



# TEMPORAL TRENDS IN SOUTHERN CALIFORNIA SURF FISH POPULATIONS 2007 to 2009

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## Introduction

Species that utilize shallow water habitat along sandy shores on the open coast such as barred surfperch, *Amphistichus argenteus*, other surfperch species, California corbina, *Menticirrhus undulatus*, yellowfin croaker, *Umbra roncadore*, and spotfin croaker, *Roncadore stearnsi*, are targeted and very popular with anglers in California. For instance, in 2008 it was estimated that 576,000 angler trips were made by nearshore anglers catching various surfperch and croaker species in southern California marine waters (RecFIN 2009). Despite the predominance of sandy beaches in southern California that support several of these sport fishes, few studies exist describing the fish fauna in this shallow surf zone environment. Aside from anecdotal data, the only studies on southern California surf fish populations were conducted in the mid 1950's (Carlisle et al. 1960) and in the mid 1990's (Valle et al. unpublished data).

The objectives of this study were to 1) describe spatial and temporal changes in surf fish abundances and length frequency distributions and 2) investigate the influence of tide height, tidal flux, and exposure to wave action on surf fish abundances.

## Methods

Monthly beach seine sets at four sites (Bolsa Chica State Beach, Seal Beach, Belmont Shore, Hermosa Beach) within the SCB were conducted monthly from May 2007 to September 2009 (Fig. 1). Each set consisted of four separate hauls. The beach seine measured 30 m long and 3 m high with 2 cm square mesh and a 2 m x 2 m x 2 m bag in the center (Fig. 2). The seine was set parallel to shore in 3 m deep water and pulled in by attached ropes. Every fish caught in the net was identified, measured, and released. Sport fishes of interest (California corbina, spotfin croaker, yellowfin croaker, barred surfperch, and walleye surfperch, *Hyperoprasion argenteum*) that were large enough to hold a 1-bar tag and appeared to be in good condition were tagged prior to release. When there was a very large group of one species caught during a haul, a sub-sample of 50 specimens was measured.



Fig. 1) Beach seine sampling locations in southern California.

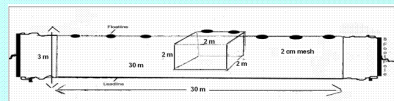


Fig. 2) Seine diagram. The seine is a 30 m long x 3 m wide nylon net with 2 cm square mesh and a 2 m x 2 m x 2 m bag in the center. The seine is held open with floats on the top, lead on the bottom, and two 2.5 m long poles attached to either side.

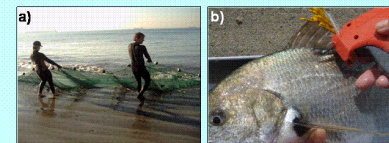


Fig. 3) California Department of Fish and Game (CDFG) biologists: a) dragging in the seine at Belmont Shore and b) tagging a spotfin croaker at Seal Beach.

a) 2007-2009 Surf Fish Study	
# of Hauls	386
# of Fish	31,631
# of Species	47
Avg. # Fish per Haul	82



Fig. 4) Overall summary of surf fish study results a) Large summer haul of spotfin croaker at Bolsa Chica State Beach b).

1) Abundances of yellowfin croaker, spotfin croaker, barred surfperch, walleye surfperch, and leopard shark increased in 2007-09 relative to the 1990s. Yellowfin croaker and leopard shark were also much more abundant in the current study than in the 1950s. Barred surfperch showed the greatest decline in abundance from the 1950s to 2007-09, falling from rank 3 to 11.

Ranks According to Abundance in Three CDFG Surf Fish Studies			
Rank	1950s	1990s	Present
1	northern anchovy	queenfish	Queenfish
2	queenfish	California corbina	Pacific sardine
3	barred surfperch	round stingray	yellowfin croaker
4	walleye surfperch	jacksmelt	walleye surfperch
5	shiner perch	Pacific sardine	topsmelt
6	topsmelt	yellowfin croaker	California corbina
7	Pa. staghorn sculpin	walleye surfperch	Round stingray
8	white croaker	bat ray	salema
9	California corbina	northern anchovy	jacksmelt
10	deepbody anchovy	topsmelt	spotfin croaker
11			barred surfperch
17		spotfin croaker	
18	spotfin croaker		
20		barred surfperch	leopard shark
26	yellowfin croaker		
31	leopard shark		
37		leopard shark	

Table 1. Abundance ranks of fishes caught by beach seine in three different studies.

2) The length frequency distribution for most species was characterized by two dominant modes. The YOY age class was often represented.

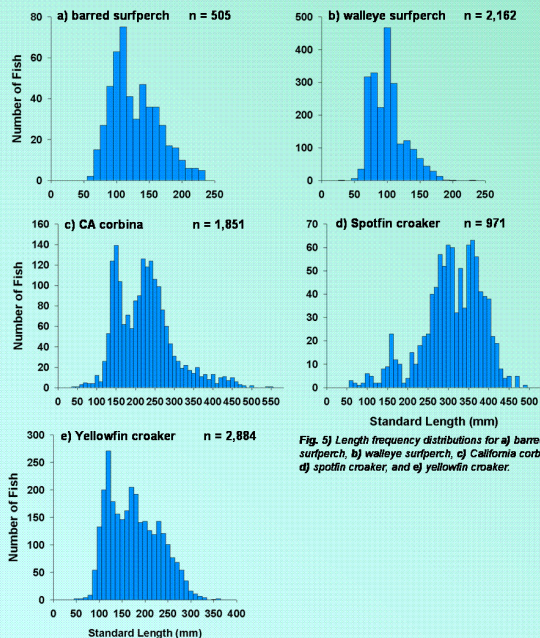


Fig. 5) Length frequency distributions for a) barred surfperch, b) walleye surfperch, c) California corbina, d) spotfin croaker, and e) yellowfin croaker.

## Results

3) Barred surfperch abundance remained relatively constant throughout all seasons, while spotfin croaker and California corbina abundances peaked in the summer and were lowest during the winter. Yellowfin croaker abundance dramatically increased in the spring.

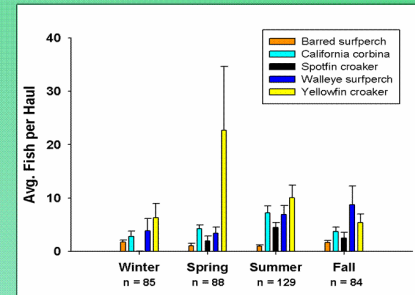


Fig. 6) Average number of fish caught per haul ( $\pm$  95% CI) by season for five important sport fishes. Winter = December - February; Spring = March - May; Summer = June - August, and Fall = September - November. n = number of hauls.

4) Yellowfin croaker were more abundant at the more protected sites while surfperches, especially walleye surfperch, were more abundant at the exposed sites. California corbina and spotfin croaker were least abundant at the most northern site (Hermosa Beach).

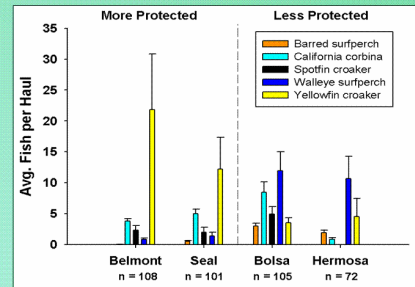


Fig. 7) Average number of fish caught per haul ( $\pm$  95% CI) by site for five important sport fishes. n = number of hauls.

5) California corbina and spotfin croaker were most abundant during lower incoming tides, while barred surfperch, yellowfin croaker, and walleye surfperch were most abundant during slightly higher outgoing tides.

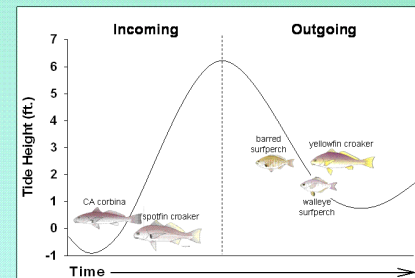


Fig. 8) Tide height and flux for five important sport fishes when the number of average fish per haul was highest. This figure represents a generic 12 hr. tidal cycle. All sampling occurred between 0630h and 1230h. These values represent the average fish per haul within 1 ft. tidal height increments.

## Discussion and Conclusions

Similar to studies in the 1950s and 1990s, this study found the southern California surf zone fish fauna was dominated by surfperches, croakers, and silversides.

Barred surfperch abundance has greatly declined since the 1950s study. This and changes in abundance for other fishes may be due to several factors including habitat modifications, regulations, oceanographic changes, and fishing pressure.

Leopard shark numbers have increased since the 1990s. This may partly be due to the implementation of commercial and recreational minimum size restrictions, recreational bag limits, and the gill net ban in state waters since the early to mid 1990s (Sweetnam 2007).

The surfperch and croaker catches consisted of many young-of-the-year (YOY). Catches of surfperches, California corbina, and yellowfin croaker were dominated by the YOY, juvenile, and subadult age classes; whereas, catches of spotfin croaker were dominated by three and four year old adults.

Select croaker and surfperch species showed seasonal variability in abundance. We attribute the large increase in yellowfin croaker abundance in the spring to an increase of YOY in the catch and two exceptionally large hauls. Increased walleye surfperch abundances in summer and fall were also due to an increase in abundance of the YOY age class.

Seasonal differences in spotfin croaker abundances may be attributed to inshore-offshore or downcoast-upcoast movements. To date, very few tagged fish have been recaptured. We hope to gather enough tag-recapture data in the near future to describe the movement patterns of these fish.

Variability in species abundances across sites could be attributed to different habitat preferences. For instance, many surfperch species prefer areas with wave action. In addition, beach slope, grain size, turbidity, and currents may also influence site specific differences in species abundances.

Select croaker and surfperch species appear to prefer the lower range of the tide cycle, regardless of flux. Further analyses will be needed to understand how tide height and flux interact to influence surf fish abundances.

## References

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Recreational Fisheries Information Network (RecFIN). (2009). "RecFIN Estimate Download Results: Estimated thousands of angler trips by marine recreational anglers fishing for all possible species by month and fishing mode for beach and bank fishing in all marine areas in southern California from January-December 2008 for user defined group - white croaker, California corbina, yellowfin croaker, spotfin croaker, shiner perch, walleye surfperch and barred surfperch." Ed. Wade Van Buskirk. Pacific States Marine Fisheries Commission. 20 May 2009. <<http://www.recfin.org>>

Sweetnam, D. (ed.) 2007. Review of some California fisheries for 2006: Coastal pelagic finfish, market squid, dungeness crab, spot prawn, highly migratory species, ocean salmon, California halibut, nearshore live-fishes, cabezon, surfperches, and leopard shark. California Cooperative Oceanic Fisheries Investigations Reports. 48:10-32.

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