, _____min	Avg Depth _____ feet
Hookah		Total Time Underwater _____hrs, _____min	Avg Depth _____ feet
Other	# Times Gear Pulled _____	Avg Time Per Set: _____hrs, _____min	Avg Depth _____ feet

Catch Information	Kept Fish (Total Lbs)		Released Fish (#Fish) – by Reason for Release						
			Regulations			*Fisherman's Preference*			
	Live	Dead	Size Limit	Trip Limit	Fishery Closed	Too Small	Too Big	Undesirable Species	Other
Black Rockfish (RF)									
Black-and-yellow RF									
Blue RF									
Brown RF									
Cabezon									
Calico RF									
CA Scorpionfish									
CA Sheephead									
China RF									
Copper RF									
Gopher RF									
Grass RF									
Kelp Greenling									
Kelp RF									
Olive RF									
Quillback RF									
Treefish									
Lingcod									
Bocaccio									
Canary RF									
Vermilion RF									
Other:_____									
Other:_____									
Other:_____									

Repeat for each microblock/microblock group fished on this trip.

Map 1 - Market Areas for Nearshore Species

General Location: Weather: Water Clarity:

Wind(dir/knts) Swell(dir/ft) Current(dir/strength)

# of Sets									
	F&G Block #	MicroBlock #		F&G Block #	MicroBlock #		F&G Block #	MicroBlock #	
Depth Rge									
SPECIES	# FISH KEPT	# RELEASED		# FISH KEPT	# RELEASED		# FISH KEPT	# RELEASED	
		Small	Big		Small	Big		Small	Big
Grass									
Gopher									
Blk&Yellow									
Kelp									
Cabezon									
Lingcod									
Sheephead									

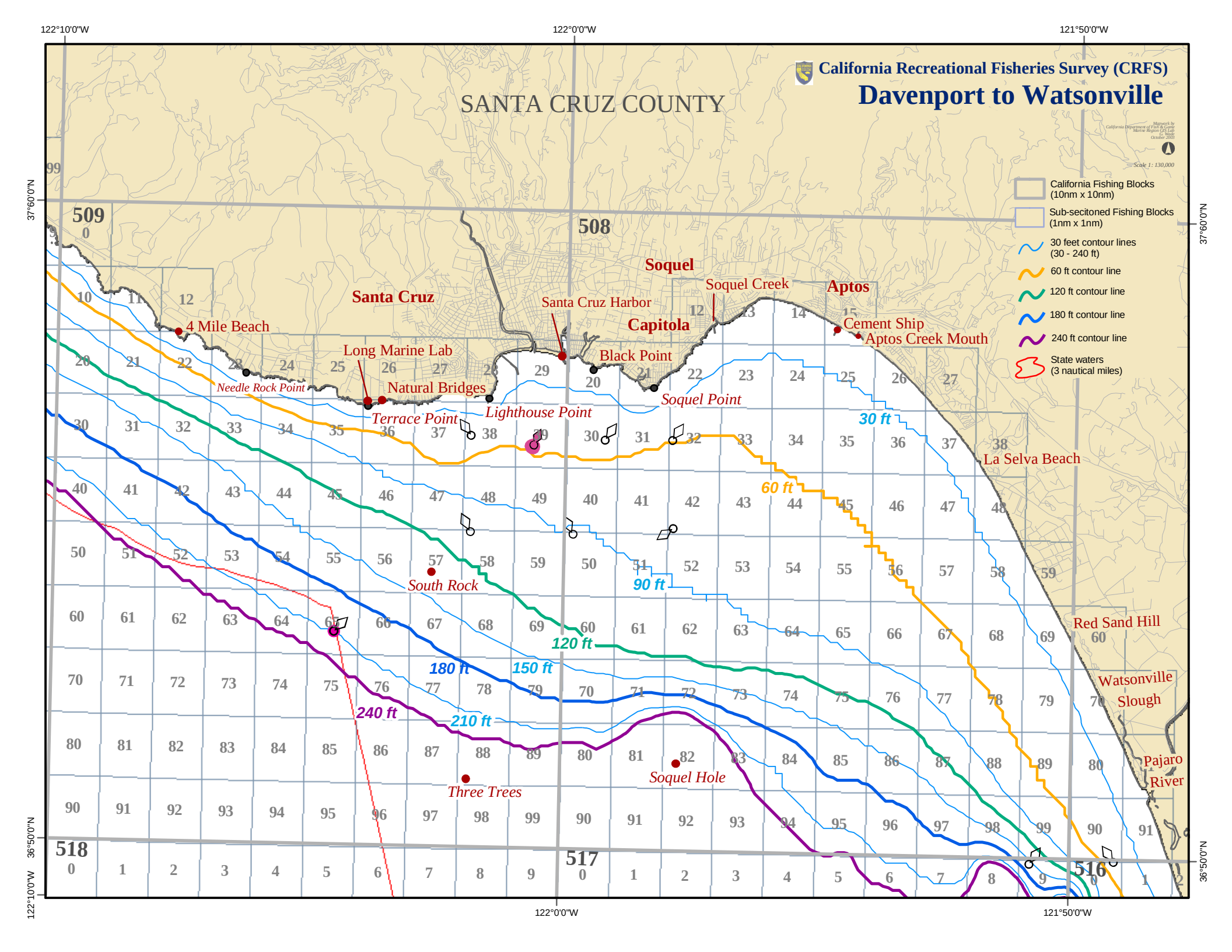
General Location: Weather: Water Clarity:

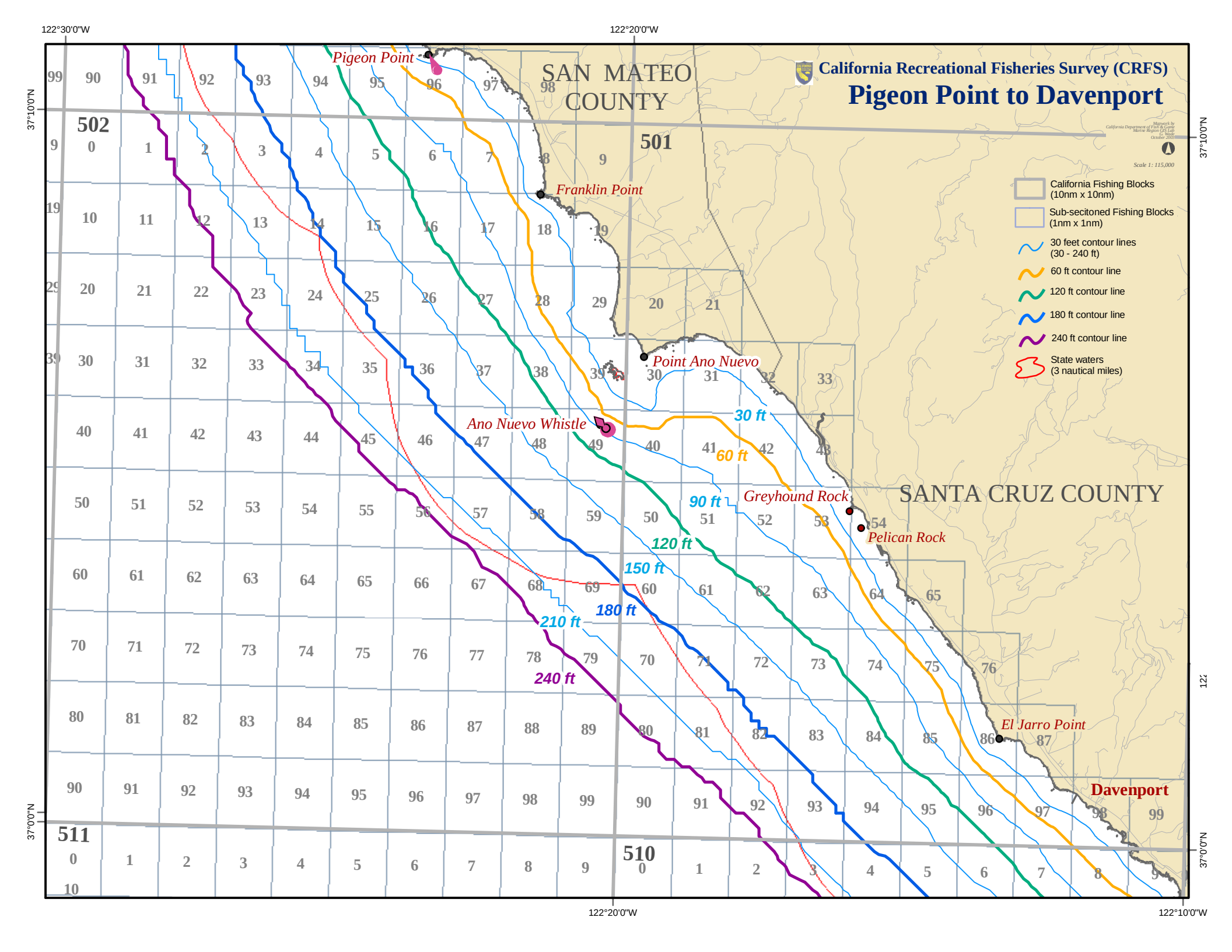
Wind(dir/knts) Swell(dir/ft) Current(dir/strength)

# of Sets									
	F&G Block #	MicroBlock #		F&G Block #	MicroBlock #		F&G Block #	MicroBlock #	
Depth Rge									
SPECIES	# FISH KEPT	# RELEASED		# FISH KEPT	# RELEASED		# FISH KEPT	# RELEASED	
		Small	Big		Small	Big		Small	Big
Grass									
Gopher									
Blk&Yellow									
Kelp									
Cabezon									
Lingcod									
Sheephead									

APPENDIX B

SAMPLE BLOCK/MICROBLOCK MAP


California Recreational Fisheries Survey (CRFS)
Davenport to Watsonville
SANTA CRUZ COUNTY
California Fishing Blocks (10nm x 10nm)
Sub-secitoned Fishing Blocks (1nm x 1nm)
30 feet contour lines (30 - 240 ft)
60 ft contour line
120 ft contour line
180 ft contour line
240 ft contour line
State waters (3 nautical miles)
509
508
517
518
516
Santa Cruz
Soquel
Capitola
Aptos
Soquel Creek
Santa Cruz Harbor
Cement Ship
Aptos Creek Mouth
4 Mile Beach
Long Marine Lab
Needle Rock Point
Natural Bridges
Black Point
Soquel Point
Terrace Point
Lighthouse Point
30 ft
60 ft
90 ft
120 ft
150 ft
180 ft
210 ft
240 ft
La Selva Beach
South Rock
Red Sand Hill
Watsonville Slough
Pajaro River
Three Trees
Soquel Hole
122°10'0"W
122°0'0"W
121°50'0"W
37°60'0"N
36°50'0"N


122°30'0"W
122°20'0"W
122°10'0"W
37°10'0"N
37°0'0"N
California Recreational Fisheries Survey (CRFS)
Pigeon Point to Davenport
SAN MATEO COUNTY
SANTA CRUZ COUNTY
Pigeon Point
Franklin Point
Point Ano Nuevo
Ano Nuevo Whistle
Greyhound Rock
Pelican Rock
El Jarro Point
Davenport
502
501
511
510
30 ft
60 ft
90 ft
120 ft
150 ft
180 ft
210 ft
240 ft
California Fishing Blocks (10nm x 10nm)
Sub-secitoned Fishing Blocks (1nm x 1nm)
30 feet contour lines (30 - 240 ft)
60 ft contour line
120 ft contour line
180 ft contour line
240 ft contour line
State waters (3 nautical miles)

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