

**An analysis of speciation and its validity from angler reported  
discarded fish data in the marine recreational private boat fishery in  
Southern California, 2013**



Blue Shark (*Prionace glauca*)

By  
Russell G. Porter

For  
Pacific States Marine Fisheries Commission

Funded by  
NOAA Fisheries, Marine Recreational Information Program (MRIP)

May, 2014

## Abstract

*The camera study to identify the speciation of discarded fish in the private boat fishery in southern California was conducted from August to October, 2013 at eight primary boat ramps. A total of 946 boats agreed to take cameras to photograph fish they discarded. About 70% of the cameras were returned and 50% had fish they discarded during the trip. Results showed anglers had good identification skills for sand basses and flatfish that they discarded. These two species groups account for about 58% of all discards. In the rockfish species group (12% of discards), anglers lacked the expertise to determine speciation very accurately. Discarded rockfish were reported as unidentified rockfish for about 50% of the rockfish discarded. Attempts to identify rockfish to species by the angler, was mostly found to be correct for olive, vermillion, treefish and bocaccio which account for about 20% of the rockfish discards. Identification was poor for gopher, honeycomb, freckled and hanfbanded rockfish which were the top four species discarded at about 30% of all discarded rockfish. Use of party/charterboat (PC) discard species mix as a proxy for the private/rental (PR) boat discards will need to be examined in the 2014 report. The California Recreational Fishery Survey currently uses angler reported discard species on PC trips they ride in place of the biologist's identification of discarded species. The other species group is diverse and accounts for about 27% of all discards. It is primarily California lizardfish, California scorpionfish, California sheephead, Pacific mackerel, and white croaker, which total 60% of the species discarded in this group. These primary species are all well identified by the angler.*

## Introduction

This study was undertaken to examine the speciation of discarded fish in the Private/Rental (PR) boat mode of the California Recreational Fisheries Survey (CRFS). Under the Pacific Fishery Management Council (PFMC) Groundfish Management Plan and California Department of Fish and Wildlife (CDFW) management, a number of rockfish species (*Sebastes* sp.) have harvest goals or guidelines for the season. Three species have a non-retention rule in an effort to rebuild depressed stocks. PFMC and state management requires application of mortality percentages for released rockfish based on depth of catch. The resultant discard mortality estimates are tallied against the harvest goal or guideline for that species. In the private boat fishery, creel surveys take place at the launch ramps at the completion of the angler trip. As a result, discarded fish identification can only be obtained from the angler. Some speciation is offered by the angler, but this data is either accepted, or changed to some higher taxonomic level, based on the sampler's analysis of the angler's fish identification expertise. Proper identification of species in the retained catch by the angler and reporting additional ones discarded can lead to species level data for the interview in the discarded catch fields. In many cases however, anglers do not know many of the

rockfish or the identification of other species and these must be recorded as unidentified rockfish or unidentified fish in general. For the annual expanded catch estimates, unidentified rockfish may represent a substantial number of metric tons.

A number of ideas have been considered as to how to decompose unidentified rockfish to the species level. Use of the percentages by species in the retained catch is one option. The thought is that this is probably not very accurate as desirable species are probably retained and undesirable ones discarded. In addition, non-retention species would not be expected to be seen in the retained catch and are rarely observed. Use of the discarded fish species ratios in the Party/Charterboat (PC) fishing mode as a proxy is another option. CRFS samplers ride the boats in the PC mode of fishing as catch is filleted at sea in order to obtain the complete biological data for the creel survey. The PC sampler uses a boat form to record catch and a sample of discards at each stop of the boat. In addition selected anglers have an angler form completed which records the anglers listing of discarded catch. The CRFS interviews currently use the angler forms to estimate total discards by depth. This study will compare this estimate to the discards reported in the PR mode. However, both these numbers are angler reported discards, so species identification or lack of it in certain species groups may be found to be consistent. When the central and northern California discard study is reported in 2014, an attempt will be made to use the sampler discard data to compare to the PR discards. I am working with CDFW to set up a method to do this for the 2014 report. This will allow for biological identification of discards to the species level in the PC mode by the biologist sampler riding aboard. This may hold promise, especially in areas where the Party/Charterboats and the private boats are fishing in the same areas. Finally, this study is designed to provide an analysis of the accuracy of angler reported discarded fish identification when the angler assumes he knows the species identification of the fish.

## **Methods**

This study was conducted from August to October, 2013 in District 1 of the California Recreational Fisheries Survey (CRFS). District 1 covers San Diego, Orange and Los Angeles counties. The study employed disposable cameras distributed to anglers at the commencement of their trip to determine the speciation of the discarded fish. The primary launch ramps (PR1 sites) from the CRFS in San Diego, Orange and Los Angeles counties were used for the survey. These ramps represent the sites where approximately 90% of the effort and catch of the species of management concern occurs. As a result, they are sampled 7 days per month drawn at random for weekend and weekdays by the CRFS sample draw program. The camera distribution assignments were matched up with the assignments drawn by CRFS for these PR1 sites. The sites sampled in San Diego County included: Shelter Island launch ramp, Dana Basin launch ramp, and Oceanside launch ramp. The sites sampled in Orange County included: Dana Point launch ramp and Sunset Aquatic Park launch ramp in Huntington Beach.

The sites sampled in Los Angeles County included: Marina del Rey launch ramp, Cabrillo launch ramp and Davies launch ramp. Numerous other secondary ramps (PR2 sites) in these three counties where the remaining 10% of the catch occurs were not sampled as part of this study.

Survey technicians arrived at the launch ramps around 5:00-5:30 AM and selected anglers launching their boats to agree to take a camera and angler log packet. No more than 20 boats were selected on busy days at a site. As a result samplers gave cameras to every third or fourth angler on busy days and to every angler when effort was much lower. Anglers were asked to photograph and record on the log the identification of the fish that they discarded. The disposable cameras allowed for up to 27 photos. The angler logs allowed spaces by photo number for the angler to write the identification of each fish photographed to the best of their ability. At the completion of their trip the state CRFS creel survey technician conducting the CRFS survey that day picked up the camera and the angler log. The CRFS sampler then conducted their creel survey interview of the angler and examined their retained catch. The CRFS sampler entered the CRFS interview ID and the boat number on the angler camera log, so that the camera and log could be tied to the specific CRFS interview for that boat. This allowed for coordination of all CRFS data elements, anglers on the boat and their retained catch for the various analyses. Cameras were then shipped back to PSMFC for development and fish identification. The CRFS interview data was then pulled from the Recreational Fisheries Information Network (RecFIN) database at PSMFC to match to the specific boat and its camera data.

## **Results**

The study began just after mid-month in August and continued through October, 2013. For all of district 1, a total of 946 cameras were distributed for 946 private boat trips. Of this total, 627 boats returned the cameras during the CRFS interview. A total of 315 cameras were not returned, resulting in retrieval of 66.3% of the cameras. The total photographs provided were of 1,383 discarded fish. There may be some slight error in the camera totals of discarded fish, as some photos seemed to be of desirable species and of a size that angler would retain. However, angler preferences vary. Some common species were obviously under reported on the camera data as numerous fish were caught and discarded (such as California lizardfish).

Missing cameras could result from boats not returning to the ramp until after CRFS sampling ended for the day. Other causes could be the boat was a missed boat in the CRFS interviews when the ramp was busy, the CRFS interviewer forgot to ask every boat if they had a camera, or the angler forgot they had taken a camera, especially if they had no discards.

Of the cameras returned, 47.2 % (296 boats) had fish that they discarded. A total of 331 boats (52.8%) reported no discards. A number of analyses were conducted with the discard data. The first was comparison of the angler identification of their discards to the actual species determined from the camera photograph. Second was the comparison of the CRFS recorded discards by species in the creel survey compared to their actual identification from the cameras. Third was a comparison of the species and their percentages in the retained catch to the species percentages in the discarded catch. Fourth, percentages by species in the discards in the CRFS Party/Charter fishing mode (PC) was compared to the species percentages of discards in the private boat mode. The CRFS samplers ride aboard the vessel in the PC mode and identify to species a majority of the discards. This data is not used in the discard estimates for the PC mode currently. Instead, the angler reported discards from a sample of anglers on the PC boat using an angler form is used. Therefore, the goal to examine this comparison to determine how accurate the species and their percentages in the PC mode might be able to serve as a proxy for the private boat discards is really a double comparison of angler identification skills. In 2014 attempts will be made to compare the CRFS sampler identified discards to the PR angler identified discards to determine if this could be a proxy for species discarded in the PR mode unidentified fish groups.

Tables of discards by species were first prepared for each camera to begin the analysis. These camera (boat specific) Excel spreadsheets are provided in the Supplemental Appendix at the end of this report. Summaries were then prepared by month for each county and then by county for the August-October study period (Appendices II-IV). The three county tables for the study period were then combined into a table for all of the CRFS District 1 estimation area (Appendix I). These four tables are provided in the Appendix. These tables list the angler reported discards compared to the camera identification of the discards, the CRFS reported discards and the CRFS retained catch for each boat which returned a camera and which had discards.

Analysis at the boat level showed that for species where a great number were caught and discarded, such as with California Lizardfish, the angler stopped photographing the fish after 5-6. In a number of cases they then added on their angler log a note such as, "and 25 more." Without fail, all anglers could identify the California Lizardfish. The angler reported substantially more California Lizardfish for the CRFS interview (480%) than shown on the camera and the angler logs. This species is rarely if ever retained and has become very prevalent in recent years in the catch. It currently is not a species of management concern.

#### Species Group Identification.

The discarded species from the camera identification were grouped into species groups for a general comparison of discards as reported by the angler and CRFS. The most prevalent discard group in the catch from the camera species identification was the sand basses of which there are three species (kelp bass, barred sand bass and spotted

sand bass. The Sand Bass group included the three species of sand basses as well as “sand bass genus (*Paralabrax* sp.).” Sand bass genus is reported in the discards by many anglers. It is also used in the CRFS discard data and the CRFS estimates. Sand basses accounted for 46.4% of all discards. The Other Fishes group was second with 27.2% of the discards (primarily California lizardfish and California scorpionfish). Third were Rockfishes (12%), followed by Flatfish (11.6%), Sharks and Rays (2.7%), and Unidentified (0.1%). The discarded fish for all of District 1 (San Diego, Orange and Los Angeles counties) for the study period from August – October, 2013 is presented in Appendix I. There is variation in these species groups between the angler identification, the actual identification (camera), the CRFS reported discards, the retained catch and the party/charterboat discards. Some of the groups have consistent numbers in all the reporting sectors and others have wide variation. This variation is shown in the table below.

Table 1. Comparison of the percentage of general species groups in the CRFS Private Boat discarded catch, CRFS retained catch, and CRFS Party/Charter Discards for comparison -- CRFS District 1, August – October, 2013.

Species Group	Angler ID Of Discards	Camera ID of Discards	CRFS Reported Discards	CRFS Retained Catch <sup>1)</sup>	CRFS PC Discards
Sand Bases	44.0%	46.4%	33.6%	19.6%	19.2%
Flatfishes	10.7%	11.6%	12.3%	1.5%	9.9%
Rockfishes	8.5%	12.0%	10.6%	48.4%	23.7%
Other Species	26.6%	27.2%	41.8%	30.5%	45.8%
Sharks & Rays	2.7%	2.7%	1.3%	0.0%	1.1%
Unknown Fish	<u>7.5%</u>	<u>0.1%</u> <sup>2)</sup>	<u>0.4%</u>	<u>0.0%</u>	<u>0.3%</u>
Total:	100%	100%	100%	100%	100%

1) Catch in the CRFS interview is mostly identified to species or at least to genus or family resulting in no “unkown fish” being recorded.

2) Camera photo poor preventing positive identification to species.

The differences in these species groups between the identification categories in the table were similar for sand basses, flatfishes, and rockfishes in the PR mode, but substantially different in the PC mode for sand basses and rockfishes. Flatfish discards in the PC mode were similar to the PR mode (9.9% compared to 11.6%).

While anglers reported 7.5 % of all species as Unknown Fish on their camera log, the CRFS interview reports only 0.4% of all discards as unknown fish. A major reason for this difference is probably the CRFS interview sampler works with the angler and picture identifications to at least get the discards into a family or genera category, leaving substantially less fish in the “unknown fish” category. This category accounts for only 0.3% of discards in the PC mode.

The private boat discards of the Sand Bases group is fairly consistent between the angler identification (44%), the actual identification from the camera (46.4%) and the CRFS interview (33.6%). However, the PC discard of this species group in the time period of this study (19.2%) was not a good measure or proxy for the discard of this species group on private boats.

In the Rockfish group there was relatively good coordination at the total rockfish level between the angler ID (8.5%), the camera ID (12%) and the CRFS interview discards (11.6%). In the PC

mode rockfishes accounted for 28.6% of all discards. This is about three times the discard of this species group in the private boat mode.

The Flatfish Group was primarily California Halibut and Pacific Sanddabs. Angler identification of California Halibut was excellent and most reported Pacific sanddabs as sanddabs genus. The angler reported flatfish as 10.7% of the catch, the actual camera identification was 11.6% and the CRFS interview reported 12.3%. The PC discard of Flatfish species group was similar to the PR mode at 9.9%.

The Sharks and Rays group was reported as 2.7% of total discards by the anglers, 2.7% from camera identification and 1.3% in the CRFS interview. The PC mode reported 1.1% of all discards as in this species group..

### Species Level Comparisons.

The species percentages within the species groups were analyzed. The percentage of each species reported out of the total of all species in the various species groups was computed. The results are presented in the follow paragraphs and Tables 2-6.

*Sand Bass Species.* The sand bass species group accounts for about 47% of all discards. The variation in species identification of Sand Basses by anglers and the various sampling statistics are provided in Table 2. Identification of the three sand bass species in the genus *Paralabrax* was compared. Anglers know that these three species are sand basses, but are not always clear of the exact species.

Table 2. Comparison between Sand Bass species in the Sand Bass Species group by angler identification, the actual camera identification, the CRFS reported discarded catch, the CRFS Private Boat retained catch, and the CRFS Party/Charter Discards for CRFS District 1, August – October, 2013.

Species	Angler ID Of Discards	Camera ID of Discards	CRFS Reported Discards	CRFS Retained Catch <sup>1)</sup>	CRFS PC Discards
Sand Basses	23.0%	00.5%	00.6%	00.0%	2.0%
Kelp Bass	38.4%	46.0%	40.0%	24.0%	89.1%
Spotted Sand Bass	34.0%	28.6%	33.4%	00.0%	0.8%
Barred Sand Bass	<u>4.6%</u>	<u>24.9%</u>	<u>26.0%</u>	<u>76.0%</u>	<u>8.1%</u>
Total:	100%	100%	100%	100%	100%

The anglers showed excellent identification skills for kelp bass, although anglers use the name calico bass in most all cases. When anglers identified kelp (calico) bass they were correct in all cases. Some additional kelp bass were listed in “sand basses” category and not to the kelp bass species. This accounts for the extra kelp bass, as some anglers used the term sand bass for any sand bass they discarded. There was close correlation between anglers, cameras and CRFS discards for kelp bass at 38.4%, 46.0% and 40.0% respectively. The retained catch of kelp bass was just about half of the discarded catch of this species. The discards of spotted sand bass had good correlation between the angler reported discards (34%), the camera identification (28.6%) and the discards of this species reported in the CRFS interview (33.4%). Barred sand bass were poorly identified by the angler (4.6%) compared to the camera identification of this species (24.9%). The CRFS interview report of barred sand bass discards correlated well with the camera identification at 26%. It is assumed the CRFS sampler did some education and showed

pictures to boost this percentage in the CRFS interview compared to the angler identification on the camera log. Analysis of the retained CRFS catch showed three quarters as barred sand bass and one quarter as kelp bass. This matches poorly with the sand bass discards. The PC mode discards primarily kelp bass (90%) and the rest mainly barred sand bass (9%). Anglers were not good at identifying barred sand bass. CRFS took anglers' word for discarding spotted sand basses. It is in the ball park, but overestimated these discards by about 17%. Barred sand basses were properly identified in the CRFS discards even though angler ID on the camera log was very inaccurate. The bottom line is sand basses as a group is very accurately reported in the CRFS discards even though there is some error in the actual identification of the three species.

*Flatfish Species.* The flatfish species discarded account for about 12% of all discards. They are almost exclusively California halibut (70%) and sanddabs (30%). California halibut have a minimum size of 22 inches and thus, a number of smaller fish must be discarded. Sanddabs vary in their acceptance by anglers and many are discarded.

Table 3. Comparison between Flatfish species in the Flatfish Species group by angler identification, the actual camera identification, the CRFS reported discarded catch, the CRFS Private Boat retained catch, and the CRFS Party/Charter Discards for CRFS District 1, August – October, 2013.

Species	Angler ID Of Discards	Camera ID of Discards	CRFS Reported Discards	CRFS Retained Catch <sup>1)</sup>	CRFS PC Discards
California Halibut	69.5%	69.4%	33.0%	66.6%	1.6%
Sanddabs	27.8%	00.0%	25.8%	00.0%	31.5%
Pacific Sanddab	00.7%	29.4%	40.6%	00.0%	66.9%
Flounder	1.3%	00.0%	00.0%	00.0%	00.0%
Diamond Turbot	00.7%	1.2%	00.6%	00.0%	000%
Big Mouth Sole	00.0%	00.0%	00.0%	16.7%	00.0%
Fantail Sole	<u>00.0%</u>	<u>00.0%</u>	<u>00.0%</u>	<u>16.7%</u>	<u>00.0%</u>
Total:	100%	100%	100%	100%	100%

Anglers are very good at identifying California halibut. Angler identification from the camera study was basically 100% correct. The next species discarded are sanddabs. There are four species in California, but most anglers catch two species – Pacific sanddab and longfin sanddabs. The Pacific sanddab is the predominant species and was the sole species found in the camera study. Most anglers refer to sanddabs as just “sanddabs.” Just over 2% of the time did the angler identify sanddabs they discarded a Pacific sanddabs. A few minor other flatfish were seen in the camera study, the most common was Diamond turbot. Anglers properly identified this species 50% of the time. There does not appear to be identification issues with flatfish that are reported discarded by the angler as the primary species (California halibut) is known by most all anglers. Sanddab species reporting by the angler is very low, though all those seen in the study were Pacific sanddabs. The CRFS retained catch in this category is about 70% California halibut and the other 30% sole. No sanddabs were retained by the vessels sampled in this study. The PC discards is a poor match with the PR boats at about 98.4% sanddabs and only 1.6% California halibut.

*Rockfish Species.* The rockfish species reported as discarded is presented in Table 4. They account for 12% of all species discarded. The rockfish species in Table 4 are listed from the



most to least prevalent based on the actual identification from the camera photos taken by anglers prior to discarding the fish. A minor number of fish are listed at unidentified rockfish from the cameras, as some photos did not provide for definite species identification.

Table 4. Comparison between Rockfish Species in the Rockfish Species group by angler identification, the actual camera identification, the CRFS reported discarded catch, the CRFS Private Boat retained catch, and the CRFS Party/Charter Discards for CRFS District 1, August – October, 2013.

Species	Angler ID Of Discards	Camera ID of Discards	CRFS Reported Discards	CRFS Retained Catch <sup>1)</sup>	CRFS PC Discards
Unidentified <i>Sebastes</i> sp.	53.8%	4.2%	39.1%	1.5%	47.5%
Gopher rockfish	2.5%	19.4%	0.3%	2.6%	0.6%
Freckled rockfish	2.5%	12.5%	0.0%	1.0%	0.0%
Honeycomb rockfish	4.2%	9.5%	1.2%	2.1%	3.3%
Halfbanded rockfish	0.0%	9.0%	11.1 %	0.0%	11.5%
Brown rockfish	1.7%	6.6%	0.3%	0.5%	0.6%
Kelp rockfish	0.0%	6.6%	1.0%	1.5%	0.6%
Olive rockfish	5.0%	6.6%	7.7%	3.1%	1.6%
Vermillion rockfish	8.4%	6.6%	12.3%	10.3%	3.3%
Treefish	3.4%	4.2%	1.7%	0.5%	1.6%
Copper rockfish	1.7%	3.6%	1.0%	9.7%	1.6%
Grass rockfish	0.0%	3.0%	0.0%	0.0%	0.6%
Calico rockfish	0.8%	2.1%	0.7%	0.1%	9.8%
Greenspotted rockfish	0.0%	1.7%	0.5%	26.2%	0.6%
Bocaccio	1.7%	1.2%	10.1%	8.8%	3.3%
Greenstripped rockfish	0.0%	1.2%	0.3%	14.3%	0.6%
Speckled rockfish	1.7%	1.2%	0.0%	0.5%	0.6%
Blue rockfish	0.8%	0.5%	0.3%	1.0%	0.6%
Starry rockfish	11.8%	0.5%	9.6%	6.7%	3.3%
Bank rockfish	0.0%	0.0%	3.0%	0.0%	0.0%
Chillipepper rockfish	0.0%	0.0%	0.0%	0.5%	0.6%
Flag rockfish	0.0%	0.0%	0.0%	9.1%	1.7%
<i>Other PC Mode Species:</i>					
Cowcod	0.0%	0.0%	0.0%	0.0%	1.7%
Rosy rockfish	0.0%	0.0%	0.0%	0.0%	1.6%
Squarespot rockfish	0.0%	0.0%	0.0%	0.0%	1.6%
Widow rockfish	0.0%	0.0%	0.0%	0.0%	0.6%
Yelloweye rockfish	0.0%	0.0%	0.0%	0.0%	0.6%

The speciation for rockfish in the private boat mode is the main thrust of this study. The Pacific Fishery Management Council Groundfish Management Plan incorporates rebuilding plans for some depressed rockfish stocks and harvest goals and guidelines for a number of rockfish species. Because of the numerous species in this species group and lack of identification skills at the species level, over half the time the angler reports discards as unidentified rockfish. There is also no retention for cowcod, canary rockfish and yelloweye rockfish. . This 2013 camera study showed that in order of abundance rockfish discards were primarily gopher, freckled, honeycomb, halfbanded, brown, kelp, olive, vermillion, treefish, copper, grass and calico rockfish. Of note is no angler identified halfbanded rockfish on their camera log on their own, but 9% of the discards were this species. During the CRFS interview, a number of halfbanded rockfish were recorded. This is undoubtedly a result of the CRFS interviewer working with the angler using the rockfish ID guide and photo chart to get better speciation. The halfbanded rockfish is very distinct and once the photo is shown many anglers can probably confirm that species in their discards. The CRFS interview recorded 11% of rockfish discarded as halfbanded rockfish. This is close to the 9% shown in the camera identification.

Honeycomb rockfish were only identified by the angler 50% of the time, but accepted far less by the CRFS interview as a discarded species. Vermillion rockfish were over reported by the angler by about 27%. The CRFS interview accepted a 100% increase in reported vermillion discards from what the camera study showed. Olive rockfish are fairly distinct with their spots and were well identified by the angler, the cameras and the CRFS interview. There was no more than 15-20% difference in the three reported discard numbers. Olive rockfish made up 6.6% of all rockfish discards in the camera study. Treefish were identified well by the angler in relation to the camera identification, but was under reported by about 60% in the CRFS interview. Finally, there seems to be a problem with bocaccio. In most cases they are well known by anglers and the angler identification was within the ball park with the camera ID at 1.7% and 1.2% of total rockfish discards respectively. However, the CRFS interview recorded bocaccio discards at about 8 times the camera identification of this species (10.1%).

The use of PC species ratio discards for the private boat fishery does not seem to fit. Except for halfbanded rockfish, the primary private boat discards would be underreported and the bocaccio and calico rockfish discards would be over reported.

*Other Species.* The other species group accounted for 27.2% of all discards. The five main species discarded in this group were California lizardfish, California scorpionfish, California sheephead, Pacific mackerel and white croakers. The comparison of the discards by species in this group is provided in Table 5.

Table 5. Comparison between the Other Species angler identification, the actual camera identification, the CRFS reported discarded catch, the CRFS Private Boat retained catch, and CRFS Party/Charter Discards for CRFS District 1, August – October, 2013.

Species	Angler ID Of Discards	Camera ID of Discards	CRFS Reported Discards	CRFS Retained Catch <sup>1)</sup>	CRFS PC Discards
California lizardfish	30.9%	20.2%	47.5%	0.0%	2.5%
California scorpionfish	12.9%	13.3%	4.1%	0.0%	39.9%
Sculpin	0.6%	0.0	0.0	0.0%	0.0%
California Sheephead	7.8%	10.9%	4.7%	30.9%	1.7%
Pacific mackerel	9.7%	8.5%	13.1%	30.1%	42.4%
White croaker	3.5%	8.5%	11.0 %	0.0%	0.4%
Tomcod	1.6%	0.0%	0.0%	0.0%	0.0%
Croaker Family	2.7%	0.0%	0.0%	0.0%	0.0%
Yellowfin croaker	0.4%	0.3%	0.2%	0.0%	0.0%
Spotfin croaker	0.4%	0.3%	0.1%	0.0%	0.0%
Black croaker	0.0%	0.3%	0.0%	0.0%	0.0%
White seabass	2.3%	5.6%	2.0%	0.0%	0.4%
Pacific barracuda	4.0%	5.3%	1.9%	0.0%	1.7%
Cabezon	3.2%	4.0%	1.4%	2.4%	0.4%
Lingcod	3.5%	4.0%	1.8%	4.1%	3.4%
Senorita	1.7%	3.7%	1.4%	0.0%	0.4%
Black perch	0.0%	2.7%	0.3%	4.1%	0.0%
Giant kelpfish	1.9%	2.4%	0.3%	0.0%	0.4%
Yellowtail	1.9%	1.9%	3.2%	8.9%	0.0%
Garibaldi	2.7%	1.1%	0.3%	0.0%	0.4%
Blacksmith	0.5%	1.0%	0.6%	0.0%	0.8%
Halfmoon	0.0%	1.0%	1.8%	0.0%	0.8%
Rock wrasse	0.4%	1.0%	0.1%	1.7%	0.0%
Wrasse Family	0.0%	0.0%	0.1%	0.0%	0.0%
Ocean whitefish	0.5%	0.7%	0.2%	2.5%	0.4%

Pacific bonito	1.2%	0.4%	0.8%	0.9%	0.8%
Silverside family	0.6%	0.0%	0.4%	0.0%	0.0%
Jack smelt	0.6%	0.4%	0.0%	0.0%	0.4%
Sarcastic fringehead	0.5%	0.4%	0.1%	0.0%	0.0%
California Corbina	0.4%	0.3%	0.2%	0.0%	0.0%
Blue banded ronquill	0.0%	0.3%	0.0%	0.0%	0.0%
Wolf eel	0.4%	0.3%	0.1%	0.0%	0.4%
Zebra perch	0.0%	0.3%	0.0%	0.0%	0.0%
Surfperch family	2.8%	0.2%	1.3%	0.0%	0.4%
Kelp surfperch	0.0%	0.2%	0.4%	0.0%	0.0%
Rubberlip sea perch	0.4%	0.2%	0.3%	0.0%	0.0%
Sargo	0.0%	0.0%	0.2%	0.0%	0.0%
Thornback sculpin	0.0%	0.0%	0.1%	0.0%	0.0%
Drum Family	0.0%	0.0%	0.0%	0.0%	0.4%
Monkeyface pricklyback	0.0%	0.0%	0.0%	0.0%	0.4%
Opaleye	0.0%	0.0%	0.0%	14.6%	0.4%
Pink surfperch	0.0%	0.0%	0.0%	0.0%	0.4%
Spotted ratfish	<u>0.0%</u>	<u>0.0%</u>	<u>0.0%</u>	<u>0.0%</u>	<u>0.4%</u>
Total:	100%	100%	100%	100%	100%

The California lizardfish is a major discard species. Many anglers catch 30 or more per trip. They are all discarded with none retained. In the camera study, anglers did not photograph all the lizardfish they caught and discarded. Some wrote notes on the camera log indicating they threw back a number of additional lizardfish. In most cases these were reported to the CRFS sampler who recorded 7 times the number of lizardfish discarded as shown on the camera photos. A substantial number of California sheephead and California scorpionfish were also discarded. White croaker and pacific mackerel also had high discards. The CRFS interview seemed to under report California scorpionfish and California sheephead. CRFS tallies were one half to one third of the camera identification. Pacific mackerel and white croaker were over reported in the CRFS interview compared to the camera study by about 50%. Most of the species in this discard group are a small percentage and match fairly well between the angler report, the camera identification and the CRFS listed discards. The PC mode discards do not match well with the PR discards by species.

*Sharks, Skates & Rays.* The sharks, skates and rays species group accounted for 2.7% of all discards. The primary species in this group were round stingrays, blue sharks, smoothhound sharks, shovelnose guitarfish and bat rays. These species accounted for about 70% of the discards in this group. Thresher sharks as shown in the photo to the left accounted for about 5% of discarded sharks in this species group.

Table 6. Comparison between Sharks, Skates and Rays in the Sharks, Skates & Rays species group by angler identification, the actual camera identification, the CRFS reported discarded catch, the CRFS Private Boat retained catch, and the CRFS Party/Charter Discards for CRFS District 1, August – October, 2013.

Species	Angler ID of Discards	Camera ID of Discards	CRFS Reported Discards	CRFS Retained Catch <sup>1)</sup>	CRFS PC Discards
Round stingray	23.7%	24.3%	37.8%	0.0%	0.0%
Blue shark	7.9%	13.5%	10.8%	0.0%	0.0%
Shovelnose guitarfish	10.5%	13.5%	10.8%	0.0%	0.0%
Brown smoothhound	0.0%	10.8%	0.0%	0.0%	0.0%

Sand shark	7.9%	0.0%	0.0%	0.0%	0.0%
Gray smoothhound	5.3%	5.4%	0.0%	0.0%	14.3%
Smoothhound genus	0.0%	0.0%	2.7%	0.0%	14.3%
Bat ray	7.9%	10.8%	8.1%	0.0%	0.0%
Thresher shark	5.3%	5.4%	5.4%	0.0%	0.0%
Thornback	0.0%	5.4%	0.0%	0.0%	0.0%
Leopard shark	5.3%	2.7%	8.1%	0.0%	14.3%
Spiny dogfish shark	5.3%	2.7%	2.7%	0.0%	14.3%
Diamond stingray	0.0%	2.7%	0.0%	0.0%	0.0%
Unidentified shark	10.5%	2.7%	5.4%	0.0%	14.3%
Shortfin mako shark	0.0%	0.0%	2.7%	0.0%	0.0%
Soufin shark	2.6%	0.0%	0.0%	0.0%	0.0%
Ray order	5.3%	0.0%	5.4%	0.0%	14.3%
Stingrays	2.6%	0.0%	0.0%	0.0%	0.0%
Swell shark	<u>0.0%</u>	<u>0.0%</u>	<u>0.0%</u>	<u>0.0%</u>	<u>14.3%</u>
Total:	100%	100%	100%	100%	100%

The PC mode discards did not match well with the PR mode for sharks, skates and rays. The discards by PC anglers were mainly smoothhound sharks, Leopard and swell sharks, spiny dogfish sharks and rays. The species don't match with the PR discards and the identification on the PC boat by the angler usually gets an assist from the deck hands who identify the shark once it surfaces for the angler, as most all sharks are discarded.

## Discussion

As expected, angler identification of some species is good, while others are poorly identified. The sand bass group is well known by anglers. Kelp bass are readily identified by anglers and in most cases they list the species in identifying this fish. Spotted and barred sand bass are not as readily identified. Spotted sand bass is the species of choice if it is not a kelp bass. Barred sand is the most poorly identified of the species. The group as a whole is however, not mixed up with any other species, except for an occasional identification as a rockfish.

California halibut and sanddabs are readily identified by anglers and this self-reported data is good. Anglers do not attempt in most cases to identify the sanddabs to species, although all of those observed in this study were Pacific sanddabs. This is the species most often caught in the sanddabs group. Other flatfishes were identified properly at about a 50% rate.

Rockfishes are not well identified to species by the angler and they report about 50% of them as unidentified rockfish. The more distinct ones such as Treefish were identified well, but the most commonly caught species were not well identified. The exact percentage variation of the various species was reported in Table 4. An attempt to compare the actual discard rockfish PR species mix to that in the PC mode was unable to be examined. The CRFS survey currently uses the angler reported discard ratios from the angler reported data in the PC mode. On PC vessels, the anglers have the benefit of deck hands on site that can provide some species information when they catch fish that they do not know what they are. In total this may provide a little better set of angler reported species breakdown than exists in the PR mode where anglers are on their own. Data is collected at random from a set of the anglers on the boat using the Angler interview form.

The CRFS sampler on the PC trip does collect discard species data that they observe and identify at each stop of the boat on their CRFS boat form, but it is not currently used in the estimates. I

discussed this with CDFW and we will attempt to make this comparison between the PR actual discards from the cameras with the biologist identified discard species on the PC vessels in the 2014 report for southern California as well as central and northern California. It is recommended that CDFW work to modify CRFS estimates to use the CRFS biologist discard species identifications in the PC mode when they ride the vessel, rather than the angler provided information as to the species they discarded.

The species in the other fishes group were well identified by the angler as the majority were California lizardfish, California scorpionfish, California sheephead, Pacific mackerel, and white croakers, all of which the anglers were very good at identifying.

In summary, the problem remains the speciation of the rockfish discards in the PR mode. This study enumerated the actual species in southern California in the August-October, 2013 time period. We did not find a good proxy for the species ratios that could be applied in the future, unless the comparison with the PC CRFS sampler identification shows promise. It appears however, that the retained catch and the discards of all species on the PC trips would seem to indicate fishing operations on a different set of species than is occurring in the PR mode.

#### Acknowledgements

Thanks to the California Department of Fish and Wildlife(CDFW) for their assistance in this study of picking up the cameras during their creel survey of anglers in the CRFS survey, cooperation and participation by their CRFS supervisors and field samplers. CDFW also helped in matching some camera data to the CRFS interview when the interview identification was not recorded on the camera log. Thanks to Craig Miller and Darla Voyce of the Pacific States Marine Fisheries Commission for data entry services of the camera log sheets into excel spreadsheets and for assistance with numbering and packaging cameras and logs for the field technicians. Ed Hibsich, RecFIN Programmer/Analyst for Pacific States Marine Fisheries Commission provided data from the RecFIN database to match CRFS interviews to the cameras returned. Thanks to NOAA Fisheries and their Marine Recreational Information Program for funding this study.

## APPENDICIES

**Appendix I. Summary of number of fish from all counties (District 1) from Aug- October, 2013**

Total Cameras Distributed: 942  
 Total Cameras Returned: 627  
 Boats with Discards: 296  
 Total Discard Anglers: 674  
 Boats with No Discards: 331  
 Cameras Not Returned: 315

<u>Species</u>	<u>Angler Log</u>	<u>Camera</u>	<u>CRFS Discards</u>	<u>CRFS Retained</u>
Sand Basses				
Spotted Sand Bass	209	184	315	
Kelp Bass	236	296	377	19
Barred Sand Bass	28	160	245	60
Sandbasses	<u>141</u>	<u>3</u>	<u>6</u>	
Total:	614	643	943	79
Flatfish				
Big Mouth Sole	0	0	0	1
California Halibut	105	111	114	4
Diamond Turbot	1	2	2	
Fantail Sole	0	0	0	<u>1</u>
Flounder	2	0	0	
Sanddabs (General)	42	0	89	
Pacific Sanddab	<u>1</u>	<u>47</u>	<u>140</u>	
Total:	151	160	345	5
Rockfishes				
Bank Rockfish	0	0	9	
Brown Rockfish	2	11	1	
Blue Rockfish	1	1	1	2
Bocaccio	2	2	30	17
Calico Rockfish	1	4	2	1
Chilipepper Rockfish	0	0	0	1
Copper Rockfish	2	6	3	19
Flag Rockfish	0	0	0	18
Freckled Rockfish	3	21	0	2
Gopher Rockfish	3	33	1	5
Grass Rockfish	0	5	0	
Greenspotted Rockfish	0	3	9	51
Greenstriped Rockfish	0	2	1	28
Halfbanded Rockfish	0	15	33	
Honeycomb Rockfish	5	16	4	3
Kelp Rockfish	0	11	3	4
Olive Rockfish	6	11	23	6

Speckled Rockfish	2	2	0	1
Starry Rockfish	14	1	29	13
Treefish	4	7	5	1
Vermillion Rockfish	10	11	37	20
Unidentified Rockfish	<u>64</u>	<u>7</u>	<u>117</u>	<u>3</u>
Total:	119	166	298	195
Other Fishes:				
Blacksmith	2	4	7	
Cabazon	12	15	16	3
Sculpin	2	0	0	
California Scorpionfish	48	50	48	
California Lizardfish	115	76	555	
California Sheephead	29	41	55	38
Corbina	1	1	2	
Garibaldi	10	4	3	
Giant Kelpfish	7	9	4	
Blue Banded Ronquil	0	1	0	
Monkeyfaced Prickleback	1	0	1	
Sarcastic Fringehead	2	2	1	
Wolf Eel	1	1	1	
Halfmoon	0	4	21	
Opaleye	0	0	3	18
Zebra Perch	0	1	0	
Wrasse Family	0	0	1	
Rock Wrasse	1	4	1	2
Ocean Whitefish	2	3	2	3
Lingcod	13	15	21	5
Pacific Barracuda	15	20	22	
Pacific Mackerel	36	32	153	37
Surfperch Family	10	1	15	
Black Perch	0	10	4	5
Kelp Surfperch	0	1	5	
Ruberlip Sea Perch	1	1	3	
White Seabass	11	21	23	
Croaker Family	10	0	0	
Black Croaker	0	1	0	
Spotfin Croaker	1	1	1	
Tomcod	6	0	0	
White Croaker	13	32	129	
Yellowfin Croaker	1	1	2	
Silverside Family	2	0	5	
Jack Smelt	2	2	0	
Sargo	0	0	2	
Senorita	6	14	16	
Thornback Sculpin	0	0	1	
Pacific Bonito	4	2	9	1
Yellowtail	<u>7</u>	<u>7</u>	<u>37</u>	<u>11</u>



TOTAL	371	377	1169	123
Sharks & Rays:				
Blue Shark	3	5	4	
Smoothhound Genus	0	0	1	
Brown Smoothhound	0	4	0	
Gray Smoothhound	2	2	0	
Shortfin Mako Shark	0	0	1	
Leopard Shark	2	1	3	
Thresher Shark	2	2	2	
Sand Shark	3	0	0	
Soupfin Shark	1	0	0	
Spiny Dogfish Shark	2	1	1	
Shovelnose Guitarfish	4	5	4	
Thornback	0	2	0	
Bat Ray	3	4	3	
Rays (Order)	2	0	2	
Stingray	1	0	0	
Diamond Stingray	0	1	0	
Round Stingray	9	9	14	
Unidentified Shark	<u>4</u>	<u>1</u>	<u>2</u>	
Total:	38	37	37	
Unidentified Fish	104	2	11	

## Appendix II. Summary of Number of Fish from San Diego County from Aug-October, 2013

Total Cameras Distributed: 446  
 Total Cameras Returned: 271  
 Boats with Discards: 118  
 Total Discard Anglers: 276  
 Boats with No Discards: 153  
 Cameras Not Returned: 175

<u>Species</u>	<u>Angler Log</u>	<u>Camera</u>	<u>CRFS Discards</u>	<u>CRFS Retained</u>
Sand Basses				
Spotted Sand Bass	207	176	294	
Kelp Bass	32	54	40	2
Barred Sand Bass	4	51	102	14
Sandbasses	<u>53</u>	<u>3</u>	<u>2</u>	
Total:	296	284	438	16
Flatfish				
California Halibut	81	77	81	4
Pacific Sanddab	0	15	4	
Sanddabs (General)	11	0	34	
Diamond Turbot	0	1	0	
Flounder	<u>2</u>	<u>0</u>	<u>0</u>	
Total:	79	88	108	
Rockfishes				
Bank Rockfish	0	0	9	
Brown Rockfish	0	2	0	
Blue Rockfish	1	1	1	2
Bocaccio	1	1	20	4
Brown Rockfish	1	3	0	
Calico Rockfish	1	2	2	
Copper Rockfish	0	2	1	9
Flag Rockfish	0	0	0	3
Freckled Rockfish	3	2	0	2
Gopher Rockfish	3	7	1	2
Grass Rockfish	0	2	0	
Greenspotted Rockfish	0	3	9	18
Greenstriped Rockfish	0	1	1	
Halfbanded Rockfish	0	1	8	
Honeycomb Rockfish	5	7	4	
Kelp Rockfish	0	1	2	4
Olive Rockfish	1	3	3	5
Speckled Rockfish	2	2	0	1
Starry Rockfish	8	1	8	
Treefish	1	3	3	1

Vermillion Rockfish	6	4	24	20
Unidentified Rockfish	<u>14</u>	<u>0</u>	<u>16</u>	<u>3</u>
Total:	47	48	112	74
Other Fishes:				
Blacksmith	0	1	0	
Pacific Bonito	4	2	9	1
Sculpin	2	0	0	
California Scorpionfish	14	27	20	
Cabazon	2	2	2	1
California Lizardfish	41	29	231	
California Sheephead	4	9	5	11
Corbina	1	1	2	
Garibaldi	0	0	1	
Giant Kelpfish	3	3	3	
Halfmoon	0	0	1	
Ocean Whitefish	0	1	2	1
Pacific Barracuda	8	12	8	
Pacific Mackerel	10	7	50	5
Surfperch Family		1	0	0
Black Perch	0	0	1	
Kelp Surfperch	0	1	0	
Ruberlip Sea Perch	1	1	1	
White Seabass	1	2	2	
Black Croaker	0	1	0	
White Croaker	0	1	1	
Yellowfin Croaker	1	0	2	
Senorita	0	5	7	
Thornback Sculpin	0	0	1	
Yellowtail	<u>7</u>	<u>7</u>	<u>37</u>	<u>11</u>
TOTAL	99	112	384	30
Sharks & Rays:				
Smoothhound Genus	0	0	1	
Brown Smoothhound	0	3	0	
Grey Smoothhound	2	2	0	
Leopard Shark	1	1	2	
Spiny Dogfish Shark	2	1	1	
Unidentified Shark	2	0	0	
Round Stingray	3	4	6	
Rays	<u>2</u>	<u>0</u>	<u>1</u>	
Total:	12	11	11	
Unidentified Fish	104	2	11	

### Appendix III. Summary of Number of Fish from Orange County from Aug-October, 2013

Total Cameras Distributed: 220  
 Total Cameras Returned: 150  
 Boats with Discards: 80  
 Total Discard Anglers: 159  
 Boats with No Discards: 70  
 Cameras Not Returned: 70

<u>Species</u>	<u>Angler Log</u>	<u>Camera</u>	<u>CRFS Discards</u>	<u>CRFS Retained</u>
Sand Basses				
Spotted Sand Bass	2	8	0	
Kelp Bass	108	116	118	
Barred Sand Bass	6	63	72	12
Sandbasses	<u>49</u>	<u>0</u>	<u>4</u>	
Total:	165	187	194	
Flatfish				
California Halibut	17	23	26	
Pacific Sanddab	0	10	31	
Sanddabs (General)	9	0	32	
Diamond Turbot	<u>1</u>	<u>1</u>	<u>2</u>	
Total:	27	34	91	
Rockfishes				
Bocaccio	0	0	2	1
Brown Rockfish	0	1	1	
Calico Rockfish	0	1	0	1
Chillipepper Rockfish	0	0	0	2
Copper Rockfish	1	2	1	1
Freckled Rockfish	0	2	0	
Gopher Rockfish	0	2	0	
Grass Rockfish	0	1	0	
Honeycomb Rockfish	0	2	0	
Olive Rockfish	0	1	0	1
Starry Rockfish	1	0	2	
Vermillion Rockfish	1	2	1	2
Unidentified Rockfish	<u>7</u>	<u>2</u>	<u>5</u>	
Total:	10	16	12	8
Other Fishes:				
Drum Family	0	0	7	
Cabazon	3	3	4	
California Lizardfish	23	28	32	
California Scorpionfish	13	14	10	
California Sheephead	17	24	31	6

Pacific Barracuda	6	6	11	
Pacific Mackerel	19	19	57	25
Yellowtail	0	0	0	1
Wrasse Family	0	0	1	
Rock Wrasse	1	0	0	
Surf Perch Family	0	0	6	
Black Perch	0	9	0	
Blue Perch	1	0	0	
Kelp Surfperch	0	0	5	
Rubberlip Sea Perch	0	0	1	
Zebra Perch	0	1	0	
White Seabass	8	15	14	
Croaker Family	1	0	0	
Spotfin Croaker	1	1	1	
Yellowfin Croaker	0	1	0	
Tomcod	1	0	0	
White Croaker	0	1	18	
Senorita	3	5	5	
Ocean Whitefish	0	0	0	1
Smelt	2	0	0	
Silverside Family	0	0	4	
Jack Smelt	1	3	1	
Halfmoon	0	1	1	1
Sargo	<u>0</u>	<u>0</u>	<u>2</u>	
Total:	102	120	212	34
Sharks, Skates & rays:				
Blue Shark	3	3	4	
Leopard Shark	1	0	1	
Shortfin Mako Shark	0	0	1	
Thresher Shark	2	2	2	
Shovelnose Guitarfish	2	3	1	
Ray (Order)	0	0	1	
Bat Ray	2	1	2	
Round Stingray	<u>5</u>	<u>5</u>	<u>7</u>	
Total:	15	14	19	
Unidentified Fish	36	6	12	

## Appendix IV. Summary of Number of Fish from Los Angeles County from Aug- October, 2013

Total Cameras Distributed: 276  
 Total Cameras Returned: 206  
 Boats with Discards: 98  
 Total Discard Anglers: 239  
 Boats with No Discards: 108  
 Cameras Not Returned: 70

<u>Species</u>	<u>Angler Log</u>	<u>Camera</u>	<u>CRFS Discards</u>	<u>CRFS Retained</u>
<b>Sand Basses:</b>				
Spotted Sandbass	0	0	21	
Kelp Bass	96	126	219	17
Barred Sand Bass	18	46	71	34
Sandbasses General	39	0	0	
<b>Total:</b>	<b>153</b>	<b>172</b>	<b>311</b>	
<b>Flatfish:</b>				
California Halibut	7	11	7	
Pacific Sanddab	1	22	105	
Sanddabs (General)	22	0	23	
Big Mouth Sole	0	0	0	1
Fantail Sole	0	0	0	1
<b>Total:</b>	<b>30</b>	<b>33</b>	<b>135</b>	<b>2</b>
<b>Rockfishes:</b>				
Bocaccio	1	1	8	13
Brown Rockfish	1	5	0	
Calico Rockfish	0	1	0	
Canary Rockfish	0	1	0	
Copper Rockfish	1	2	1	9
Flag Rockfish	0	0	0	15
Freckled Rockfish	0	17	0	
Gopher Rockfish	0	24	0	3
Grass Rockfish	0	2	0	
Greenspotted Rockfish	0	0	0	33
Greenstriped Rockfish	0	1	0	28
Halfbanded Rockfish	0	14	25	
Honeycomb Rockfish	0	7	0	3
Kelp Rockfish	0	10	1	4
Olive Rockfish	5	7	20	
Rosy Rockfish	0	1	0	2
Starry Rockfish	5	0	19	13
Squarespotted Rockfish	0	2	7	1
Treefish	3	4	2	
Vermillion Rockfish	3	5	12	57

Unidentified Rockfish	<u>43</u>	<u>5</u>	<u>96</u>	<u>10</u>
<b>Total:</b>	<b>62</b>	<b>109</b>	<b>191</b>	<b>191</b>
<b>Other Fishes:</b>				
Blacksmith	2	3	7	
Cabezon	7	10	10	2
California Lizardfish	51	72	292	
California Scorpionfish	21	19	18	40
California Sheephead	8	8	19	21
Croaker	9	0	0	
Tomcod	5	0	0	
White Croaker	13	30	110	
Garibaldi	10	4	2	
Giant Kelpfish	4	6	1	
Halfmoon	0	3	19	16
Jack Smelt	0	2	0	
Lingcod	13	15	21	5
Ocean Whitefish	2	2	0	1
Opaleye	0	0	3	18
Pacific Barracuda	1	2	3	
Pacific Mackerel	7	6	46	7
Rock Wrasse	0	4	1	2
Surfperch Family	9	0	9	
Black Perch	0	1	3	5
Rubberlip Sea Perch	0	0	1	1
Monkeyfaced Prickleback	1	0	1	
Blue Banded Ronquil	0	1	0	
White Seabass	2	4	7	
Sarcastic Fringehead	2	2	1	
Silversides	0	0	1	
Senorita	3	4	4	
Wolf Eel	<u>1</u>	<u>1</u>	<u>1</u>	
<b>Total:</b>	<b>171</b>	<b>199</b>	<b>580</b>	<b>118</b>
<b>Sharks, Skates &amp; Rays:</b>				
Blue Shark	0	2	0	
Brown Smoothhound Shark	0	1	0	
Sand Shark	3	0	0	
Soupfin Shark	1	0	0	
Unidentified Shark	2	1	2	
Shovelnose Guitarfish	2	2	3	
Thornback	0	2	0	
Stingray	1	0	0	
Round Stingray	1	0	1	
Diamond Stingray	0	1	0	
Bat Ray	<u>1</u>	<u>3</u>	<u>1</u>	
<b>Total:</b>	<b>11</b>	<b>12</b>	<b>7</b>	

Unidentified Fish

108

6

4