Monitoring of Nearshore Fishes Within and Adjacent to California Marine Protected Areas:
CA Collaborative Fisheries Program

Rick Starr¹, Dean Wendt², and Noëlle Yochum¹*
1: Moss Landing Marine Laboratories/ CA Sea Grant
2: San Luis Obispo Science and Ecosystem Alliance (Cal Poly)

Monterey Bay National Marine Sanctuary Advisory Council Meeting
12 December 2008
Captains

- Allen Chin (F/V Tigerfish)
- Roger Cullen (F/V Dorado)
- Tom Haffer (F/V Kathyrn H)
- Bob Ingles (F/V Queen of Hearts)
- Joe Kucera (F/V Patriot)
- Brad Leagues (F/V Princess)
- Michele Leary (F/V Rita G)
- David Lemon (F/V Caroline)
- Tom Mattusch (F/V Huli Cat)
- Giovanni Nevolooso (F/V Gabbiano)
- Mike Ricketts (F/V Sea Hawk)
- Sal Rocha (F/V Pacific Horizon)
- John Rowley (F/V Fiesta)
- Dustin Selck (F/V Pacific Horizon)
- Charlie (F/V Admiral)
The Starr Lab at MLML

- CA Collaborative Fisheries Research Program (Commercial and Recreational)
- Resource Management: Managing Data-Poor Fisheries
- Delta Submersible Surveys of Fishes and Invertebrates
- Assessment of Nearshore Fishes in Duxbury Reef
- Fish Movement (External Tagging): Duxbury Reef
- Survey Methodology Comparisons
- CPUE of Nearshore Fishes in Carmel Bay
- Fish Movement (Acoustic Tagging):
  - Blue and Black Rockfish (Carmel Bay)
  - Groupers (Spain and Belize)
  - Leopard and Prickly Sharks (Monterey Bay)
  - Lingcod (Carmel Bay)
• Improve Resource Management:
  - Collaborative Research
  - Involve Local Communities
Collaborative Fisheries Approach

- PEW Oceans Commission, US Commission on Ocean Policy
- Utilize the extensive expertise of fishermen
- Makes fishermen part of the information solution
- Generate useful and needed data for DFG and NOAA
- Traditional fishing gear samples certain habitats and species better than other methodologies
- Tremendous outreach potential to diffuse historic tensions
Baseline Studies

• 5 Peer-reviewed Projects Funded for Baseline Surveys of Central CA MPAs
  - Collaborative Fishing
  - Intertidal
  - SCUBA
  - Submersible
  - Socio-economic
CA Collaborative Fisheries Research Program

• Objectives of the Baseline Surveys:
  – Generate baseline comparisons between MPA and reference sites
  – Develop rigorous scientific monitoring protocols
  – Engage the fishing community in MPA monitoring
  – Create a sampling design that can be used to collect data for stock assessments
CA Collaborative Fisheries Research Program

Recreational Rod and Reel
2007 and 2008

- Año Nuevo SMR
- Point Lobos SMR
- Piedras Blancas SMR (2008 only)
- Point Buchon SMR

Commercial Trapping
2008

- Año Nuevo SMR
- Point Lobos SMR
- Piedras Blancas SMR
- Cambria SMCA
Project Development

- Commercial and Recreational Fishermen
- CA DFG
- NMFS
- NGOs
- Academic Scientists
CA Collaborative Fisheries Research Program

Recreational Rod and Reel 2007 and 2008

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• Cambria SMCA
CA Collaborative Fisheries Research Program: Sampling

- MLML (North), Cal Poly (South)
- 2007: August, September, October
- 2008: July, August, September
- 4 Days/ Month (each MPA)
  - 2 in the MPA
  - 2 in the corresponding reference site
CA Collaborative Fisheries Research Program: Rec. Grid Cells

- < 40 m
- CSUMB Seafloor Mapping
- Fishermen Knowledge
- 4 Grid Cells/Day
Randomly Select Grid Cells

Skippers Select Fishing Sites

Three 15-Minute Drifts
Standardized Fishing

Photo by Robin Robinson

Photo by Noëlle Yochum

Bow: Lingcod Bars

2 3

1 4

Port: Shrimp Flies, Bait

14

13

12

11

Starboard: Shrimp flies, NO bait

6

7

8

9

Photo by Robin Robinson
Rec. Protocols: Tagging

Photo by Robin Robinson

Photo by Noëlle Yochum

Photo by Noëlle Yochum

Photo by Rick Starr
Rec. Protocols: Release

Photo by Noëlle Yochum

Photo by Rick Starr

Photo by Noëlle Yochum
Outreach and Review

Workshops:
- In Half Moon Bay
- In Moss Landing
- In Morro Bay

Attendees:
- Fishermen
- CA DFG and NMFS
- NGOs
- Academic Scientists

Objectives:
- Get Feedback
- Review and Improve Protocols
- Discuss Use of Data in Stock Assessments
Rec. 2007 Results: Overview

- 34 Days of Sampling
- 96 Hours of Fishing
- 174 Discrete Anglers
- 366 Volunteer Days
- 57 of 62 Grid Cells Sampled
- 5 CPFVs
- 5 Captains
- 7,928 Fishes Caught
- 27 Fish Species Caught (10 Genera)
- 97% Rockfishes (Sebastes spp.)
Rec. Results: Species Comp.

- **Año Nuevo**
  - N: 1275
  - Black rockfish: 38%
  - Blue rockfish: 27%
  - China rockfish: 11%
  - Copper rockfish: 10%
  - Olive rockfish: 10%
  - Gopher rockfish: 10%
  - Kelp rockfish: 10%
  - Lingcod: 10%
  - Vermilion rockfish: 10%
  - Yellowtail rockfish: 10%
  - Other: 10%
  - 19 Species

- **Point Buchon**
  - N: 2476
  - Black rockfish: 38%
  - Blue rockfish: 27%
  - China rockfish: 11%
  - Copper rockfish: 10%
  - Gopher rockfish: 10%
  - Kelp rockfish: 10%
  - Lingcod: 10%
  - Olive rockfish: 10%
  - Vermilion rockfish: 10%
  - Yellowtail rockfish: 10%
  - Other: 10%
  - 21 Species

- **Point Lobos**
  - N: 4177
  - Black rockfish: 38%
  - Blue rockfish: 27%
  - China rockfish: 11%
  - Copper rockfish: 10%
  - Gopher rockfish: 10%
  - Kelp rockfish: 10%
  - Lingcod: 10%
  - Olive rockfish: 10%
  - Vermilion rockfish: 10%
  - Yellowtail rockfish: 10%
  - Other: 10%
  - 20 Species

- All Areas Combined:
  - Blue Rockfish 38%
  - Gopher Rockfish 27%
  - Black Rockfish 11%
  - Olive Rockfish 10%

Ten most frequently caught species are those species that were greater than or equal to 1.5% of the total catch in any area: 96% of total catch.
Rockfishes (*Sebastes* spp.) Caught

- Sedentary Bottom Dwellers < 200 ft
- Structure Association

- Gopher Rockfish
- Black-and-Yellow Rockfish
- Brown Rockfish
- China Rockfish

Photos by Linda Snook, Noëlle Yochum, and Tom Landig
Rockfishes (*Sebastes spp.*) Caught

- Sedentary Bottom Dwellers < 500 ft
- Structure Association

Photo by Liz Sassone

Rosy Rockfish

Photo by Rick Starr

Starry Rockfish
Rockfishes (*Sebastes spp.*) Caught

• Kelp Forest Associated

Copper Rockfish

Kelp Rockfish

Vermilion Rockfish
Rockfishes (*Sebastes spp.*) Caught

- Semi-Pelagics

- Canary Rockfish
- Olive Rockfish
- Yellowtail Rockfish
- Blue Rockfish
- Black Rockfish
Other Caught Fishes

• Mobile Predators

Kelp Greenling (*Hexagrammos decagrammus*)

Lingcod (*Ophiodon elongatus*)

Photo by Noëlle Yochum

Photo by Rick Starr
Other Caught Fishes

Sea Perch: Reefs and Kelp Beds

Cabezon (Scorpaenichthys marmoratus): Sedentary Bottom Dwellers, Kelp Beds
Rec. Results: Avg. Length

![Graph showing average length of various fish species with annotations for statistical significance.]
Rec. Results: Avg. Length

![Graph showing average length of various rockfish species with statistical significance markers (* p < 0.05, ** p < 0.001).]

- Black rockfish
- Blue rockfish
- China rockfish
- Copper rockfish
- Gopher rockfish
- Kelp rockfish
- Lingcod
- Olive rockfish
- Vermilion rockfish
- Yellowtail rockfish
Rec. Results: Avg. Length

Average Length (cm)

- Black rockfish
- Blue rockfish
- China rockfish
- Copper rockfish
- Gopher rockfish
- Kelp rockfish
- Lingcod
- Olive rockfish
- Vermilion rockfish
- Yellowtail rockfish

PB MPA
PB REF

* p < 0.05
** p < 0.001
Rec. Results: CPUE

![Bar chart showing catch per angler hour for different species of rockfish in Año Nuevo MPA and REF areas. Species include Black rockfish, Blue rockfish, China rockfish, Copper rockfish, Gopher rockfish, Kelp rockfish, Lingcod, Olive rockfish, Vermilion rockfish, and Yellowtail rockfish. Asterisks indicate p < 0.05.](image)
Rec. Results: CPUE

Point Lobos

Catch per Angler Hour

Black rockfish  Blue rockfish  China rockfish  Copper rockfish  Gopher rockfish  Kelp rockfish  Lingcod  Olive rockfish  Vermilion rockfish  Yellowtail rockfish

* p < 0.05  ** p < 0.001

*  **
Rec. Results: CPUE

Point Buchon

* p < 0.05  ** p < 0.001

- Black rockfish
- Blue rockfish
- China rockfish
- Copper rockfish
- Gopher rockfish
- Kelp rockfish
- Lingcod
- Olive rockfish
- Vermilion rockfish
- Yellowtail rockfish

Catch per Angler Hour

MPA  REF
Rec. Results: Final Report


Project Websites:

http://seagrant.mlml.calstate.edu/crmpamonitor.php

http://www.slosea.org/collaborative/
Tag Returns

Reward
For Returned Fish Tags

Rick Stair of the UC Cooperative Extension Sea Grant Program and Dean Wendt of California Polytechnic State University, San Luis Obispo have been working with commercial fishermen, Commercial Passenger Fishing Vessel captains, and recreational anglers to catch and tag fish out of Port San Luis and Morro Bay, Montecito, and Pillar Point Harbors. The purpose of this collaborative research is to collect baseline and monitoring information about the Piedras Blancas, Cambria, Point Buchon, Point Lobos, and Ano Nuevo Marine Protected Areas.

If you catch a tagged fish, please record the species and/or description of the fish, total length (from the longest fin of the tail), tag number, date caught, latitude and longitude, and depth where the fish was caught, and call, email, or mail the information to:

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California Polytechnic State University
San Luis Obispo, CA 93407
805.756.2560
llongabach@calpoly.edu

For more information about this study go to:

Please report the information even if you decide to release the fish!

Thank you for your help!

August 2008
2008 Rec. Study

• Preliminary Results:
  - 4 MPAs
  - 48 Sampling Days
  - 473 Volunteer Days
  - 10 CPFVs
  - 9,917 Fishes Caught

• Species Composition:
  - Same as 2007, except the following fishes were also caught:
    • Bocaccio and chilipepper RF
    • Sea perch
    • Smelt
    • Pacific bonito
    • Painted greenling
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Commercial Trapping 2008

- Año Nuevo SMR
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Photo by Noëlle Yochum
Photo by Tom Mattusch
CA Collaborative Fisheries Research Program: Sampling

- MLML (North), Cal Poly (South)

- 2008: July, August, September (November)
  - 2 days/ month in the MPA
  - 2 days/ month in the corresponding reference site
CA Collaborative Fisheries Research Program: Comm. Grid Cells

- < 20 m
- CSUMB Seafloor Mapping
- Fishermen Knowledge
- 2-3 Grid Cells/ Day
Randomly Select Grid Cells

Skippers
Select Fishing Sites

10 Traps

X

X

X
Commercial Protocols

10 Traps per Set

One Pint of Squid

Photo by Noëlle Yochum
Commercial Protocols
Comm. Preliminary Results

We worked:
• With 6 commercial captains
• Aboard 5 fishing vessels
• In 4 MPAs and corresponding reference sites

• Overall Totals:
  - Fishes: 2,609
  - Invertebrates: 2,937

Species Composition:

Fishes:
Rockfishes: Black-and-Yellow, Blue, Brown, China, Copper, Gopher, Grass, Kelp, Treefish, Vermilion

Other: Cabezon, Kelp Greenling, Lingcod, Rainbow Sea perch, Striped Seaperch, Wolf Eel

Photo by Noëlle Yochum
Comm. Preliminary Results

Species Composition:

Invertebrates:
Crabs: Brown Rock, Cryptic Kelp, Dungeness, Northern Kelp, Red Rock, Slender, Sharpnose

Photo by Noëlle Yochum

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Photo by Noëlle Yochum

Photo by Noëlle Yochum

Photo by Noëlle Yochum

Photo by Noëlle Yochum
Comm. Preliminary Results

Species Composition:

**Invertebrates:**
- Sea Stars: Blood, Bat, Giant Pink, Giant Spined, Leather, Short Spined, Sunflower

**Other:** Snails, Whelk, Urchin

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*Photo by Noëlle Yochum*

*Photo by Tom Mattusch*

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Leather Star

Giant Pink Star

Sunflower Star

Giant Spined Star

Bat Star
CCFRP

Work Accomplished: 2007 and 2008

- Developed rigorous scientific monitoring protocols that are capable of detecting statistically significant differences between the MPA and reference sites
- Engaged the fishing community in MPA monitoring
- Generated baseline comparisons between MPA and reference sites
- Created a sampling design that can be used to collect data for stock assessments
Acknowledgements

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• **NMFS**

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Photo by Noëlle Yochum