

**Cruise Report for the
Surface Waters Ambient Monitoring Program (SWAMP)
Bioaccumulation Screening Study Year 2
on
the Coast of California (FY 09-10)**

Sampling Dates: April 2010- November 2010

**Written by: Billy Jakl
CDFG/Marine Pollution Studies at Moss Landing Marine Laboratories
Updated: 01/20/2011**

1.0 Introduction

This report describes the second year sampling activities of a two year screening study of popular fish species caught along California's coast, bays, and estuaries for bioaccumulation of contaminants in fish tissue. Fish were collected from designated zones with guidance from SWAMP Bioaccumulation Oversight Group (BOG) and a scientific review board. The State Water Quality Control Board (SWQCB) work was authorized via FY 09-10 in support of Work Order 09SWBG01. The work for the FY 09-10 SWAMP BOG collection effort is a screening study that focuses on the fishing beneficial use of sport fish along the coast, bays and estuaries of California.

1.1 Cruise Report

1.1 Objectives

Year Two's objective was to collect fish tissue samples in the northern half of California. Year Two's sampling effort was broken into twenty-eight zones, determined by BOG, which covered the coast, bays, and estuaries from Pt. Conception north to Crescent City. Region Two's nine coastal zones (Año Nuevo to Tamales Bay) were sampled in Year One's sampling effort and reported in Year One's cruise report.

Five different species were collected in each zone. Each sample was a composite of five individuals of one fish species that were all within 75% total length of the largest individual. Five additional fish were collected that maybe outside the 75% rule. These additional fish were collected for two of the five species which were analyzed as individuals for a length to mercury tissue concentration regression. The fish tissue was analyzed as directed by BOG in Work Order No. 09SWBG01 (see Section 1.3 below). Sample sites were reached by boating or hiking to a "species-specific" habitat. Fish samples were collected with gill nets, cast nets, otter-trawl, traps, beach seine, hook and line and/or spears.

1.2 Sampling personnel

Dylan Service	MPSL/CDFG	Crew Lead
Billy Jakl	MPSL/CDFG	Crew Lead
Gary Ichikawa	MPSL/CDFG	Crew Lead
Dustin Service	MPSL/CDFG	Research Tech
John Negrey	MPSL/CDFG	Research Tech
Steve Martenuk	MPSL/CDFG	Research Tech

Jon Goetzl
Sean Mundell

MPSL/CDFG
MPSL/CDFG

Research Tech
Research Tech

1.3 Authorization to collect samples

All sampling personnel are MPSL staff (through San Jose State University Foundation) contracted through CDFG to conduct the sample collection activities listed herein. The funding and authorization to collect the samples described herein is contained in the State Water Resources Control Board (SWRCB) Work Order 09SWBG01, including the description of the number samples and species targeted to be collected at each zone. Sixty-four zones were authorized for sample collection effort over a two year period. Thirty-six of the Sixty-four zones were sampled in Year one. The remaining twenty-eight zones were to be sampled in Year Two's sampling effort.

1.4 Station reconnaissance and selection

CDFG /MPSL conducted the pre-sample collection reconnaissance activities by locating popular fishing areas within each zone. Popular fishing areas were determined from local knowledge and desktop reconnaissance. After reconnaissance, multiple fishing areas were identified within each zone. All zones were authorized by BOG, SWQCB and the scientific review panel for fish collection and for specific types of tissue analyses as set forth in the Work Order 09SWBG01.

1.5 Summary of types of samples authorized to be collected

After reconnaissance, a total of twenty-eight zones were authorized for fish tissue collection effort. Five different species of fish were targeted for all zones. The target species were determined by: distribution along the coast, different pathways of exposure to contaminants (trophic level), commonly caught and consumed by anglers and that are good indicators of mercury, synthetic organics or selenium bioaccumulation. A list of Primary and Secondary target species was developed based on their ability to fulfill the above requirements (Table 4 and 5 of the BOG Coastal QAPP 2009 pages 92-95). Each sample was made up of five individuals of one fish species that were all within 75% total length of the largest individual. A total of five species were collected for each zone. Five additional fish were collected that maybe outside the 75% rule. These additional fish were collected for two of the five species that were analyzed as individuals for a length to mercury tissue concentration regression. For more detailed information reference the BOG Coastal QAPP 2009 pages 63-69.

Physical parameters were collected for each fish, which included: weight, total length, fork length, sex and presence of any abnormalities. The fish were tagged with a unique number, wrapped in aluminum foil, placed in a zipper-closure bag and stored on dry ice for the duration of the trip. Samples were stored at the MPSL/DFG lab freezer until they were processed for authorized analysis, per appropriate SOP's. Analysis authorization dictates tissue compositing and analysis (QA/QC requirements-preservatives, aliquoting, etc.).

1.6 Discussion

The absence of target fish and bad weather were the major problems encountered during sampling. A great deal of effort was given to collect complete composites of Primary target species. Multiple efforts were made to locate target species by talking to local fisherman and researching habitat

avored by target species. Sample composites size and fish species were altered to complete zones that lacked Primary target species.

1.7 Results

Fish tissue samples were collected at twenty-eight out of thirty-two zones authorized. Eight zones were merged into four zones due to the lack of access. North Santa Barbara County Coast (Zone 28) and Pismo Beach Area (Zone 29) were merged. Also merged, were Cambria/Cayucos Coast (Zone 34) and Northern San Luis Obispo County Coast (Zone 35), South Sonoma Coast (Zone 56) merged with North Sonoma Coast (Zone 56) and Big Sur Coast (Zone 36) merged with Southern Monterey County Coast (Zone 37).

1.8 Description of Sample Collection Stations

Multiple CDFG/MPSL teams sampled the authorized zones. Descriptions and maps of sample collection for all zones, effort per zone, and species sampled are linked to table 1.8.1 below.

Map Legend: Green (fish collected) Red (no fish collected)
 Circle (hook and line), Square (otter trawl), Triangle (pole spear), Hexagon (net)
 Star (Trap)

1.8.1 Table of Contents for effort in Central and Northern California Coastal/Harbor Zones

Zone Name (Number)	Page	Zone Name (Number)	Page
North Santa Barbara County Coast/Pismo Beach Area (Zone 28)	5	Elkhorn Slough (Zone 41)	15
Port San Luis Area (Zone 30)	6	Santa Cruz Area Wharfs/Beachs (Zone 42)	16
Diablo Canyon Coast (Zone 31)	7	Santa Cruz Coast Area (Zone 43)	17
Morro Bay Coast (Zone 32)	8	Pillar Point Harbor (Zone 46)	18
Morro Bay (Zone 33)	9	Bodega Harbor (Zone 54)	19
Cambria/Cayucos Coast/Northern San Luis Obispo County Coast (Zone 34)	10	South Sonoma Coast/North Sonoma Coast (Zone 56)	20
Southern Monterey County Coast/Big Sur Coast (Zone 36)	11	Point Arena Area (Zone 57)	21
Carmel Coast (Zone 38)	12	Mendocino Coast Area (Zone 58)	22
Monterey/Pacific Grove Coast (Zone 39)	13	Fort Bragg Area (Zone 59)	23
Moss Landing/Marina Coast (Zone 40)	14	North Mendocino County Coast Area (Zone 60)	24

Zone Name (Number)	Page	Zone Name (Number)	Page
Shelter Cove Area (Zone 61)	25	North Humboldt County Coast Area (Zone 66)	29
Cape Mendocino Area/Eureka (Zone 62)	26	Del Norte Coast (Zone 67)	30
Humboldt Bay (Zone 64)	27	Crescent City Offshore (Zone 68)	31
Trinidad Area (Zone 65)	28	Crescent City Harbor (Zone 69)	32

References

Bonnema, A. 2009. Quality Assurance Project Plan: Screening Study of Bioaccumulation on the California Coast. Moss Landing Marine Labs. Prepared for SWAMP BOG, 53 pages plus appendices and attachments.



Station Name and Code: North Santa Barbara County Coast/Pismo Beach Area, 31028NSBC (Zone 28)

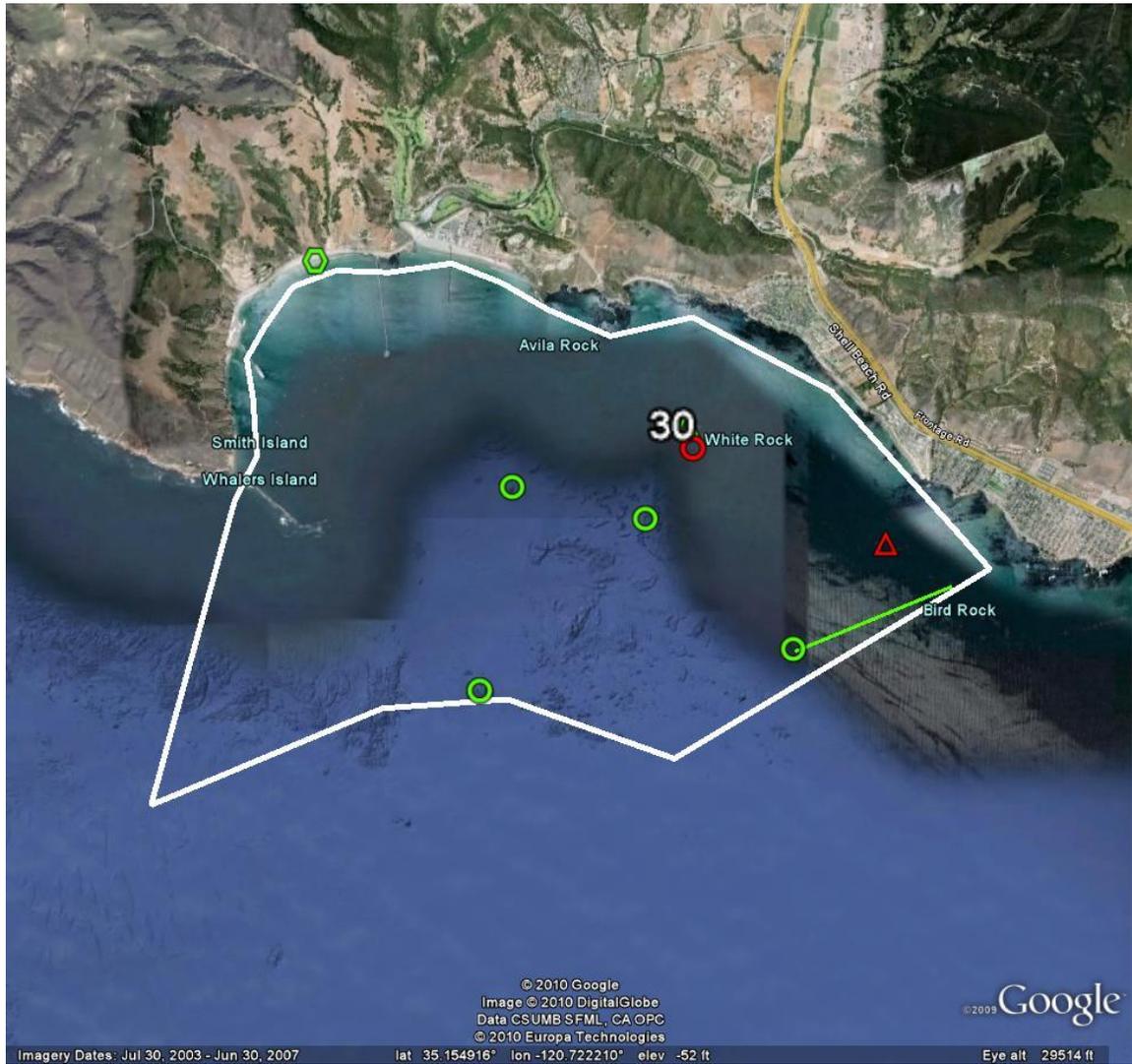
Date (s) of Collection: June 28-29 and July 7, 2010

Collection Method: Traps and Hook and Line

Fish Collected: Black Rockfish (1 Fish), Blue Rockfish (5 Fish), Brown Rockfish (10 Fish), Copper Rockfish (2 Fish), Gopher Rockfish (9 Fish), Starry Rockfish (5 Fish), Vermillion Rockfish (9 Fish), Cabezon (1 Fish) and Lingcod (3 Fish).

Comments: Multiple drifts were performed during the hook and line effort.

[Back to table](#)



Station Name and Code: Port San Luis Area, 31030PTSL (Zone 30)

Date (s) of Collection: June 28-29 and July 7, 2010

Collection Method: Traps and Hook and Line

Fish Collected: Barred Surfperch (8 Fish), Black and Yellow Rockfish (1 Fish), Brown Rockfish (13 Fish), Copper Rockfish (7 Fish), Gopher Rockfish (14 Fish), Kelp Greenling (1 Fish), Rainbow Surfperch (3 Fish) and Treefish (3 Fish).

Comments: Multiple drifts were performed during the hook and line effort.

[Back to table](#)



Station Name and Code: Diablo Canyon Coast, 31031DIAB (Zone 31)

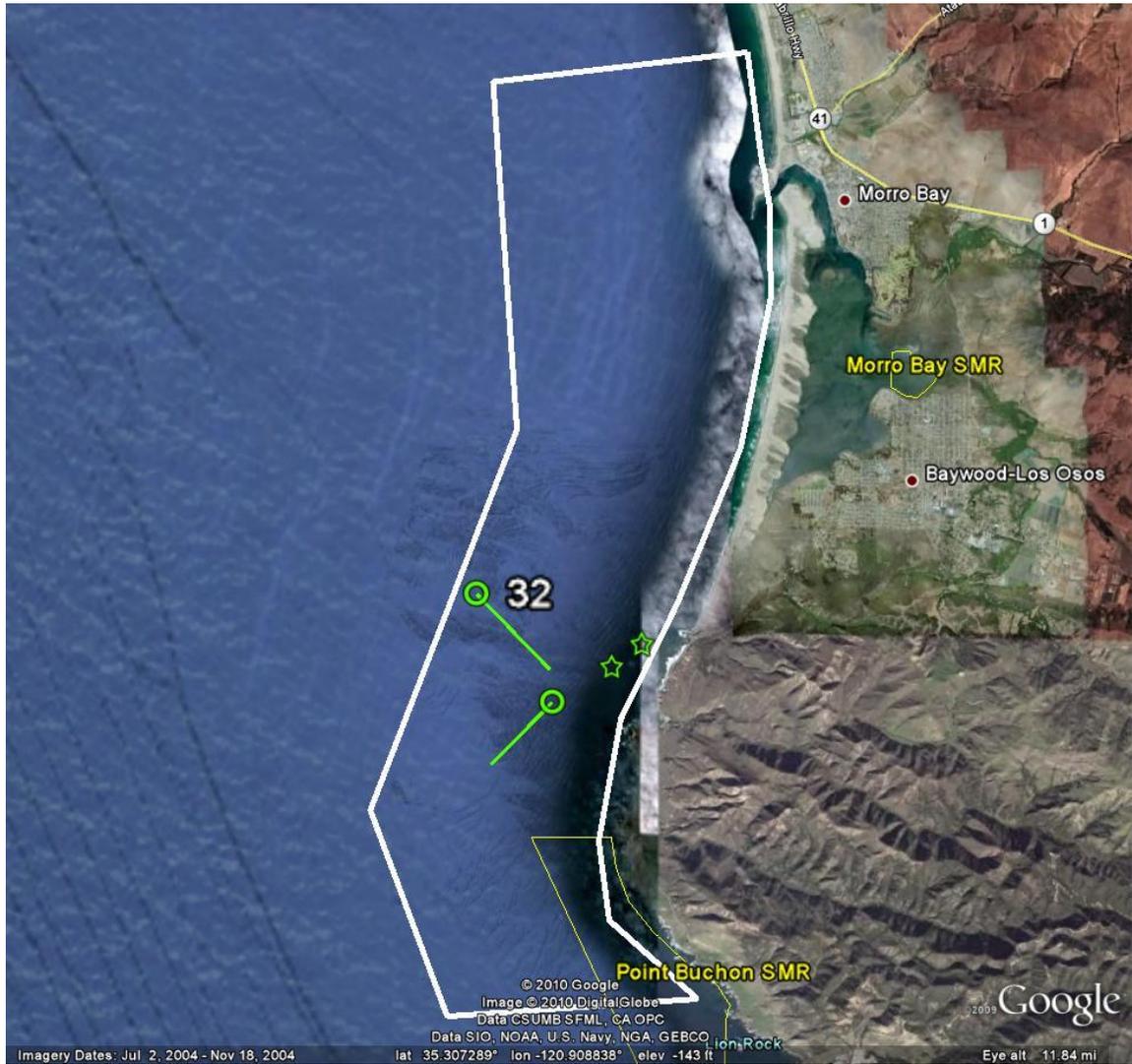
Date (s) of Collection: May 17, June 24 and Sept 10, 2010

Collection Method: Spear

Fish Collected: Black and Yellow Rockfish (5 Fish), Blue Rockfish (10 Fish), Gopher Rockfish (10 Fish), Kelp Rockfish (5 Fish), Pile Surfperch (3 Fish) and Rainbow Surfperch (5 Fish).

Comments: Multiple dives were performed at each location.

[Back to table](#)



Station Name and Code: Morro Bay Coast, 31032MRBC (Zone 32)

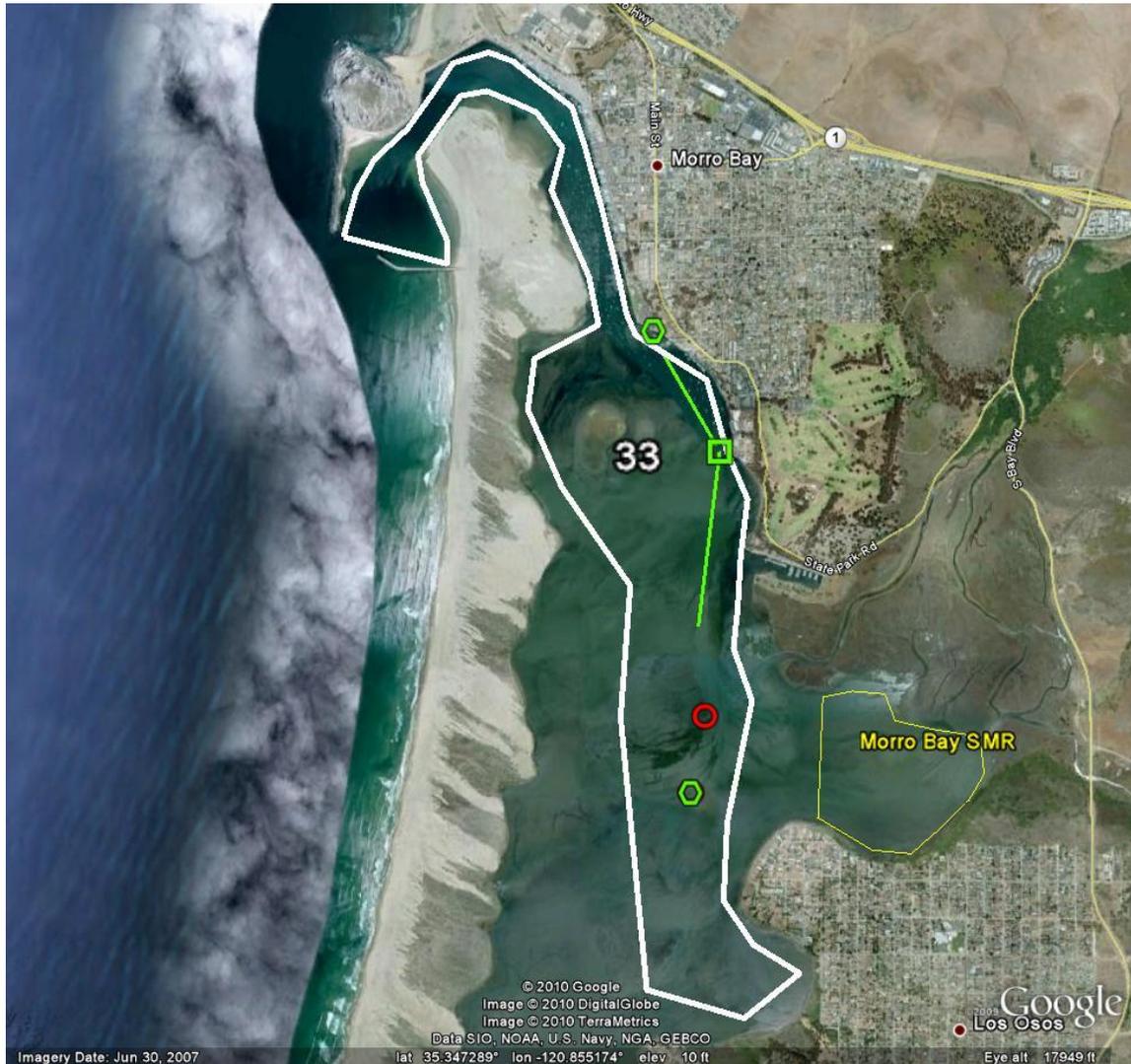
Date (s) of Collection: June 30 and July 6, 2010

Collection Method: Traps and Hook and Line

Fish Collected: Black and Yellow Rockfish (1 Fish), Cabezon (5 Fish), Copper Rockfish (1 Fish), Gopher Rockfish (10 Fish), Kelp Greenling (1 Fish), Lingcod (1 Fish), Olive Rockfish (5 Fish), Pacific Sanddab (3 Fish), Rosy Rockfish (8 Fish) and Vermillion Rockfish (7 Fish).

Comments: Multiple drifts were performed during the hook and line effort.

[Back to table](#)



Station Name and Code: Morro Bay, 31033MRRB (Zone 33)

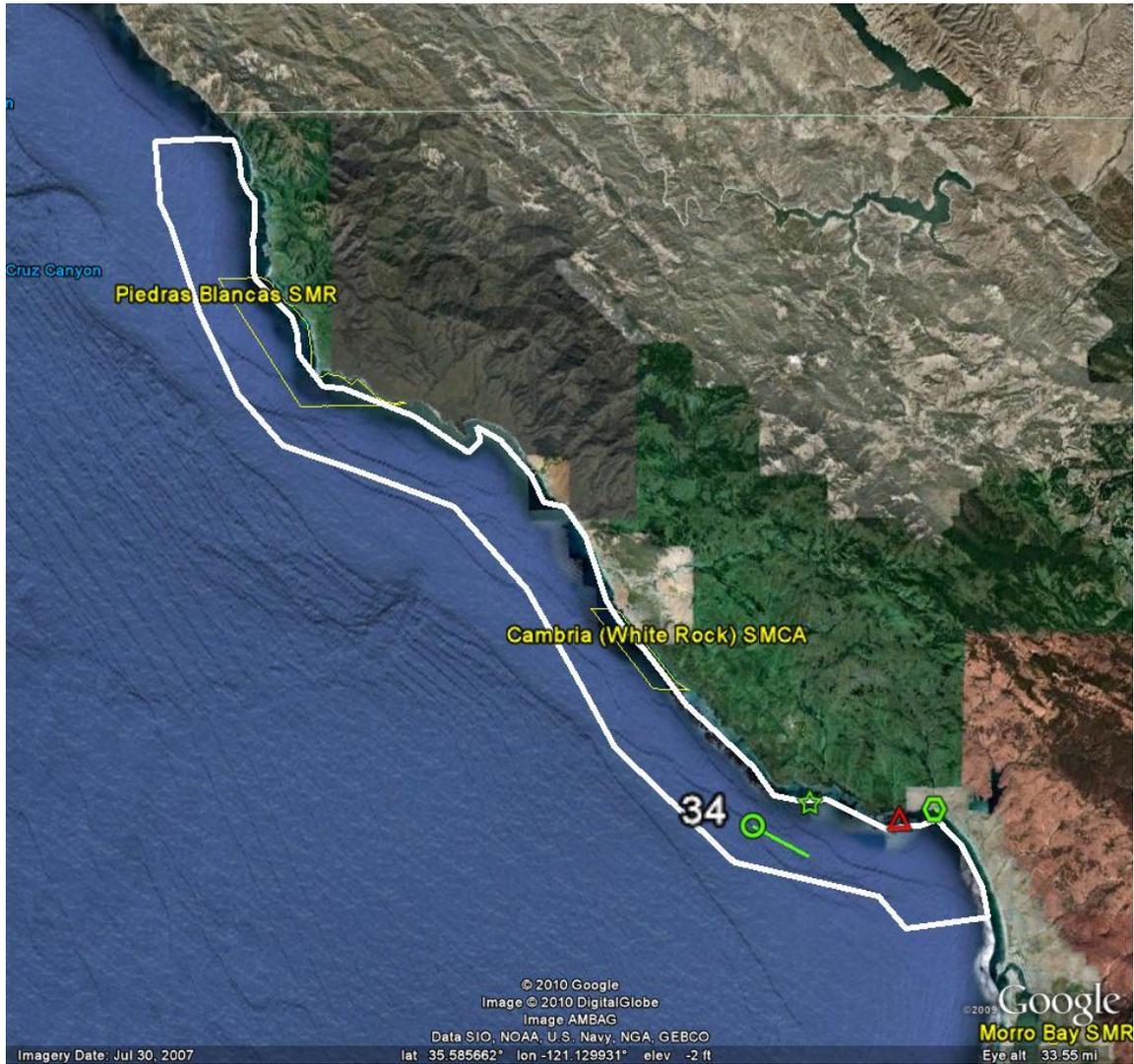
Date (s) of Collection: June 30, July 8, 27 and Sept 21, 2010

Collection Method: Trawl and nets

Fish Collected: Bat Ray (6 Fish), Leopard shark (9 Fish), Pile Surfperch (10 Fish), Rainbow Surfperch (11 Fish), rubberlip surfperch (2 Fish), Shiner Surfperch (40 Fish) and Starry Flounder (1 Fish).

Comments: Multiple trawls were performed at each trawl location.

[Back to table](#)



Station Name and Code: Cambria/Cayucos Coast/Northern San Luis Obispo County Coast, 31034CAMB (Zone 34)

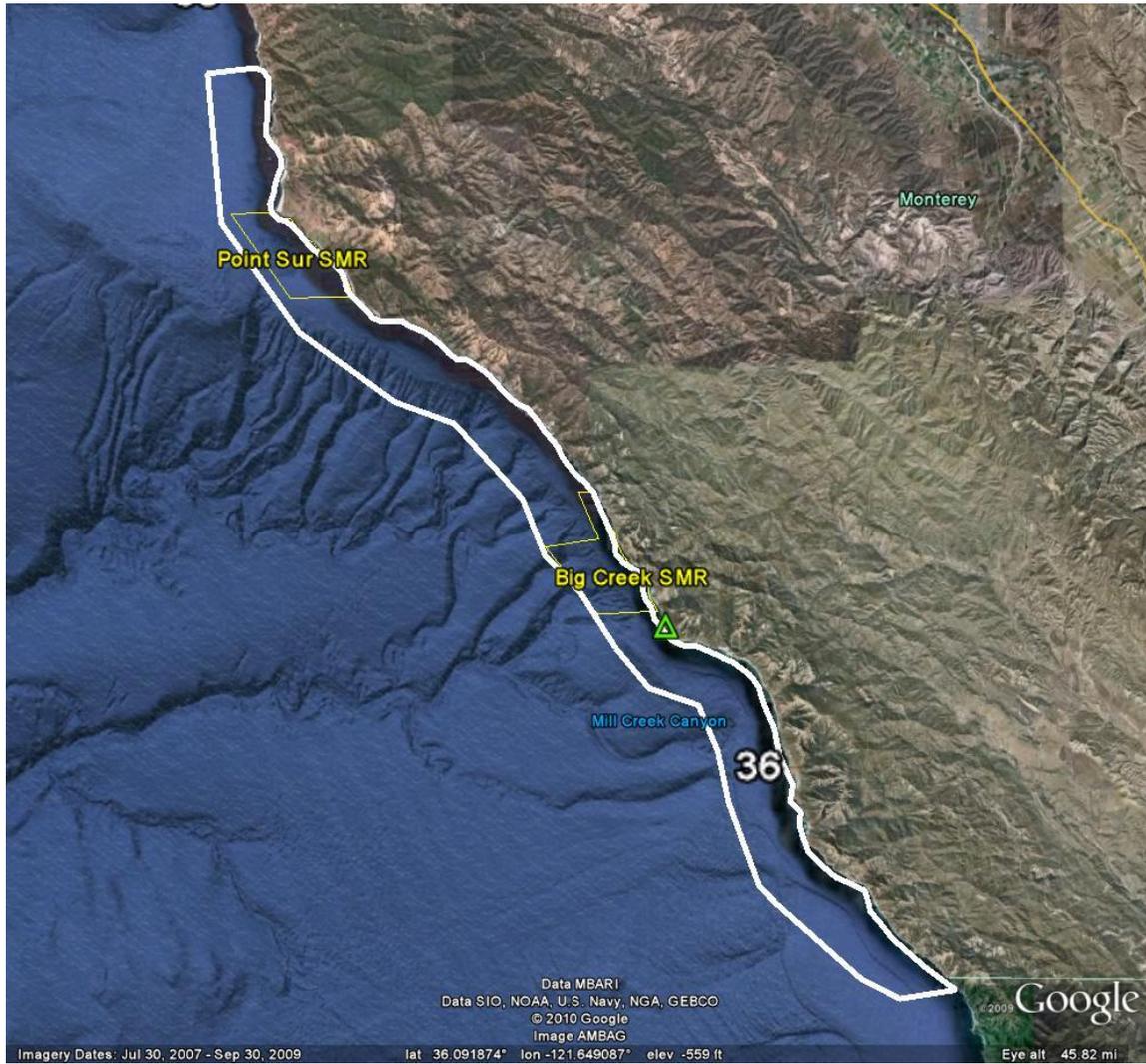
Date (s) of Collection: July 8, 28 and Sept 21, 2010

Collection Method: Hook and Line, Traps, spear and nets

Fish Collected: Barred Surfperch (18 Fish), Blue Rockfish (2 Fish), Cabezon (5 Fish), Gopher Rockfish (10 Fish), Kelp Greenling (5 Fish), Starry Rockfish (5 Fish) and Vermillion Rockfish (3 Fish).

Comments: Multiple drifts were performed during hook and line efforts.

[Back to table](#)



Station Name and Code: Southern Monterey County Coast/Big Sur Coast, 30836SMYC
(Zone 36)

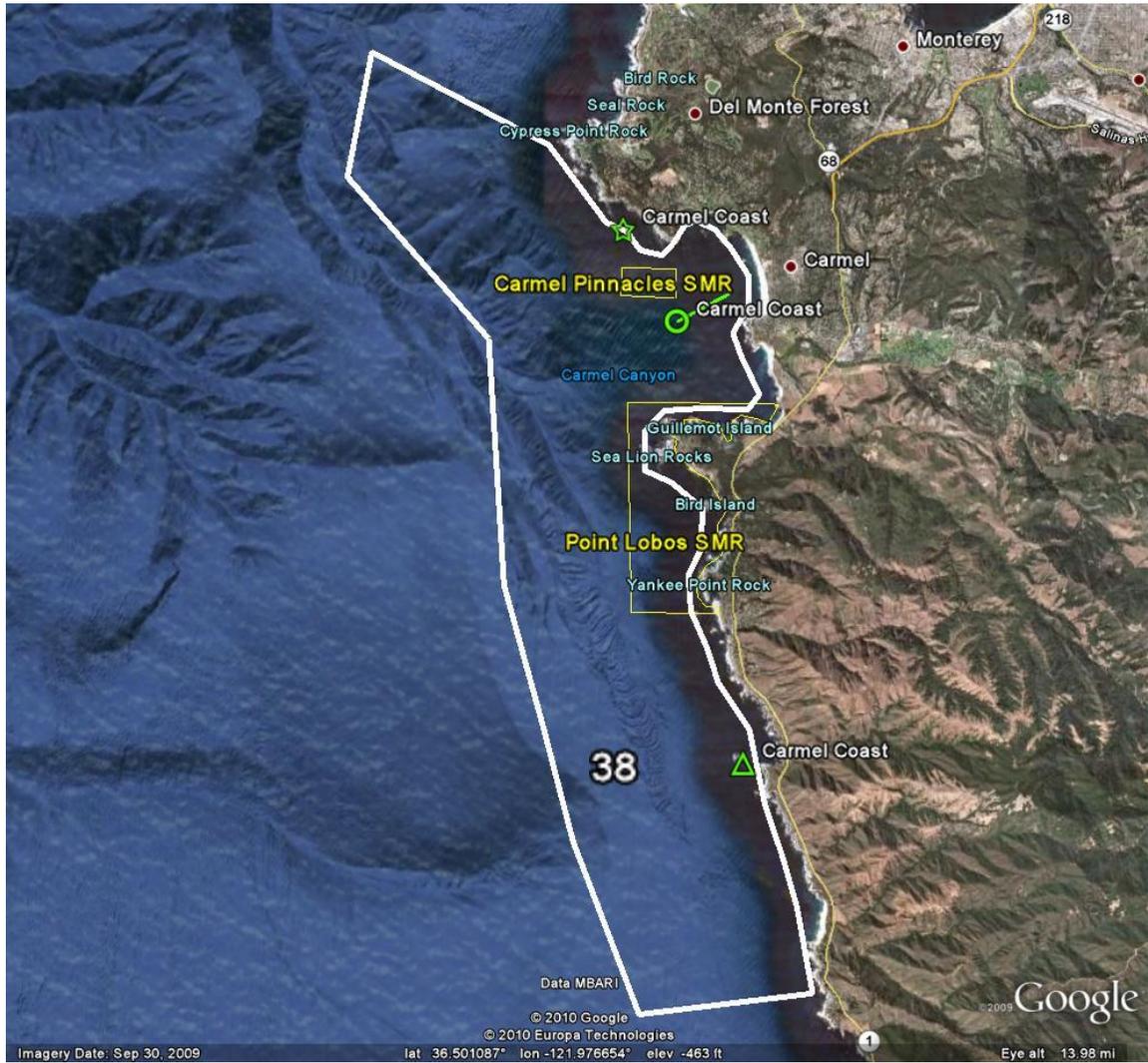
Date (s) of Collection: Aug 11-12, 2010

Collection Method: Spear

Fish Collected: Blue Rockfish (10 Fish), Brown Rockfish (5 Fish), Olive Rockfish (10 Fish), Rainbow Surfperch (5 Fish) and Vermillion Rockfish (5 Fish).

Comments: Multiple dives were performed at dive site.

[Back to table](#)



Station Name and Code: Carmel Coast, 30838CARM (Zone 38)

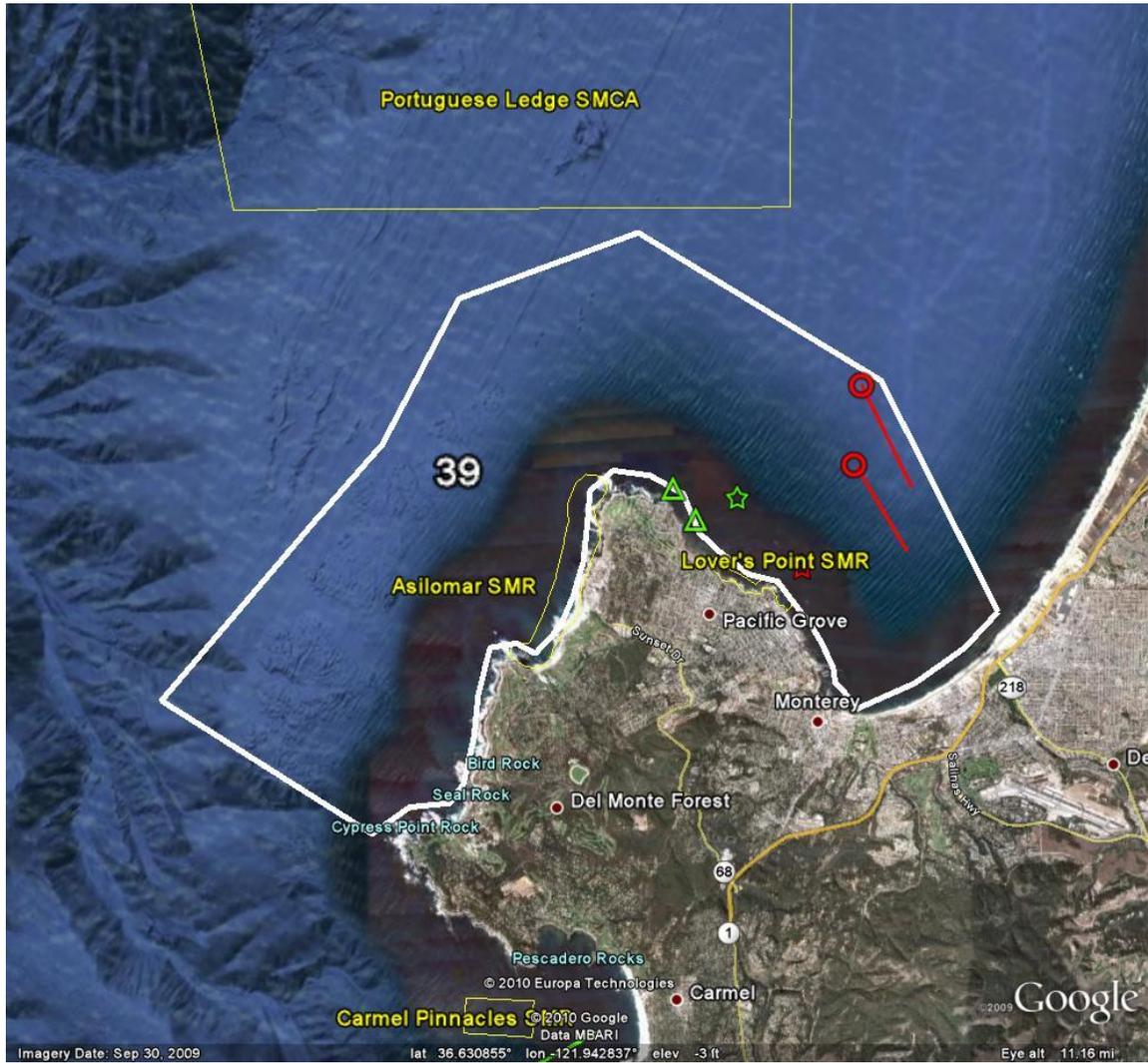
Date (s) of Collection: Jul 7 and Oct 20, 2010

Collection Method: Spear, trap and hook and line

Fish Collected: Blue Rockfish (11 Fish), Cabezon (5 Fish), Gopher Rockfish (5 Fish), Grass Rockfish (3 Fish), Lingcod (5 Fish), Olive Rockfish (10 Fish), Rainbow Surfperch (4 Fish) and Vermillion Rockfish (4 Fish).

Comments: Multiple dives and drifts were performed at each location.

[Back to table](#)



Station Name and Code: Monterey/Pacific Grove Coast, 30939MYPG (Zone 39)

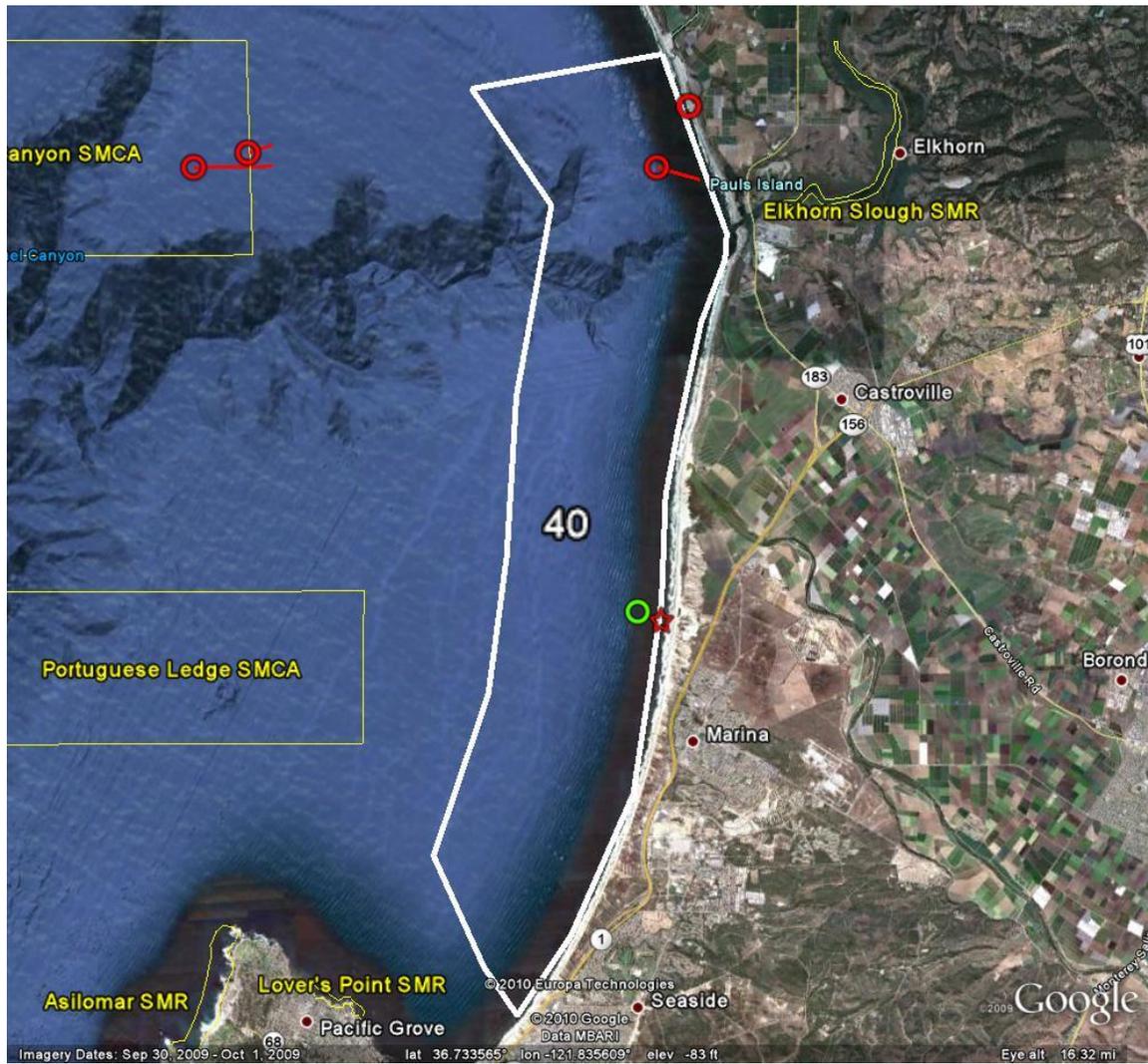
Date (s) of Collection: Jul 7 and Oct 20, 2010

Collection Method: Spear, trap and Hook and line

Fish Collected: Black Rockfish (9 Fish), Blue Rockfish (10 Fish), Gopher Rockfish (5 Fish), Kelp Rockfish (5 Fish), Pile Surfperch (4 Fish) and Rainbow Surfperch (5 Fish).

Comments: Multiple dives and drifts were performed at each location.

[Back to table](#)



Station Name and Code: Moss Landing Coast/Marina Coast, 30940MLMC (Zone 40)

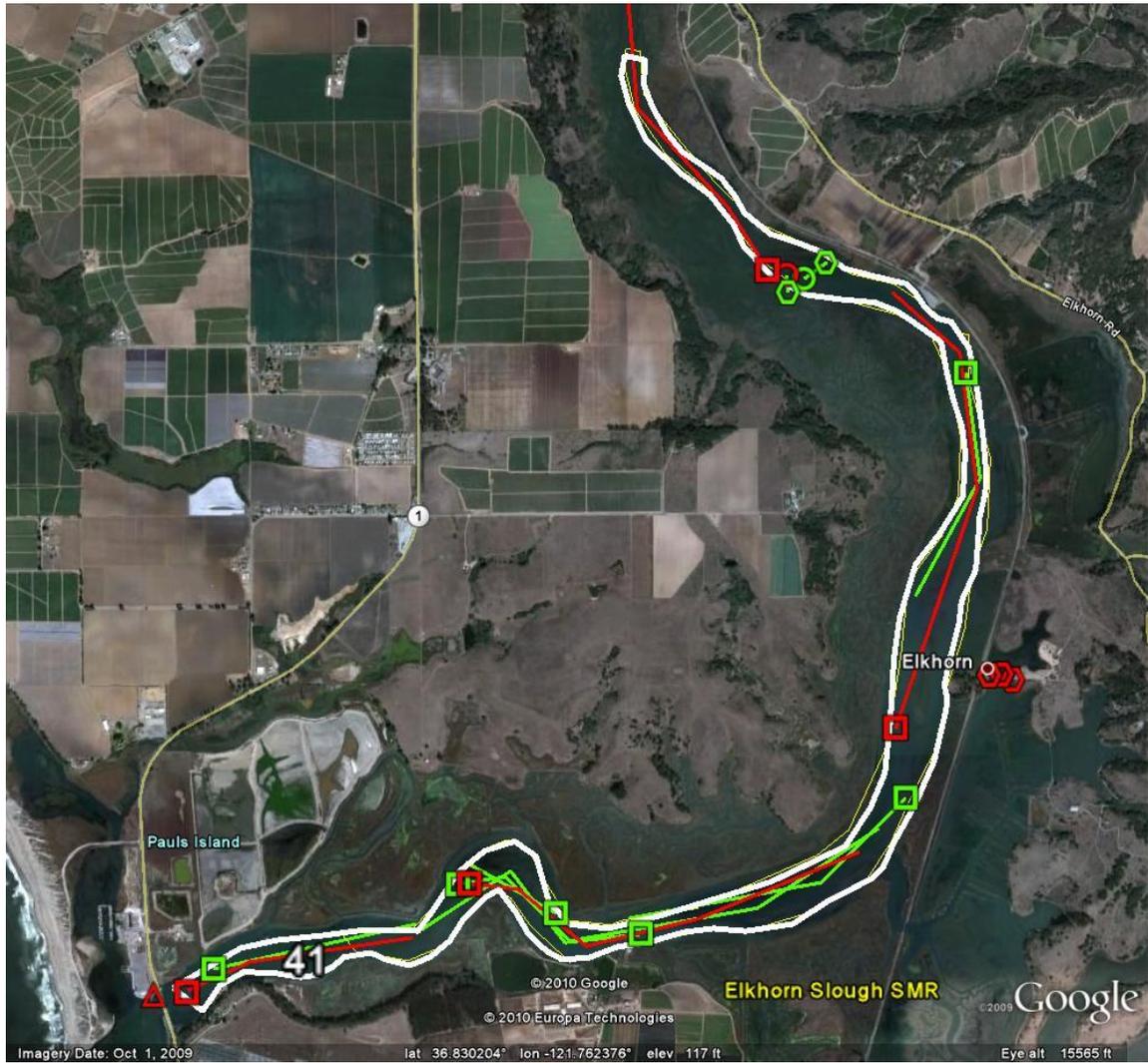
Date (s) of Collection: April 7-8, Jun 16, 17 and Jul 27, 2010

Collection Method: Trap, Hook and line

Fish Collected: Black and Yellow Rockfish (4 Fish), Black Rockfish (9 Fish), Brown Rockfish (4 Fish), China Rockfish (6 Fish) and Gopher Rockfish (10 Fish).

Comments: Multiple drifts were performed at each location.

[Back to table](#)



Station Name and Code: Elkhorn Slough, 30641ELKS (Zone 41)

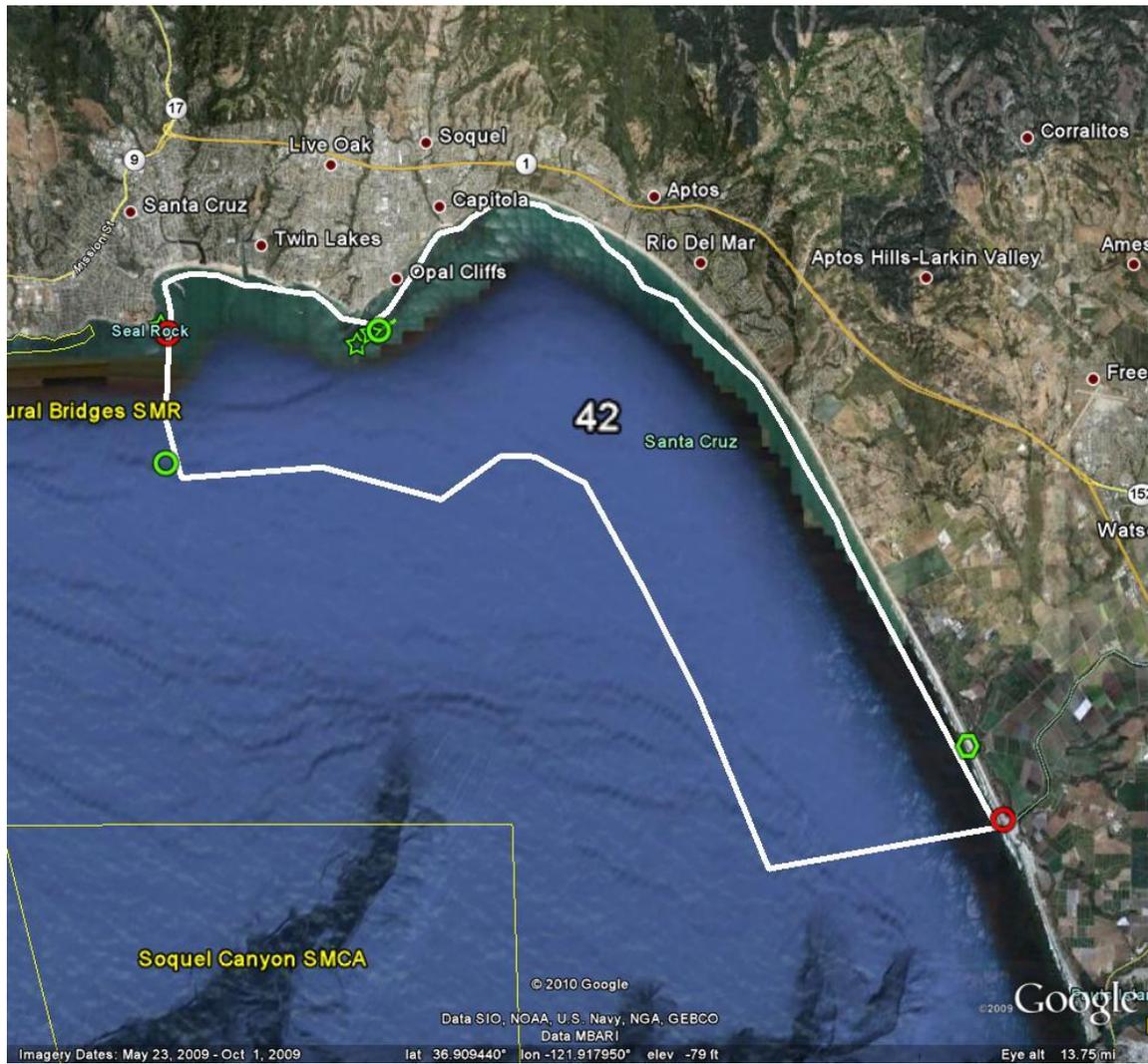
Date (s) of Collection: Jul 1-2, 27, Aug 24 and Sept 28 2010

Collection Method: Trawl, Hook and line, spear and nets

Fish Collected: Bat Ray (11 Fish), Kelpfish (3 Fish), Leopard shark (9 Fish), Shiner Surfperch (38 Fish) and Top Smelt (24 Fish).

Comments: Multiple Trawls were performed at each location.

[Back to table](#)



Station Name and Code: Santa Cruz Area Wharfs/Beaches, 30442SCWB (Zone 42)

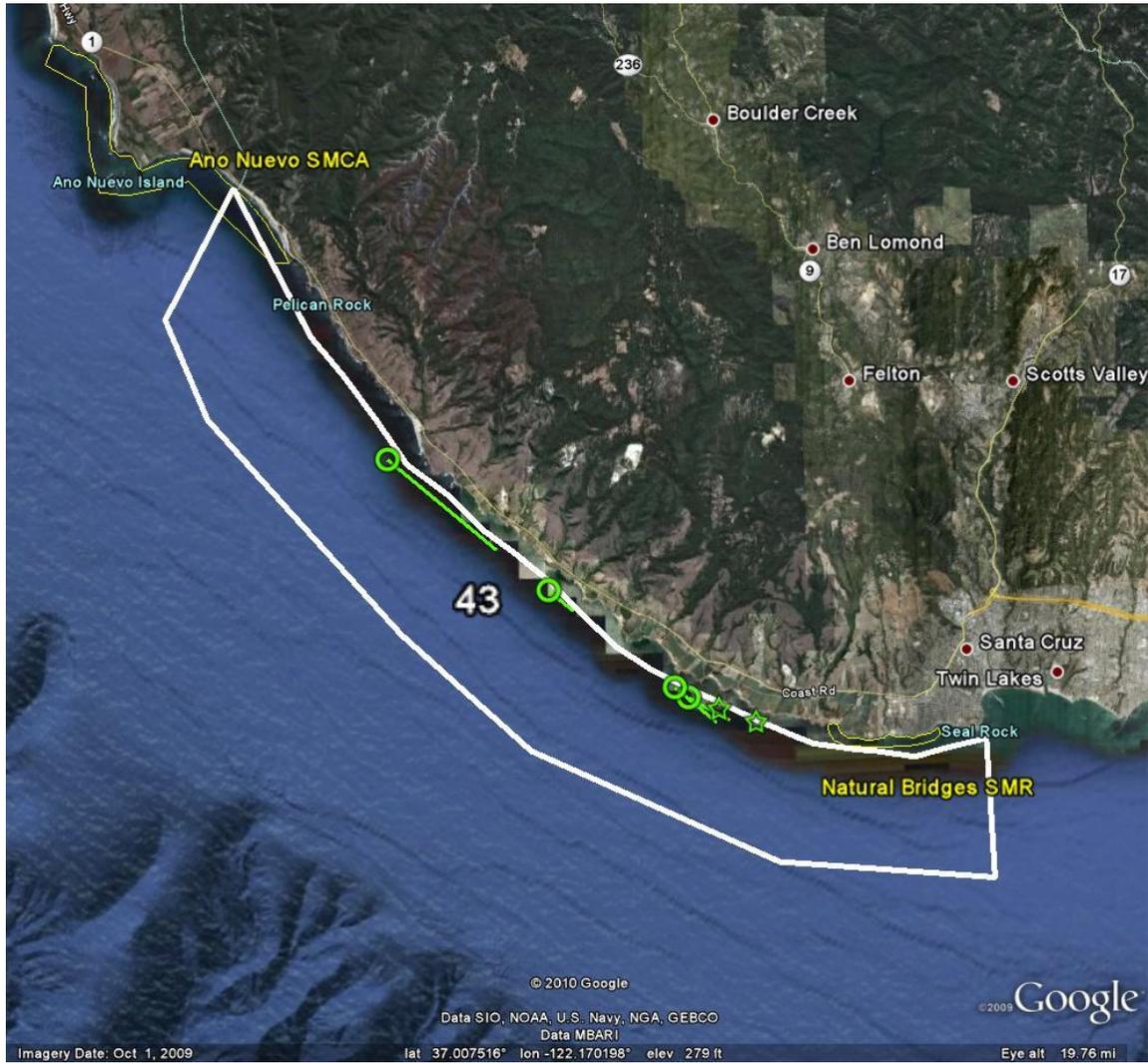
Date (s) of Collection: Jun 8-9, Oct 4 and Nov 2 2010

Collection Method: Traps, nets and hook and line

Fish Collected: Barred Surfperch (1 Fish), Black Perch (1 Fish), Cabezon (5 Fish), Copper Rockfish (4 Fish), Gopher Rockfish (7 Fish), Kelp Greenling (3 Fish), Lingcod (5 Fish), Pacific Sanddab (2 Fish) and White Croaker (10 Fish).

Comments: Multiple drifts were performed at each location.

[Back to table](#)



Station Name and Code: Santa Cruz Coast Area, 30443SCCA (Zone 43)

Date (s) of Collection: Jun 9, 14, 17 and Sept 8 2010

Collection Method: Traps and hook and line

Fish Collected: Black and Yellow Rockfish (2 Fish), Black Rockfish (13 Fish), Blue Rockfish (11 Fish), Cabezon (4 Fish), Gopher Rockfish (3 Fish), Greenspotted Rockfish (7 Fish), Kelp Greenling (5 Fish), Lingcod (4 Fish) and White Croaker (11 Fish).

Comments: Multiple drifts were performed at each location.

[Back to table](#)



Station Name and Code: Pillar Point Harbor, 20246PPTH (Zone 46)

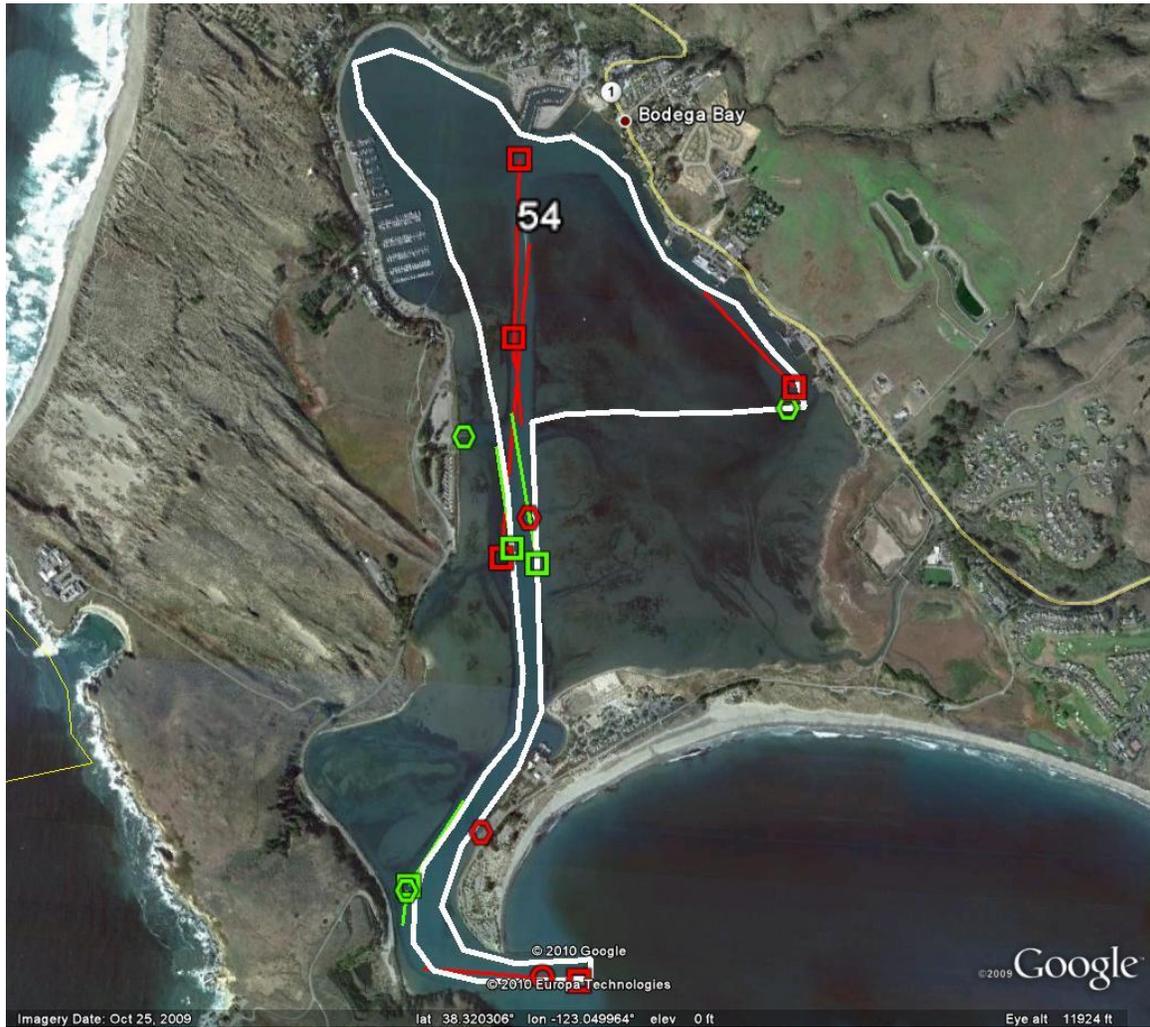
Date (s) of Collection: Oct 26, 2010

Collection Method: Nets and hook and line

Fish Collected: No fish collected

Comments: This zone was sampled in year one, another attempt was given during year two's work.

[Back to table](#)



Station Name and Code: Bodega Harbor, 11554BDGA (Zone 54)

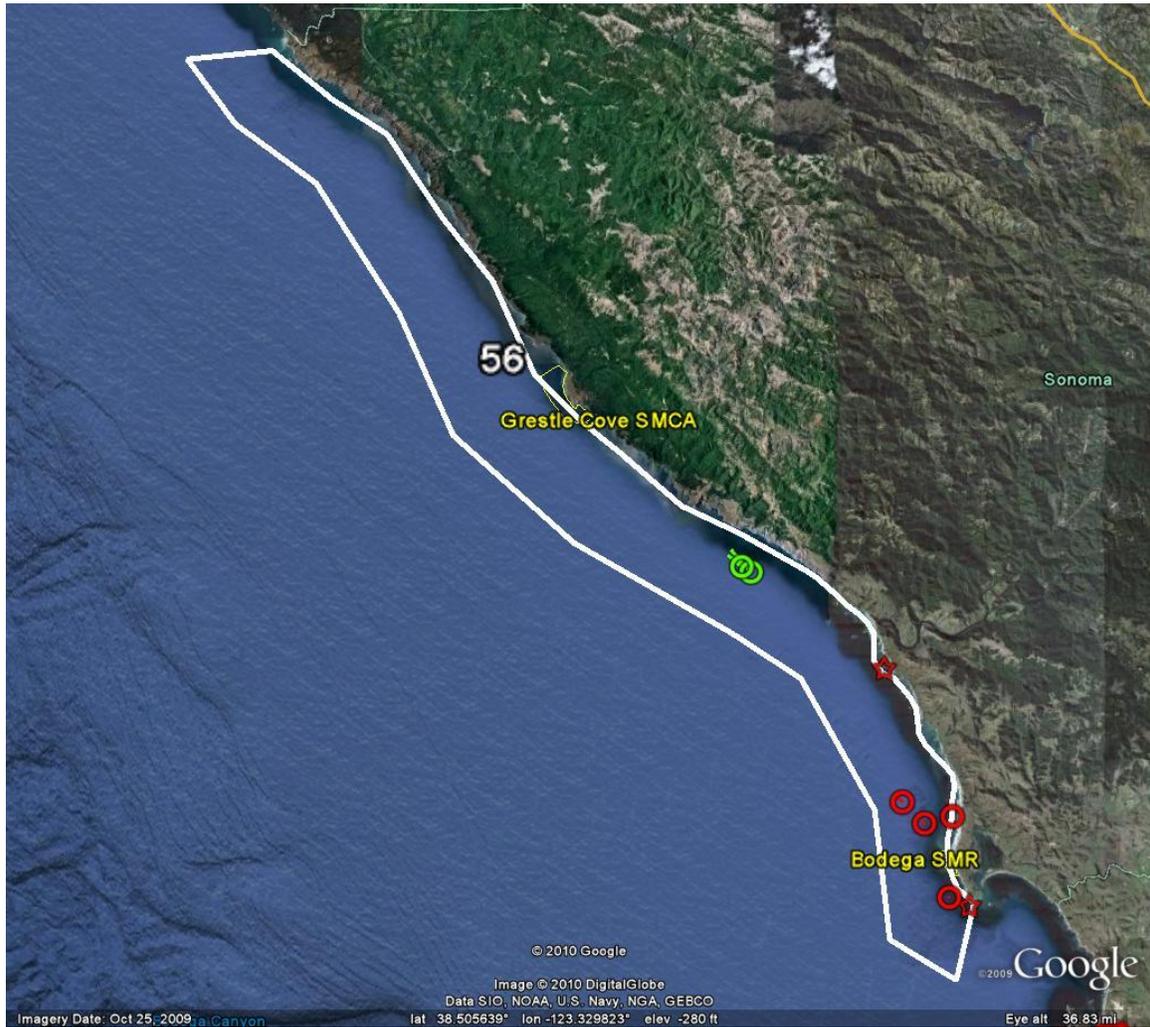
Date (s) of Collection: Jul 13 and Aug 17-18, 2010

Collection Method: Nets, trawl and hook and line

Fish Collected: Blue Rockfish (1 Fish), California Halibut (1 Fish), Leopard shark (6 Fish), Pacific Angel Shark (2 Fish), Pile Surfperch (1 Fish), Rainbow Surfperch (4 Fish), Shiner Surfperch (1 Fish) and White Surfperch (1 Fish).

Comments: Multiple trawls were performed at each location.

[Back to table](#)



Station Name and Code: South Sonoma Coast/North Sonoma Coast, 11356NSNC
(Zone 56)

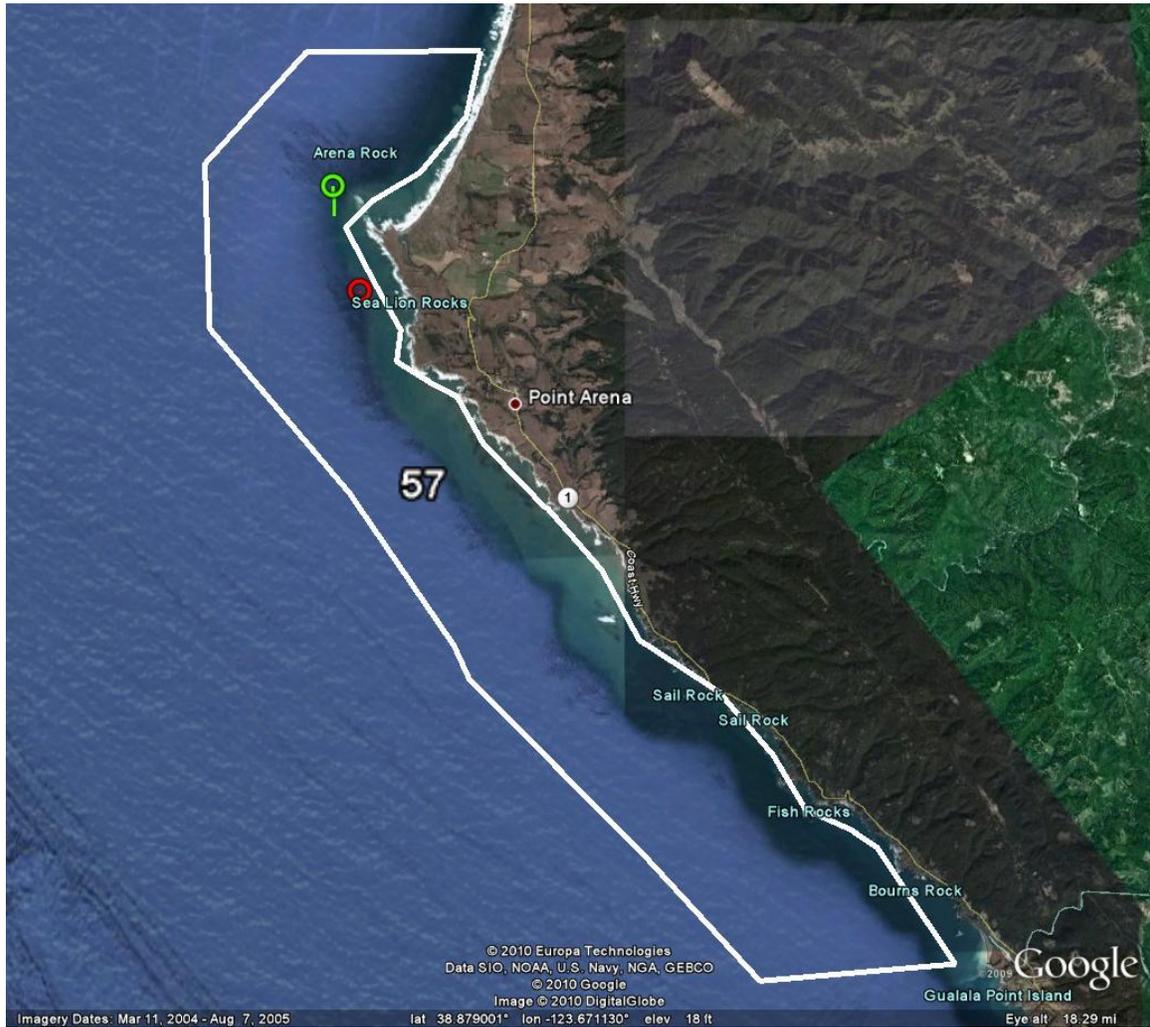
Date (s) of Collection: Jul 12-13, 2010

Collection Method: Hook and line and traps

Fish Collected: Blue Rockfish (7 Fish), Brown Rockfish (10 Fish), Copper Rockfish (7 Fish), Olive Rockfish (13 Fish) and Vermillion Rockfish (5 Fish).

Comments: Multiple drifts were performed at each location.

[Back to table](#)



Station Name and Code: Point Arena Area, 11357PTAR (Zone 57)

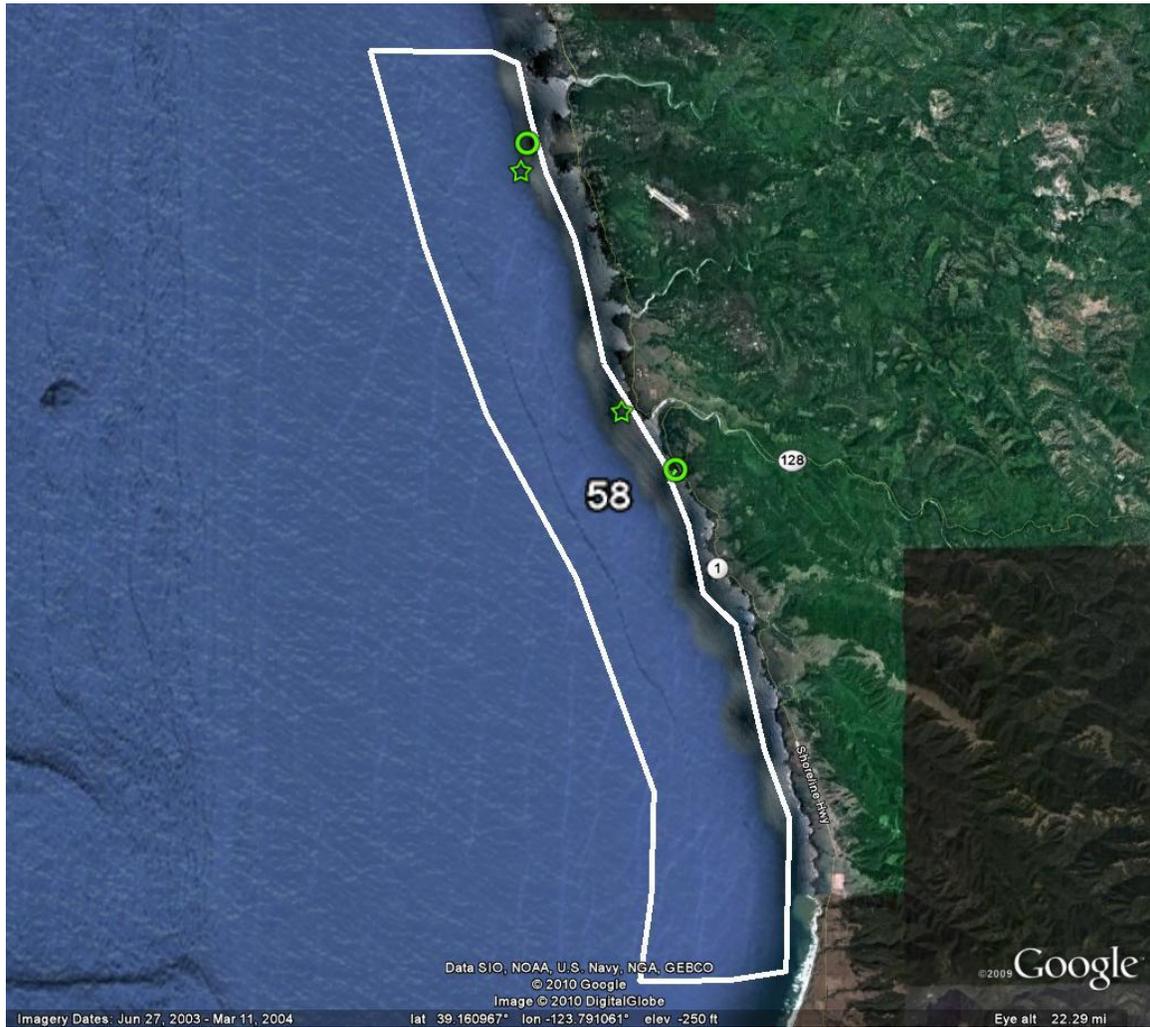
Date (s) of Collection: Aug 17-18, 2010

Collection Method: Hook and line

Fish Collected: Black Rockfish (5 Fish), Blue Rockfish (10 Fish), Cabezon (4 Fish), China Rockfish (5 Fish), Gopher Rockfish (5 Fish), Lingcod (5 Fish) and Olive Rockfish (11 Fish).

Comments: Multiple drifts were performed at each location.

[Back to table](#)



Station Name and Code: Mendocino Coast Area, 11358MENC (Zone 58)

Date (s) of Collection: Jun 3, Jul 26 and Aug 16, 2010

Collection Method: Hook and line and trap

Fish Collected: Black Rockfish (9 Fish), Blue Rockfish (11 Fish), Cabezon (5 Fish), Copper Rockfish (1 Fish), Lingcod (5 Fish), Olive Rockfish (2 Fish), Quillback Rockfish (1 Fish), Rosy Rockfish (7 Fish), Vermillion Rockfish (5 Fish) and Yellowtail Rockfish (4 Fish).

Comments: Multiple drifts were performed at each location.

[Back to table](#)



Station Name and Code: Fort Bragg Area, 11359FTBG (Zone 59)

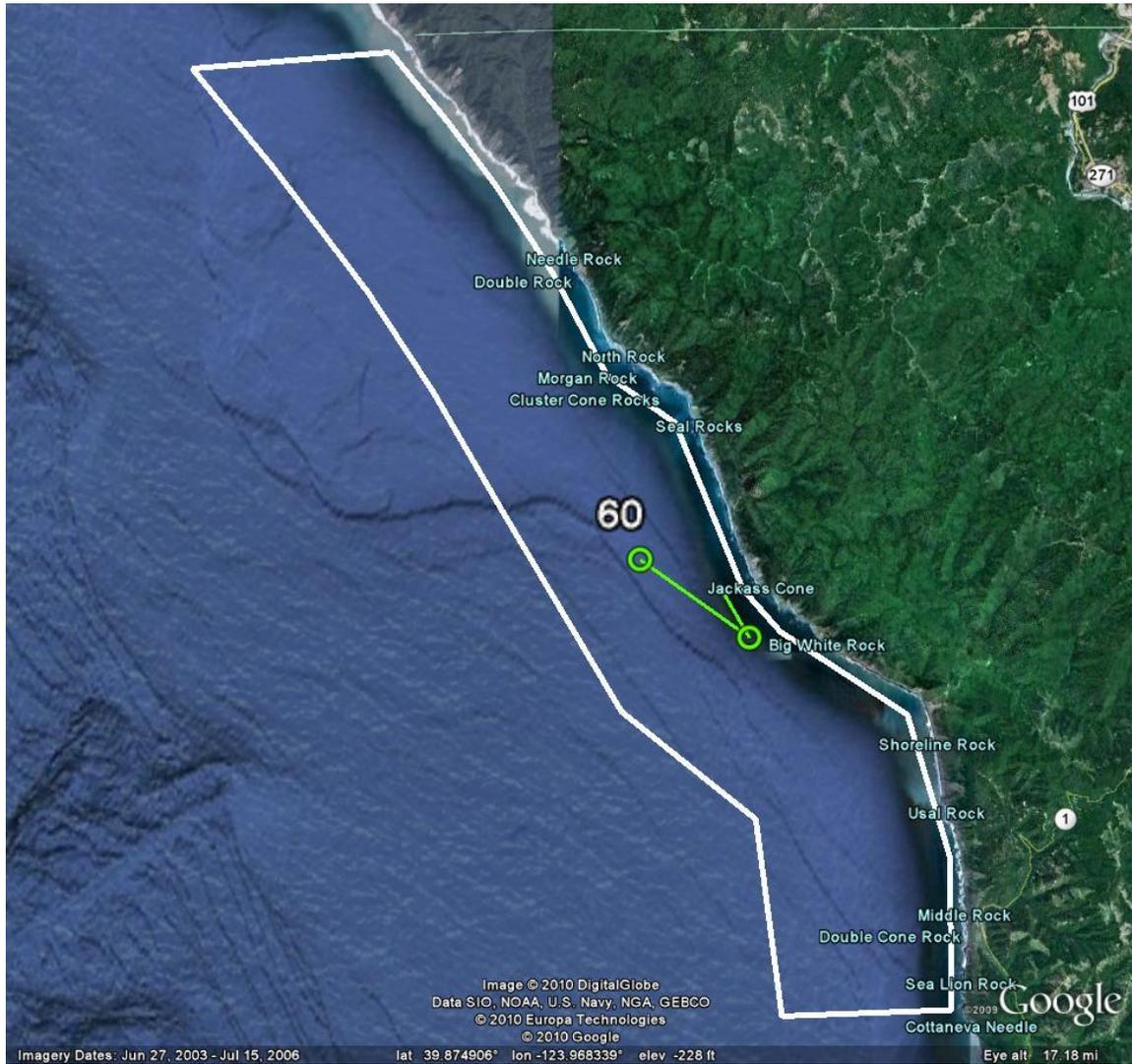
Date (s) of Collection: Jun 2-3 and Jul 26, 28, 2010

Collection Method: Hook and line and trap

Fish Collected: Black Rockfish (8 Fish), Blue Rockfish (8 Fish), Cabezon (5 Fish), Gopher Rockfish (3 Fish), Lingcod (1 Fish) and Vermillion Rockfish (5 Fish).

Comments: Multiple drifts were performed at each location.

[Back to table](#)



Station Name and Code: North Mendocino County Coast Area, 11360NMCC (Zone 60)

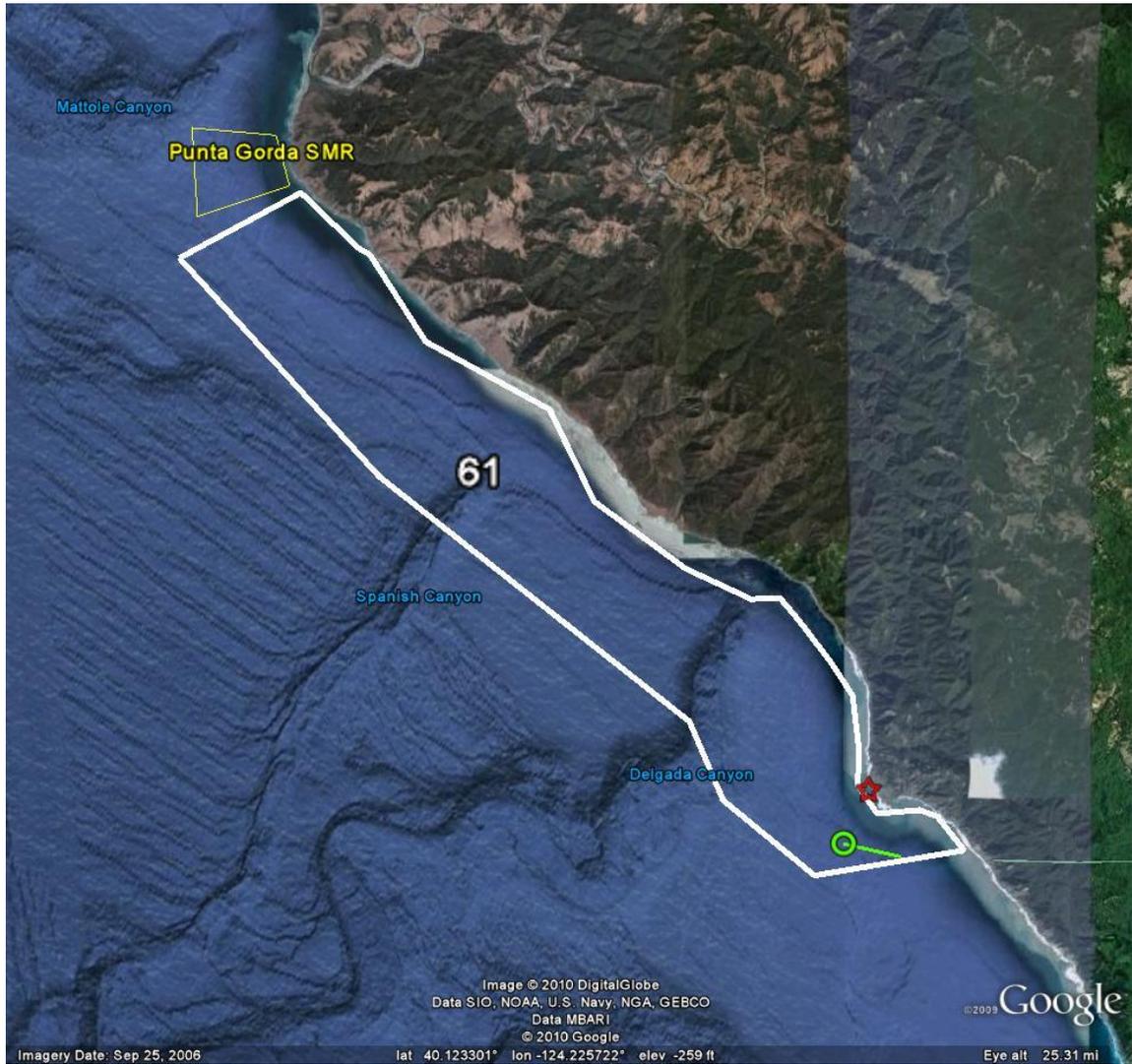
Date (s) of Collection: Jul 27 and Aug 9, 2010

Collection Method: Hook and line

Fish Collected: Black Rockfish (10 Fish), Cabezon (3 Fish), China Rockfish (5 Fish), Copper Rockfish (10 Fish), Lingcod (1 Fish) and Vermillion Rockfish (3 Fish).

Comments: Multiple drifts were performed at each location.

[Back to table](#)



Station Name and Code: Shelter Cove, 11261SHLC (Zone 61)

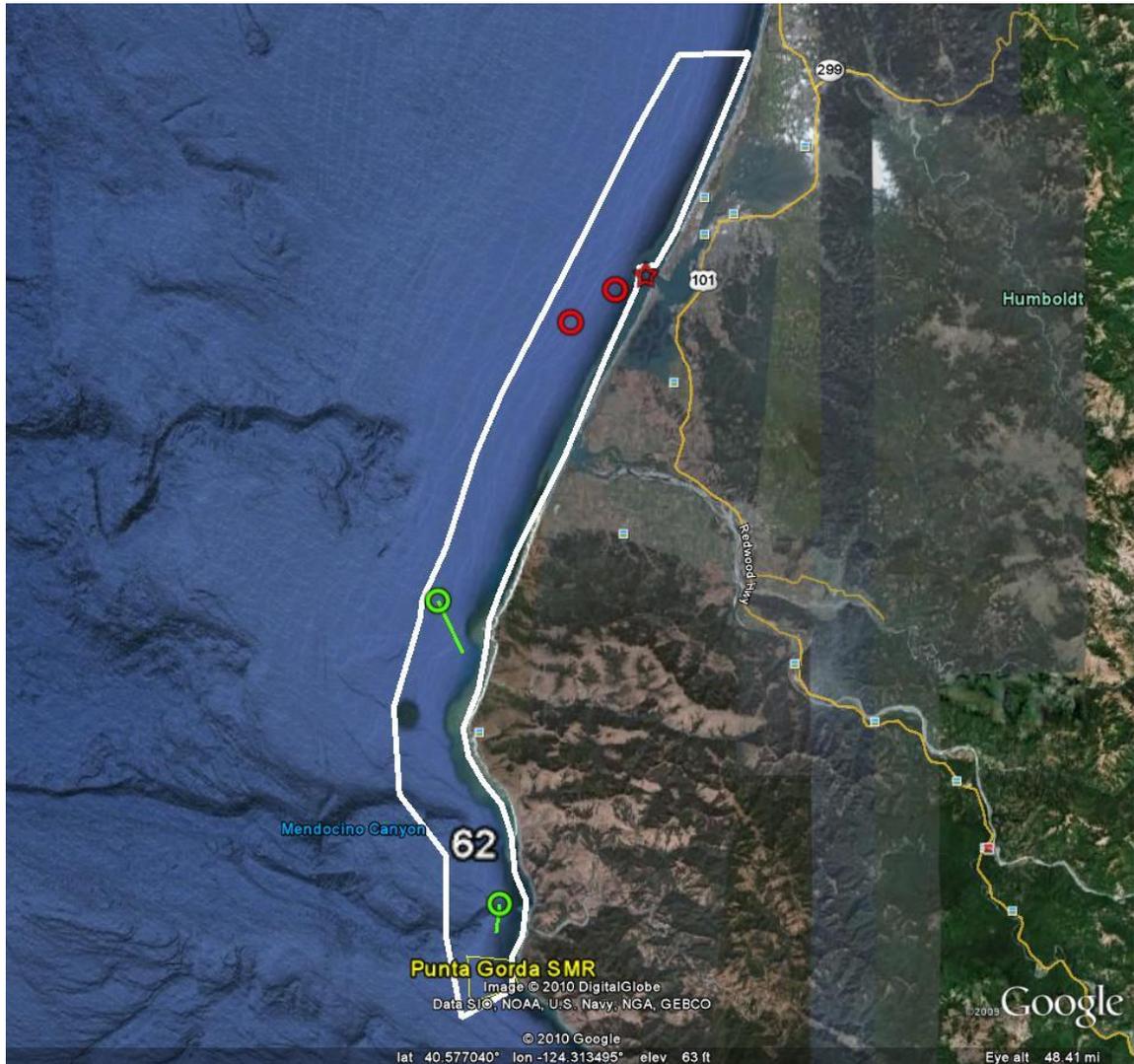
Date (s) of Collection: Aug 9 and 11, 2010

Collection Method: Hook and line and trap

Fish Collected: Black Rockfish (10 Fish), Blue Rockfish (10 Fish), China Rockfish (5 Fish), Copper Rockfish (5 Fish), Gopher Rockfish (3 Fish), Kelp Greenling (3 Fish), Lingcod (2 Fish), Olive Rockfish (2 Fish), Rosy Rockfish (3 Fish) and Vermillion Rockfish (5 Fish).

Comments: Multiple drifts were performed at each location.

[Back to table](#)



Station Name and Code: Cape Mendocino Area, 11262CMEN (Zone 62)

Date (s) of Collection: May 17-18 and Aug 10, 2010

Collection Method: Hook and line and trap

Fish Collected: Black Rockfish (11 Fish), Blue Rockfish (10 Fish), Cabezon (3 Fish), China Rockfish (5 Fish), Copper Rockfish (4 Fish), Kelp Greenling (2 Fish), Lingcod (5 Fish) and Quillback Rockfish (3 Fish).

Comments: Multiple drifts were performed at each location.

[Back to table](#)



Station Name and Code: Humbolt Bay, 11064HIMB (Zone 64)

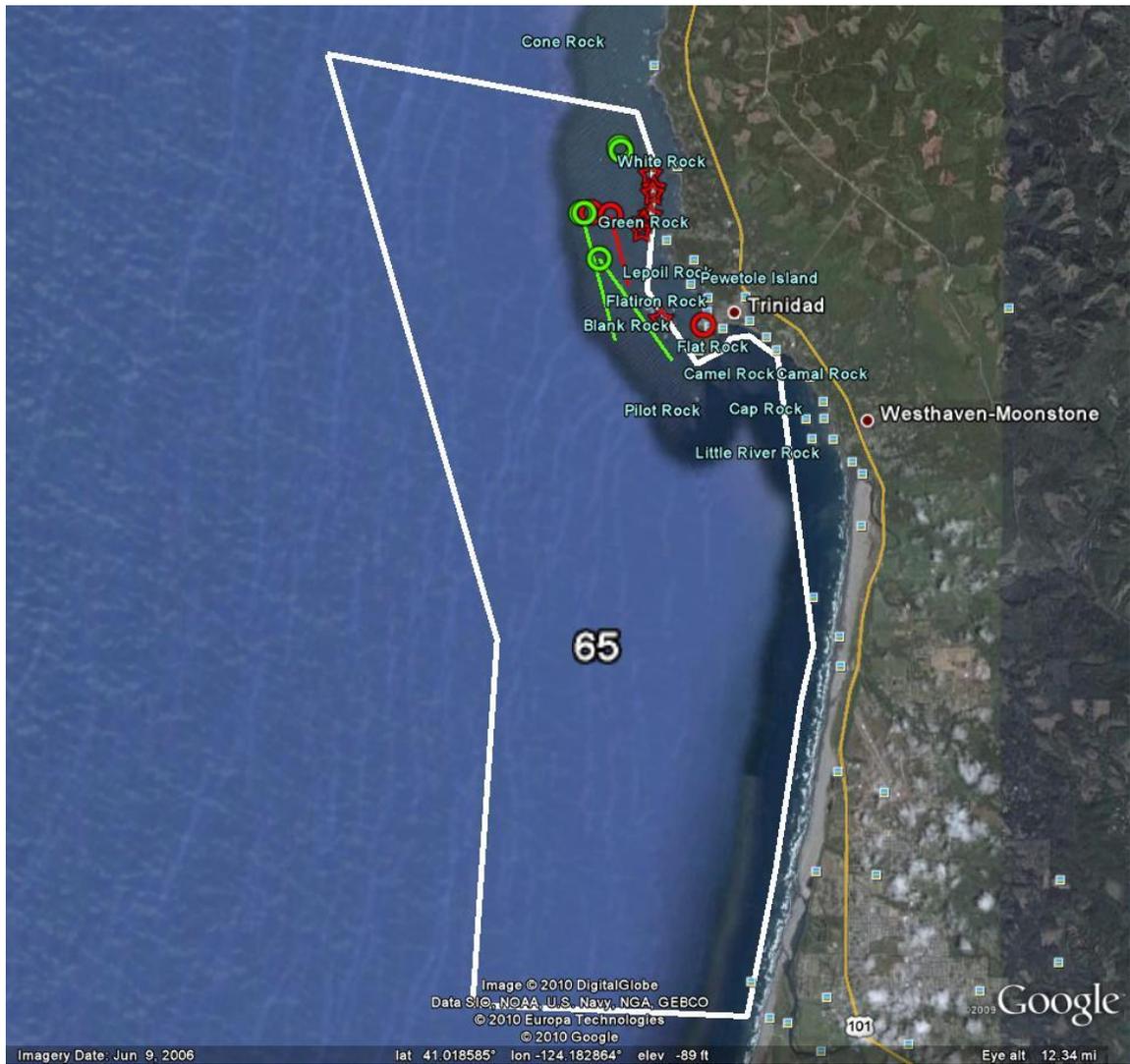
Date (s) of Collection: May 13, 19, Jul 19-21 and Aug 30-31, 2010

Collection Method: Hook and line, trawls, nets and traps

Fish Collected: Bat Ray (3 Fish), California Halibut (2 Fish), Kelp Greenling (3 Fish), Leopard shark (8 Fish), Shiner Surfperch (30 Fish) and Spiny dogfish (1 Fish).

Comments: Multiple drifts and trawls were performed at each location.

[Back to table](#)



Station Name and Code: Trinidad Area, 10865TRIN (Zone 65)

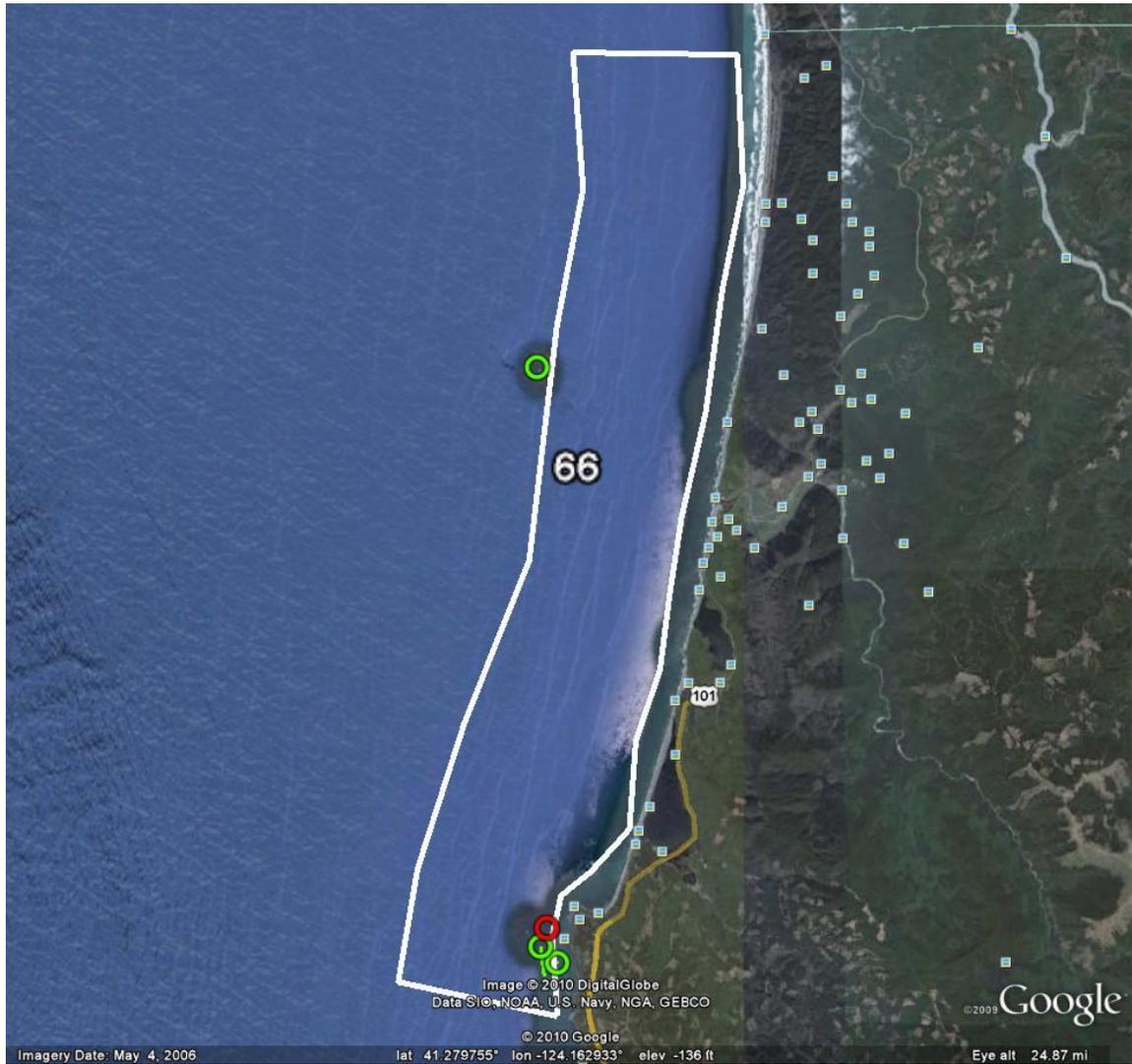
Date (s) of Collection: Aug 17-19 and 24-25, 2010

Collection Method: Hook and line and traps

Fish Collected: Black Rockfish (10 Fish), Blue Rockfish (5 Fish), Cabezon (1 Fish), Copper Rockfish (1 Fish), Kelp Greenling (1 Fish), Lingcod (5 Fish) and Quillback Rockfish (2 Fish).

Comments: Multiple drifts were performed at each location.

[Back to table](#)



Station Name and Code: North Humboldt County Coast, 10866NHCC (Zone 66)

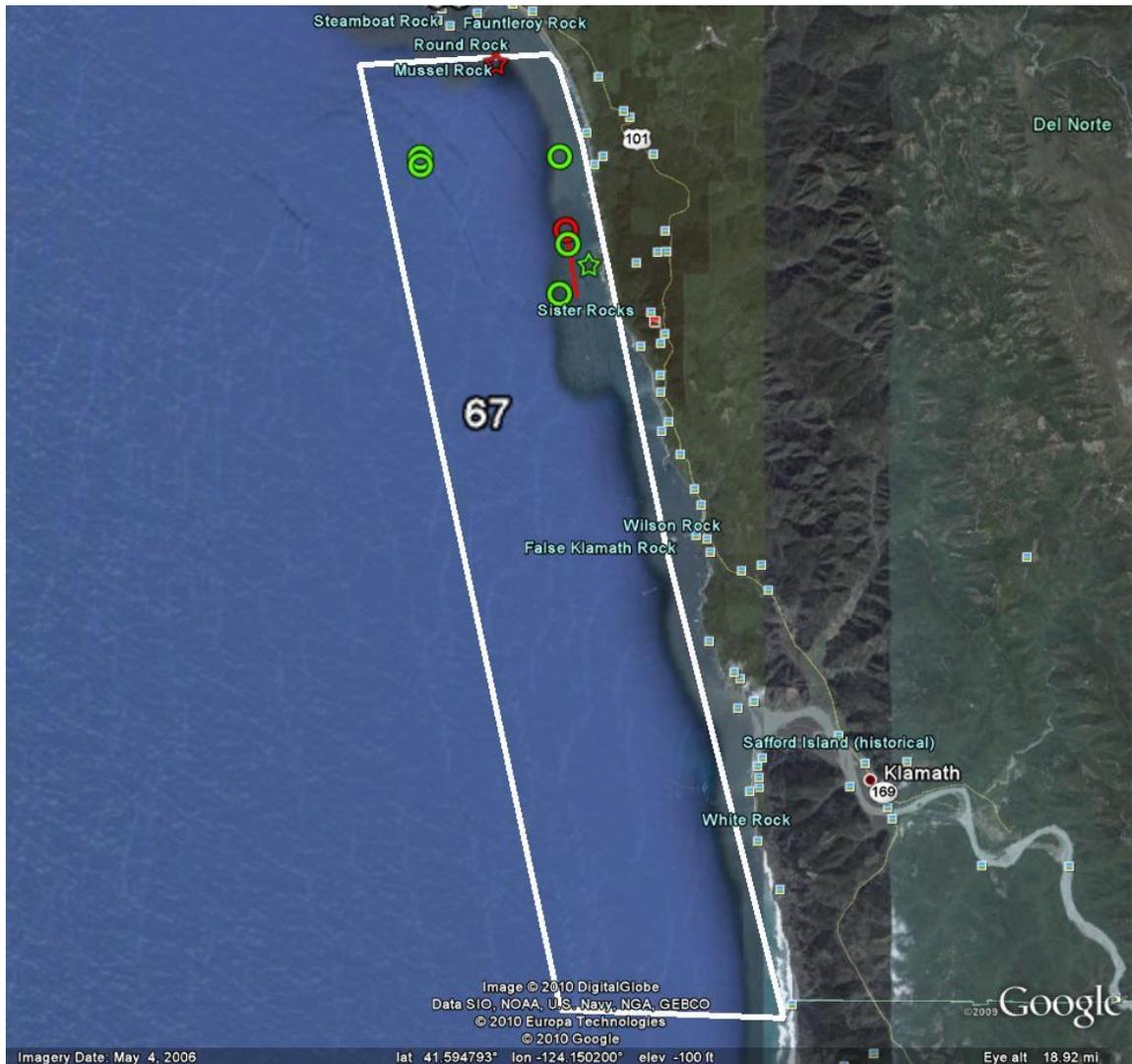
Date (s) of Collection: Aug 17-18 and 24, 2010

Collection Method: Hook and line

Fish Collected: Black Rockfish (10 Fish), Blue Rockfish (10 Fish), Brown Rockfish (1 Fish), Cabezon (3 Fish), Copper Rockfish (4 Fish), Gopher Rockfish (3 Fish), Lingcod (5 Fish), Rosy Rockfish (4 Fish) and Vermillion Rockfish (2 Fish).

Comments: Multiple drifts were performed at each location.

[Back to table](#)



Station Name and Code: Del Norte Coast, 10367DENC (Zone 67)

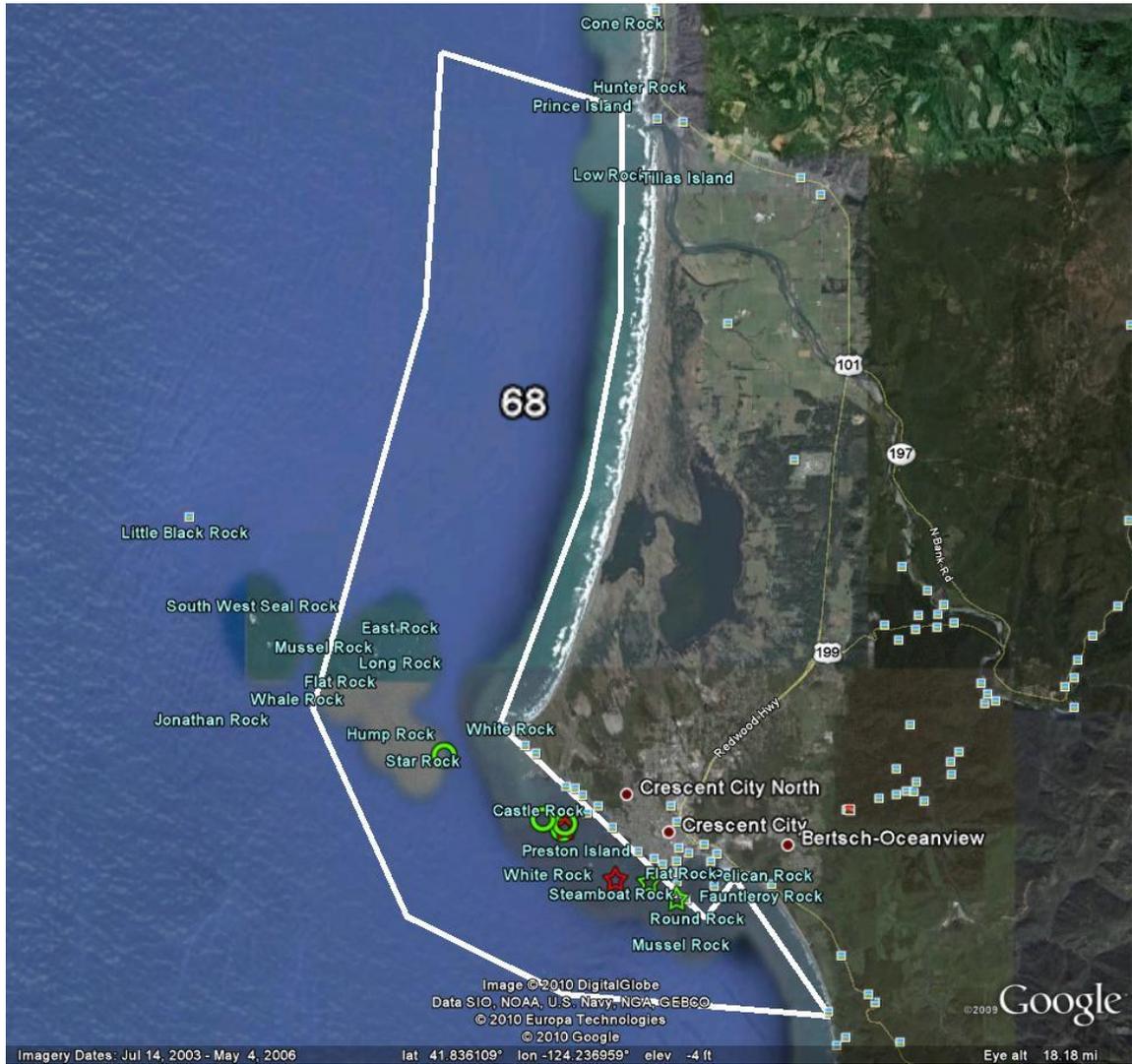
Date (s) of Collection: May 3, 5, 10-12, Aug 31 and Sept 1, 2010

Collection Method: Hook and line and traps

Fish Collected: Black Rockfish (10 Fish), Blue Rockfish (10 Fish), Cabezon (4 Fish), Copper Rockfish (1 Fish), Kelp Greenling (3 Fish), Lingcod (3 Fish), Lingcod (2 Fish), Olive Rockfish (11 Fish) and Yellowtail Rockfish (2 Fish).

Comments: Multiple drifts were performed at each location.

[Back to table](#)



Station Name and Code: Crescent City Coast, 10368CRCC (Zone 68)

Date (s) of Collection: May 4-6 and Aug 31, 2010

Collection Method: Hook and line and traps

Fish Collected: Black Rockfish (15 Fish), Blue Rockfish (8 Fish), Cabezon (4 Fish), Kelp Greenling (4 Fish), Lingcod (4 Fish) and Quillback Rockfish (3 Fish).

Comments: Multiple drifts were performed at each location.

[Back to table](#)



Station Name and Code: Crescent City Harbor, 10369CCHA (Zone 69)

Date (s) of Collection: May 11 and Jul 19, 2010

Collection Method: Traps and nets

Fish Collected: Shiner Surfperch (3 Fish)

Comments: Multiple attempts were made at each location.

[Back to table](#)