

# Cruise Report for the Surface Waters Ambient Monitoring Program (SWAMP) Bioaccumulation Monitoring Program

## **A SECOND STATEWIDE SURVEY OF BIOACCUMULATION ON THE CALIFORNIA COAST (Complete)**

Sampling Dates: July 15, 2024 - October 11, 2024

Prepared by the Marine Pollution Studies Laboratory (MPSL) at Moss Landing  
Marine Laboratories (MLML), San José State University

### **Introduction**

This report describes the statewide sampling activities in California coastal waters, including major bays and harbors, for long-term monitoring of bioaccumulated contaminants as part of the Surface Water Ambient Monitoring Program (SWAMP) Bioaccumulation Monitoring Program. Bioaccumulation monitoring is a very effective and essential tool for evaluating status and is the most cost-effective tool for evaluating trends for contaminants.











California has over 3,000 miles of coastline that span a diversity of habitats and fish populations, and dense human population centers with a multitude of popular fishing locations. To effectively cover the whole range, coastal waters were broken down into spatial units called zones and the zones were organized into southern, central, and northern regions ([2018 Monitoring Plan](#), Table 3). In each region, primary and secondary indicator species were designated for collection (see [1.1 Objectives](#)). Species to be collected were also defined by whether the zone was offshore or bay/harbor. A few zones were later combined due to accessibility constraints (distance from port) and/or essential fish habitat (present or absent).

The long-term plan was to collect fish in coastal waters statewide every ten years. The first statewide monitoring effort was completed from 2009-2010 ([Report](#)). This second statewide survey began in 2018 and was completed in October 2024. This cruise report covers the third and final year of fish collection efforts for the second statewide coastal survey. For information on the first and second years of fish collection efforts, see the [2018 Cruise Report](#) and [2020 Cruise Report](#), respectively.

## Table of Contents

Introduction .....	1
Table of Contents.....	2
1.0 Cruise Report .....	3
1.1 Objectives.....	3
1.2 MPSL Sampling personnel.....	4
1.3 Authorization to collect samples .....	4
1.4 Station selection .....	4
1.5 Summary of types of samples authorized to be collected .....	4
1.6 Results.....	5
Southern Monterey County Coast (30836SMYC) .....	6
Pacifica Coast (20248PACC) .....	7
San Francisco Coast (20249SSFC) .....	9
Farallon Islands (20150FARI).....	11
Southern Marin Coast (20151SMAC).....	13
Northern Marin Coast (20153NMRC) .....	15
Bodega Harbor (11554BDGA) .....	17
South Sonoma Coast/North Sonoma Coast (11356NSNC) .....	18
Point Arena Area (11357PTAR).....	20
Mendocino Coast Area (11358MENC).....	21
Fort Bragg Area (11359FTBG) .....	23
North Mendocino County Coast Area (11360NMCC).....	25
Shelter Cove Area (11261SHLC).....	27
Cape Mendocino Area (11262CMEN).....	29
Trinidad Area (10865TRIN) .....	30
North Humboldt County Coast Area (10866NHCC).....	32
Del Norte Coast (10367DENC) .....	34
Crescent City Coast (10368CRCC) .....	36
1.7 Discussion.....	38
Acknowledgments.....	38

## Figure Key

Symbol	Description
	successful hook and line
	unsuccessful hook and line
	successful spearfishing
	unsuccessful spearfishing
	successful beach seine or cast net
	unsuccessful beach seine or cast net
	successful fish trap
	unsuccessful fish trap
	marine protected areas (red is most restrictive)
	sampling zone boundaries

## 1.0 Cruise Report

### 1.1 Objectives

Sampling focused on nearshore areas, including bays and estuaries, in waters not exceeding 200 m in depth, and mostly less than 60 m deep. These areas are most often targeted by recreational fishing. Fish species to be collected ([2024 Monitoring Plan](#), Table 6) were prioritized for each region (northern, central, southern) and coast type (offshore, bay/harbor) with number of fish to be collected defined by tissue amount needed for analysis type and relative size of the fish species in general (2024 Monitoring Plan, Table 8).

Fish tissue samples were analyzed as directed by the SWAMP Bioaccumulation Monitoring Program with input from the [Safe to Eat Workgroup](#), including the State Water Resources Control Board (State Water Board) and the nine Regional Water Quality Control Boards, collectively known as the California Water Boards, and the Office of Environmental Health Hazard Assessment. Sample sites were reached by boat or shore, and fish were collected by hook and line, trap, spear fishing and beach seine.

## 1.2 MPSL Sampling personnel

Wesley Heim	Principal Investigator
Autumn Bonnema	Associate Project Director
William Jakl	Research Affiliate, Crew Lead
Scot Lucas	Research Technician, Crew Lead
Gary Ichikawa	Project Assistant
April Sjoboen Guimarães	Research Technician
Keagan Vasconcellos	Project Assistant
Jon Goetzl	Project Assistant
Artemis Mavrakos	Project assistant
Chris DiMaggio	Project assistant

## 1.3 Authorization to collect samples

MPSL personnel were contracted through San José State University Research Foundation (SJSURF) and the State Water Board to conduct the sample collection activities listed herein. The justification to collect samples as described is contained in the 2018 and 2024 Monitoring Plans, including the description of the locations, number of samples and species necessary to be collected at coastal zones.

All work was completed under MPSL scientific collecting permit # S-183470004-20339-002-03 authorized by the California Department of Fish and Wildlife.

## 1.4 Station selection

Eighteen California coastal zones were designated for fish collection in 2024. These zones were what remained to be completed for sampling of the entire coast statewide. Five zones were in the central California region and thirteen in the northern California region (North of Point Reyes). Focus was given to the areas within each zone containing essential fish habitat and that are known to be utilized by recreational anglers.

## 1.5 Summary of types of samples authorized to be collected

Targeted species were determined by what are frequently caught and consumed by anglers in each of the selected sampling locations. Upon collection, each fish was tagged with a unique ID that corresponded to the latitude/longitude where it was collected. Physical parameters collected for each individual fish included: weight, total length, fork length (if fork present), and presence of any abnormalities. Fish samples were stored on dry ice until returned to the laboratory facility, where they were stored in a -20°C freezer until authorized for dissection and analysis.



Details on sampling and analysis, including the description of the locations, number of samples and species necessary to be collected from each zone can be found in Tables 6 and 8 of the 2024 Monitoring Plan.

## 1.6 Results

A detailed fish catch summary can be found below. Maps of all stations are provided showing locations of successful fishing effort and unsuccessful fishing effort. Tables below each figure summarize the species, quantity, and sizes (total length [TL] in mm) of fish caught at each site. The [Table of Contents](#) above indicates on which page collection details for each station can be found.

## Southern Monterey County Coast (30836SMYC)

**Latitude:** 36.03037

**Longitude:** -121.57826

**Collection Method:** Hook and Line, Spearfishing

**Dates of Collection:** 10/11/2024

**Samplers:** Scot Lucas, April Sjoboen Guimarães, William Jakl, Wesley Heim, Artemis Mavrakos



Black and Yellow Rockfish, TL (mm)				
283	293	316	318	328

Blue Rockfish, TL (mm)				
245	269	280	282	284
290	301	308	314	315
341	354	356	366	374

Gopher Rockfish, TL (mm)									
284	285	306	313	315	316	320	320	324	327
								333	

**Comments:** Due to its remote location, difficulty of access and limited window of opportunity, fish for this zone were collected by chartering MLML Marine Operations R/V John Martin. Low visibility and high surge limited the crew to one dive using scuba before switching over to hook and line gear. Fish were collected using both methods.



Access to this zone by small boat is often dangerous, therefore a fishing charter boat was hired out of Halfmoon Bay as a fishing platform. This allowed for more personnel actively fishing onboard.

Most of the zone is sandy bottom so some effort was put in for halibut in the north, as well as the effort for groundfish in the small reef area at the south end of the zone, although no halibut were caught.



## San Francisco Coast (20249SSFC)

**Latitude:** 37.73647

**Longitude:** -122.51811

**Collection Method:** Hook and Line, Beach Seine

**Dates of Collection:** 8/20/2024 and 8/27/2024

**Samplers:** Scot Lucas, April Sjoboen Guimarães, Gary Ichikawa, Chris DiMaggio, William Jakl, Keagan Vasconcellos



Barred Surfperch, TL (mm)									
281	304	305	314	315	325	353	354	371	372

Blue Rockfish, TL (mm)				
271	280	282	284	355

Brown Rockfish, TL (mm)										
245	249	262	263	266	280	300	312	335	336	420

California Halibut, TL (mm)
593

Gopher Rockfish, TL (mm)
319

Jacksmelt, TL (mm)				
303	306	311	319	354

Kelp Greenling, TL (mm)	
327	350

Lingcod, TL (mm)					
421	499	540	543	624	650

**Comments:** This zone was sampled from the beach on 8/20/24 and from a boat launched out of Sausalito on 8/27/24. Jacksmelt and barred perch were captured using a beach seine at Ocean Beach and all other fish were captured using hook and line just outside and south of the Golden Gate Bridge.

## Farallon Islands (20150FARI)

**Latitude:** 37.70236

**Longitude:** -123.03003

**Collection Method:** Hook and Line

**Dates of Collection:** 8/23/2024

**Samplers:** Wesley Heim, Autumn Bonnema, William Jakl, Scot Lucas, April Sjoboen Guimarães, Keagan Vasconcellos, Artemis Mavrakos, Chris DiMaggio



Blue Rockfish, TL (mm)	
240	321

Brown Rockfish, TL (mm)										
269	332	341	350	359	366	368	378	380	395	396

Lingcod, TL (mm)										
430	495	533	548	565	571	582	603	670	690	710

Olive Rockfish, TL (mm)				
348	361	363	386	400

Vermillion Rockfish, TL (mm)				
284	293	436	460	480

Yellowtail Rockfish, TL (mm)				
282	291	310	319	350

**Comments:** The Farallon Islands were reached by charter boat hired out of Halfmoon Bay due to the islands' considerable distance from coastal ports. Most of the areas sampled in 2009 are now designated Marine Protected Areas (MPAs), therefore fishing was limited to a smaller area of reef habitat. This limited the variety of species seen; however, size distribution and abundance were still very good.



## Southern Marin Coast (20151SMAC)

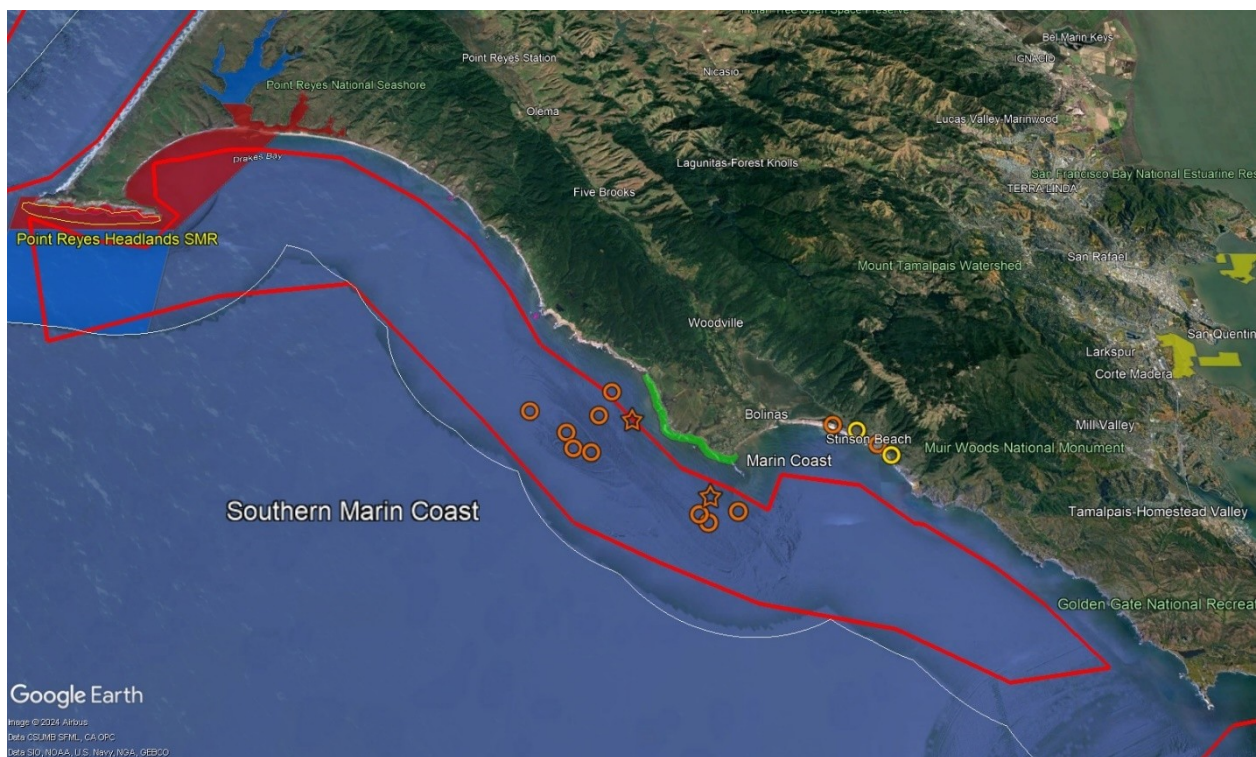
**Latitude:** 37.88844

**Longitude:** -122.72084

**Collection Method:** Hook and Line, Trap

**Dates of Collection:** 7/22/2024-7/25/2024

**Samplers:** Scot Lucas, Keagan Vasconcellos



Barred Surfperch, TL (mm)	
225	

Black Rockfish, TL (mm)		
264	307	311

Brown Rockfish, TL (mm)						
247	253	267	270	282	377	384

Gopher Rockfish, TL (mm)		
255	307	328

Jacksmelt, TL (mm)				
230	233	246	292	303

Lingcod, TL (mm)				
549	570	618	639	684

Vermillion Rockfish, TL (mm)				
271	288	311	321	345

White Croaker, TL (mm)				
233	254	275	277	293

Yellowtail Rockfish, TL (mm)	
249	279

**Comments:** Ocean conditions (i.e., fog, tides, swell, wind) out of the Golden Gate were unsafe the first day and the crew fished from shore at Stinson Beach. Subsequent conditions were favorable; therefore, the crew was able to launch from Sausalito, motor up north outside the San Francisco Bay and use trap and hook and line gear to collect the majority of the fish for this zone.

## Northern Marin Coast (20153NMRC)

**Latitude:** 38.21325

**Longitude:** -122.99614

**Collection Method:** Hook and Line, Trap

**Dates of Collection:** 7/16/2024-7/18/2024

**Samplers:** Scot Lucas, Keagan Vasconcellos, Artemis Mavrakos



Barred Surfperch, TL (mm)
152

Blue Rockfish, TL (mm)			
136	148	172	185

Brown Rockfish, TL (mm)										
273	310	314	320	320	342	342	344	346	355	370

Gopher Rockfish, TL (mm)										
216	234	242	254	277	290	297	298	301	326	342

Jacksmelt, TL (mm)				
224	225	226	241	262

Lingcod, TL (mm)	
537	547

**Comments:** High winds and swell on 7/16-7/17 limited the ability to use trap gear and affected the distance away from the launch ramp inside Bodega Bay where collections could safely be conducted. When boating conditions were prohibitive, the crew worked from shore using hook and line with limited success.



## Bodega Harbor (11554BDGA)

**Latitude:** 38.32063

**Longitude:** -123.04856

**Collection Method:** Hook and Line, Beach Seine

**Dates of Collection:** 8/26/2024-8/27/2024

**Samplers:** Gary Ichikawa, April Sjoboen Guimarães, Chris DiMaggio



Black Rockfish, TL (mm)
269

Blue Rockfish, TL (mm)				
157	157	159	192	224

Jacksmelt, TL (mm)				
234	235	244	269	280

**Comments:** Bodega Harbor is a shallow water body (<2ft) with mud flats and eel grass beds dominant in most of the bay and only mid-harbor channels are generally navigable by boat. Therefore, most effort was put into beach seining and using hook and line fishing from shore and banks (jetties). All fish were collected with hook and line.

Due to limited access outside the main channel, very few anglers fish inside Bodega Harbor according to California Department of Fish and Wildlife personnel encountered at the launch. MPSL does not recommend sampling here again.

## South Sonoma Coast/North Sonoma Coast (11356NSNC)

**Latitude:** 38.48134

**Longitude:** -123.22011

**Collection Method:** Hook and Line, Trap

**Dates of Collection:** 7/15/2024-7/16/2024

**Samplers:** Scot Lucas, Keagan Vasconcellos, Artemis Mavrakos



Black Rockfish, TL (mm)										
300	303	310	310	310	311	322	327	329	335	356

Brown Rockfish, TL (mm)										
210	292	293	302	322	338	340	345	351	353	359

Gopher Rockfish, TL (mm)										
254	255	258	258	265	273	275	277	279	286	302

Jacksmelt, TL (mm)				
207	226	230	239	265

Lingcod, TL (mm)										
423	452	466	470	476	495	518	541	560	567	725

**Comments:** Most of the groundfish/reef habitat is in the southern portion of this zone and all fishing effort was concentrated there accordingly. Both trap gear and hook and line gear were used, but all fish were collected by hook and line. Originally two separate zones, this zone was combined from original proposed zones 55 and 56 during the 2009-2010 effort due to the distance to the northernmost part of the zone and lack of good reef habitat in the north portion. Fishing grounds were accessed from the Westside Bodega Bay boat ramp.



## Point Arena Area (11357PTAR)

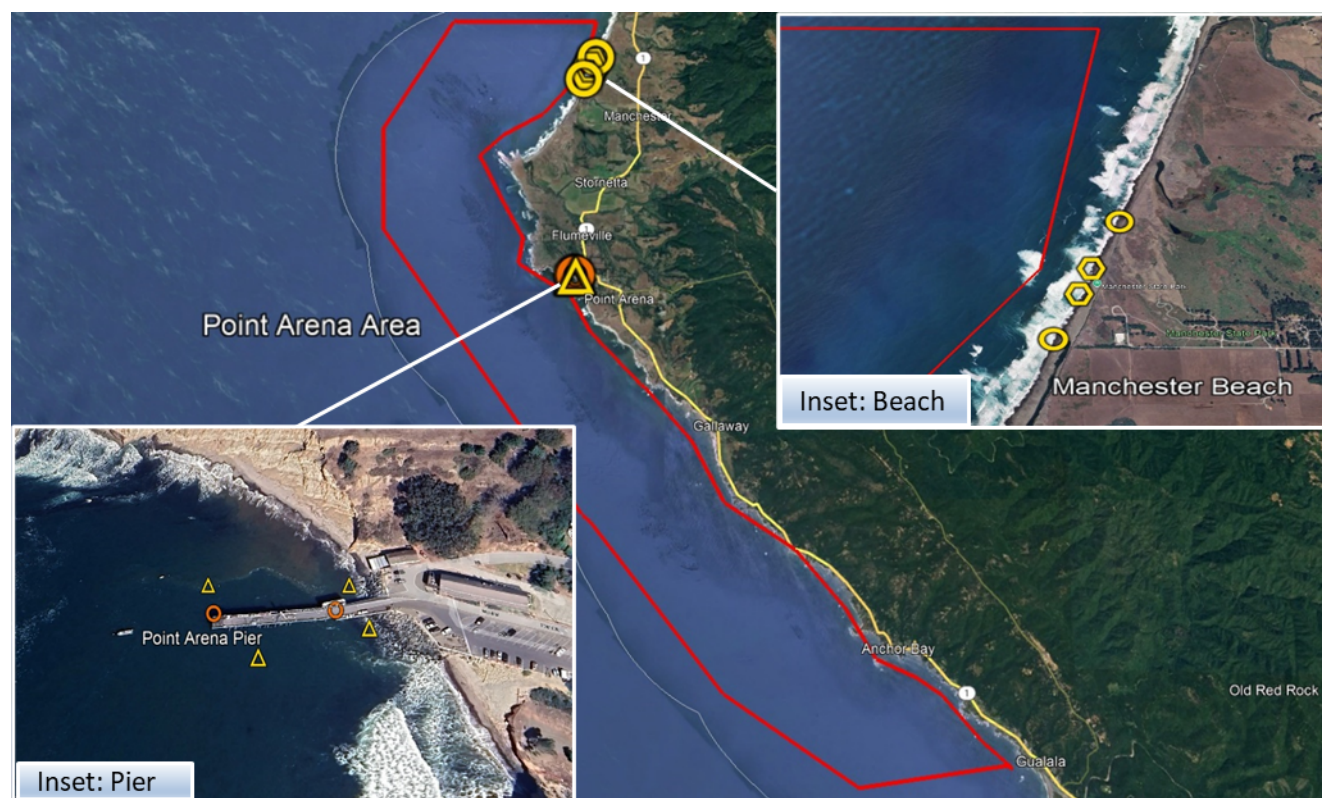
**Latitude:** 38.96291

**Longitude:** -123.75539

**Collection Method:** Hook and Line, Spear, Beach Seine

**Dates of Collection:** 9/23/2024-9/24/2024

**Samplers:** Scot Lucas, Gary Ichikawa, Jon Goetzl, Keagan Vasconcellos



Black and Yellow Rockfish, TL (mm)
253

Striped Surfperch, TL (mm)										
175	176	182	182	182	183	184	185	233	246	278

**Comments:** Boat access is limited to the hoist that lowers boats off the side of the Point Arena Pier, which is highly weather dependent, and it can be difficult to find information regarding when the hoist is running. The hoist was down indefinitely for repairs beginning in September 2024.

Fishing effort was made from the pier using net gear, hook and line and spearfishing. Two spearfishing dives were conducted at the pier with no adult fish seen. Beach seining was also attempted north of Point Arena, however, swell and currents limited personnel safety. Hook and line effort was unsuccessful from the beach but was successful from the pier.



## Mendocino Coast Area (11358MENC)

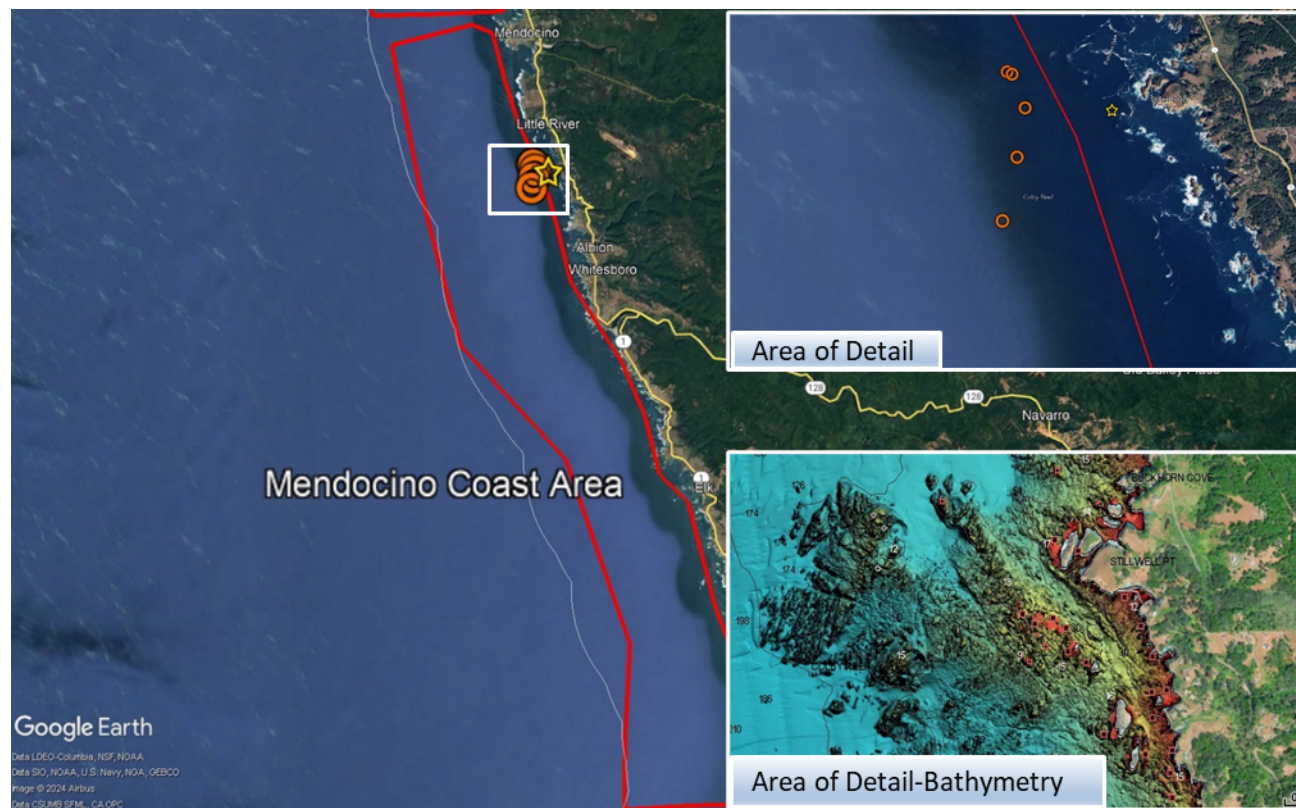
**Latitude:** 39.24559

**Longitude:** -123.79331

**Collection Method:** Hook and Line, Trap

**Dates of Collection:** 7/31/2024

**Samplers:** Scot Lucas, Keagan Vasconcellos, Chris DiMaggio



Black Rockfish, TL (mm)										
304	310	315	336	345	346	348	356	361	372	396

Blue Rockfish, TL (mm)				
295	301	304	307	361

Cabezon, TL (mm)	
465	

Gopher Rockfish, TL (mm)										
250	265	275	276	280	284	285	298	300	310	310

Lingcod, TL (mm)										
500	535	553	570	572	574	587	590	655	692	760

Olive Rockfish, TL (mm)
434

Yellowtail Rockfish, TL (mm)				
247	253	267	269	277

**Comments:** The crew launched out of Albion River campground to access this zone. Hook and line fishing was successful within high-relief rocky habitat. Traps were also used but yielded no fish.

## Fort Bragg Area (11359FTBG)

**Latitude:** 39.48153

**Longitude:** -123.82793

**Collection Method:** Hook and Line

**Dates of Collection:** 7/29/2024-7/30/2024

**Samplers:** Scot Lucas, Keagan Vasconcellos, Chris DiMaggio



Black Rockfish, TL (mm)										
263	266	280	310	310	319	320	325	332	333	341

Blue Rockfish, TL (mm)				
216	227	261	323	411

Cabezon, TL (mm)				
416	422	476	490	497

Gopher Rockfish, TL (mm)										
249	260	266	268	269	272	272	274	275	279	290

Lingcod, TL (mm)										
535	551	555	566	572	583	608	623	634	640	908

Yellowtail Rockfish, TL (mm)				
226	248	254	306	330

**Comments:** The boat was launched from the Noyo Harbor ramp in Fort Bragg.



## North Mendocino County Coast Area (11360NMCC)

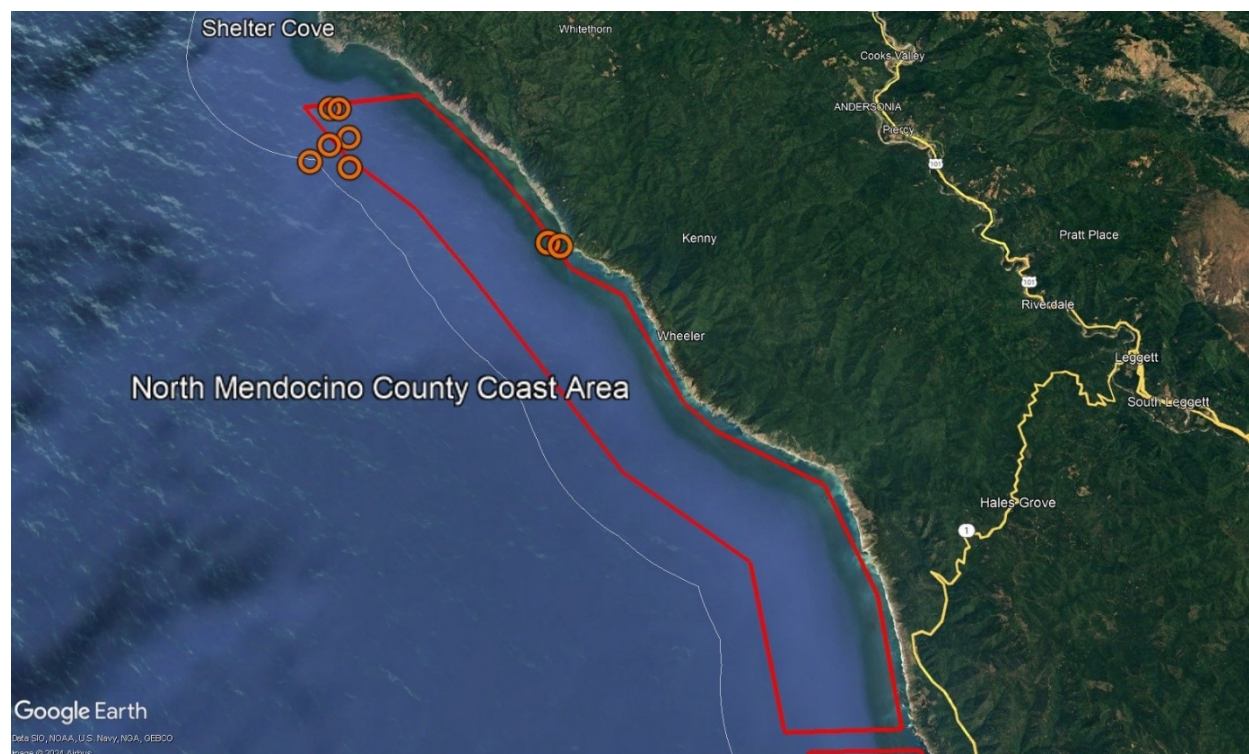
**Latitude:** 39.85898

**Longitude:** -123.92771

**Collection Method:** Hook and Line

**Dates of Collection:** 8/7/2024, 8/20/2024

**Samplers:** Scot Lucas, Keagan Vasconcellos, William Jakl, Artemis Mavrakos



Black Rockfish, TL (mm)										
255	259	283	291	304	310	314	370	375	400	405

Blue Rockfish, TL (mm)	
270	329

Cabezon, TL (mm)			
390	461	491	500

Gopher Rockfish, TL (mm)										
253	272	289	295	296	304	304	320	341	359	360

Jacksmelt, TL (mm)				
257	268	275	302	305

Lingcod, TL (mm)										
364	505	525	525	532	547	566	587	605	634	770

Vermillion Rockfish, TL (mm)				
344	417	450	460	484

**Comments:** Boating access to this zone was from the tractor launch at the Shelter Cove Boat Launching Facility. Fish were collected over two non-consecutive days, and all fish were caught by hook and line.

## Shelter Cove Area (11261SHLC)

**Latitude:** 40.00472

**Longitude:** -124.07837

**Collection Method:** Hook and Line, Trap

**Dates of Collection:** 8/6/2024-8/7/2024

**Samplers:** Scot Lucas, Keagan Vasconcellos, Artemis Mavrakos



Black Rockfish, TL (mm)										
290	303	305	316	326	351	357	373	382	386	421

Blue Rockfish, TL (mm)				
243	251	274	374	379

Cabazon, TL (mm)
334

Gopher Rockfish, TL (mm)										
277	291	303	305	310	311	311	320	332	345	384

Lingcod, TL (mm)										
520	530	549	553	559	561	562	599	599	611	913

Olive Rockfish, TL (mm)			
325	373	379	464

Vermillion Rockfish, TL (mm)				
315	406	416	435	503

**Comments:** Most of the nearshore rocky-reef habitat in this zone is concentrated near the main point just out front and north of Shelter Cove, so all fishing effort was focused in that area (See map above). Hook and line and trap gear were used but no fish were caught in the traps.



## Cape Mendocino Area (11262CMEN)

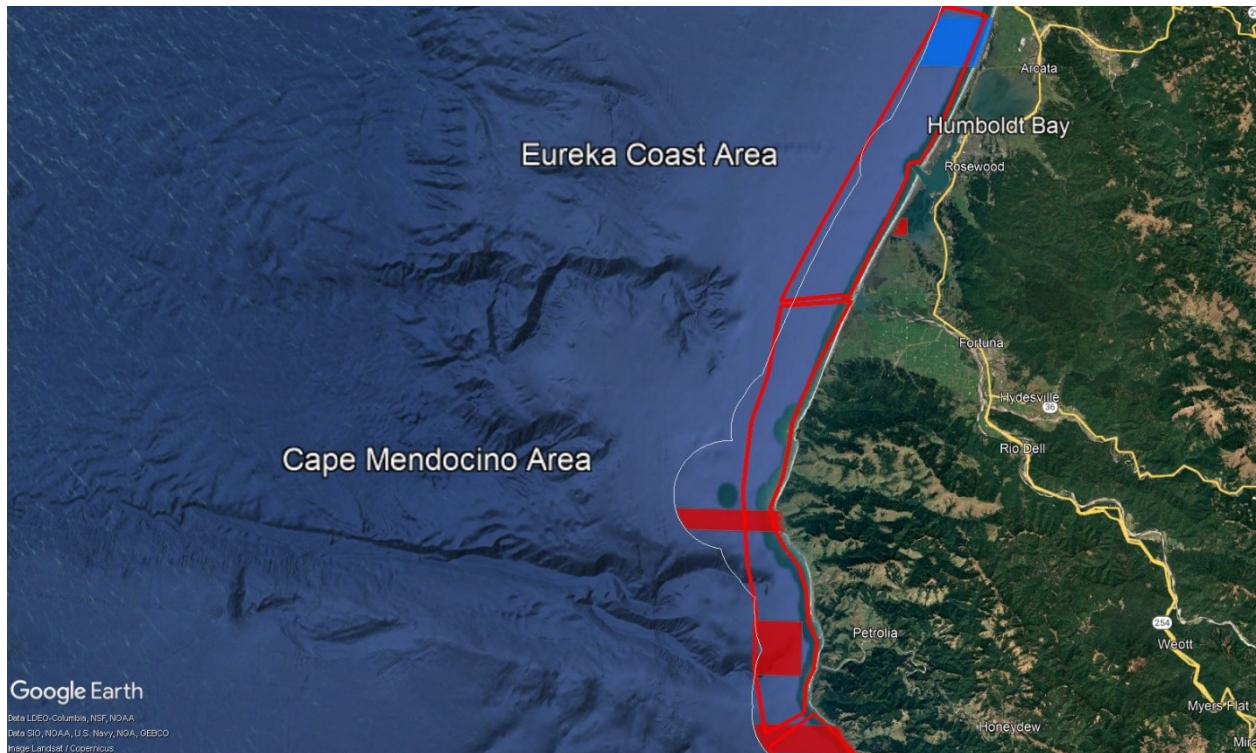
**Latitude:** 40.42239

**Longitude:** -124.40885

**Collection Method:** Not Applicable

**Dates of Collection:** Not Applicable

**Samplers:** Not Applicable



**Comments:** It is recommended that this zone (combined zones Cape Mendocino Area and Eureka Coast Area) be dropped from future sampling consideration for safety reasons. There is also minimal recreational fishing effort in this area because of access issues, as well as a lack of reef habitat (pers. comm. local US Coast Guard staff).

## Trinidad Area (10865TRIN)

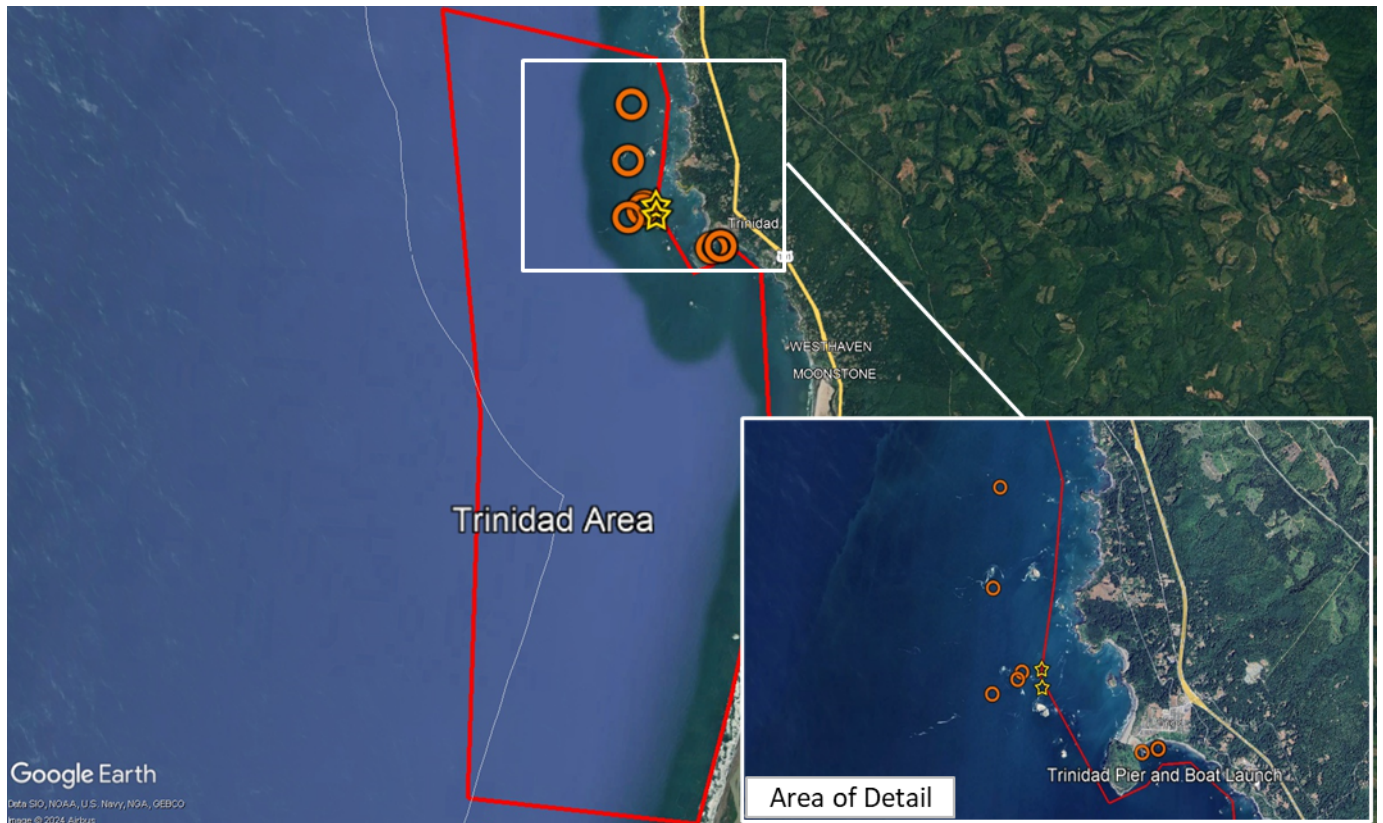
**Latitude:** 41.07317

**Longitude:** -124.17215

**Collection Method:** Hook and Line, Trap

**Dates of Collection:** 8/13/2024-8/15/2024

**Samplers:** William Jakl, Keagan Vasconcellos, Chris DiMaggio



Black Rockfish, TL (mm)										
250	282	286	290	300	365	415	422	425	430	430

Blue Rockfish, TL (mm)				
244	254	260	261	298

Brown Rockfish, TL (mm)	
415	

Cabezon, TL (mm)	
290	450

Gopher Rockfish, TL (mm)							
296	305	315	320	325	330	336	353

Kelp Greenling, TL (mm)				
305	340	355	360	362

Lingcod, TL (mm)					
390	472	540	616	666	749

**Comments:** Ocean boating access in this area is by a “rail car” type launch from the Seascapes Pier and Harbor parking area, Trinidad. The launch was closed on Mondays and Tuesdays, so hook and line from shore was conducted on 8/13 with some success. Hook and line and trap gear were used from the boat the rest of the week, although no fish were caught in the traps.



## North Humboldt County Coast Area (10866NHCC)

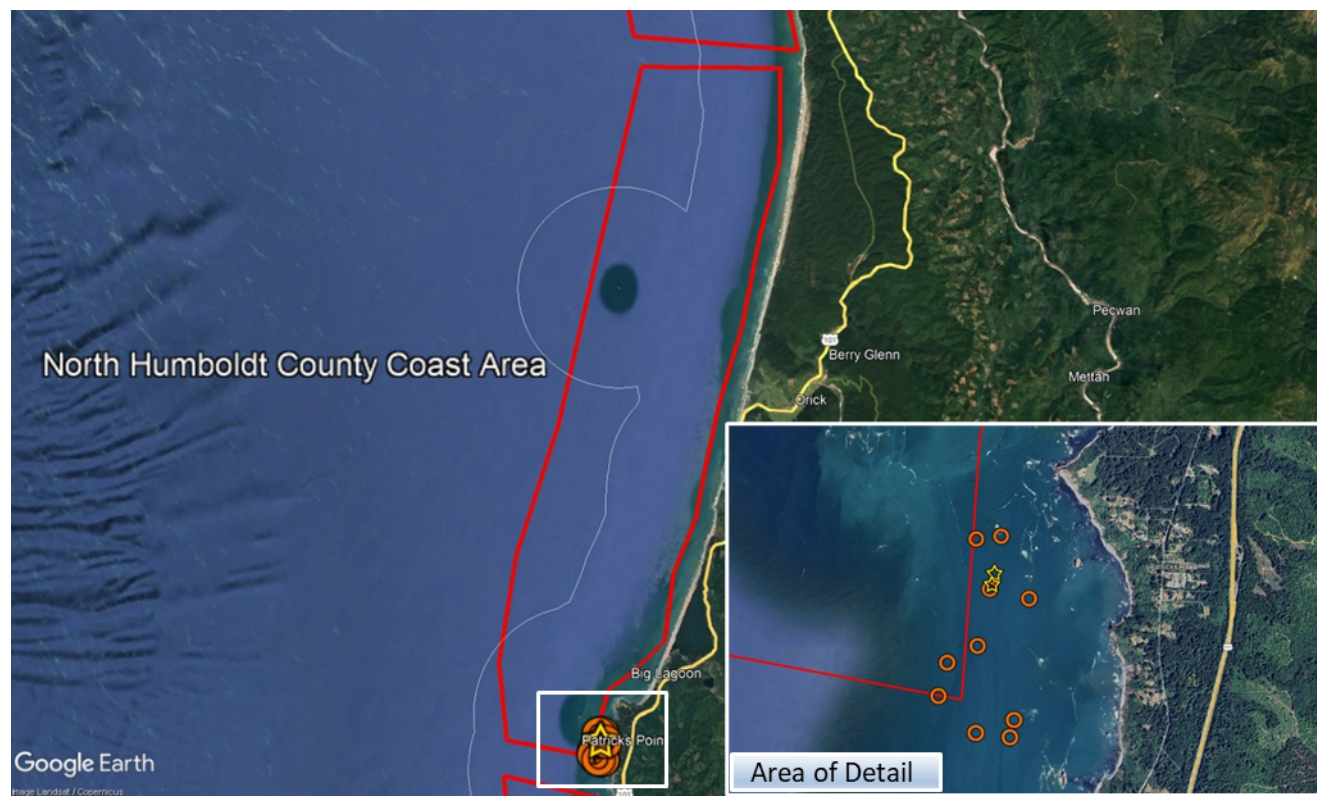
**Latitude:** 41.23209

**Longitude:** -124.17522

**Collection Method:** Hook and Line, Trap

**Dates of Collection:** 8/13/2024-8/14/2024

**Samplers:** William Jakl, Keagan Vasconcellos, Chris DiMaggio



Black Rockfish, TL (mm)										
240	318	331	335	344	390	410	412	440	442	500

Blue Rockfish, TL (mm)				
270	275	306	345	356

Brown Rockfish, TL (mm)			
404	430	438	451

Cabezon, TL (mm)	
465	477

Kelp Greenling, TL (mm)			
313	355	364	370

Lingcod, TL (mm)										
360	545	605	625	630	673	710	710	730	786	864

**Comments:** Access to this zone is the same as for Trinidad Area, therefore hook and line effort was conducted from a local 6-pack charter boat on 8/13. On 8/14, trap and hook and line gear were utilized, with success from hook and line.

## Del Norte Coast (10367DENC)

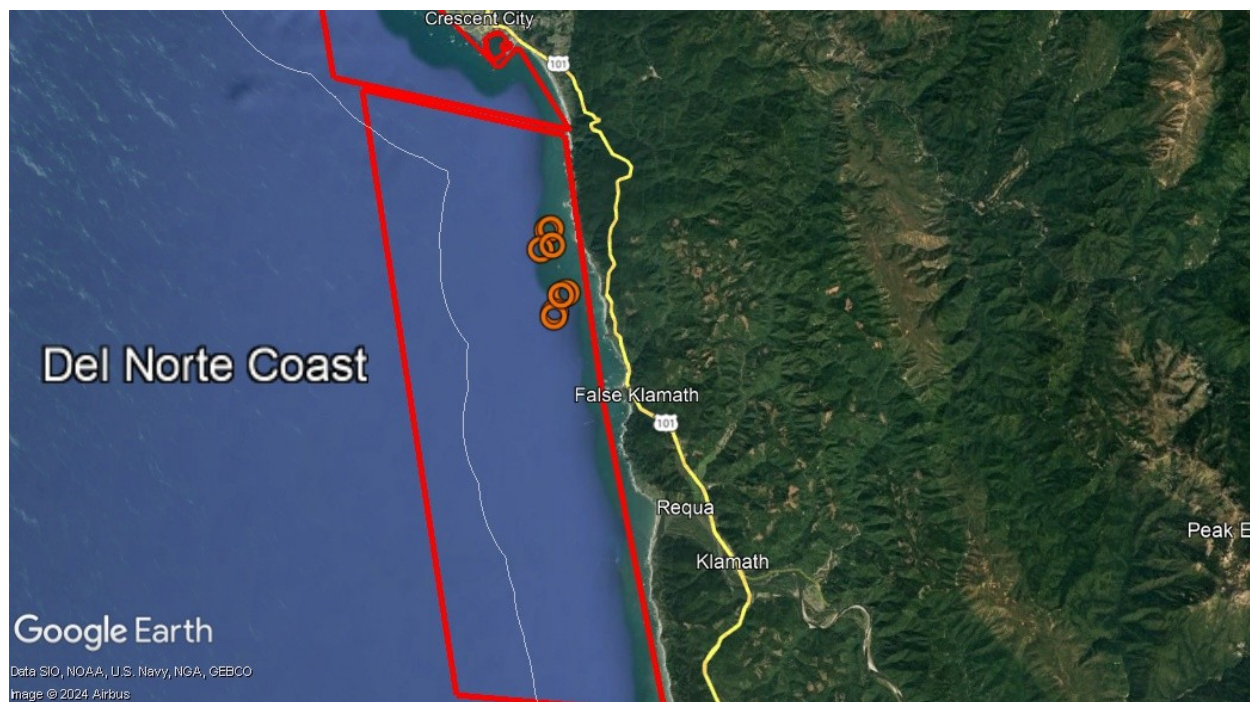
**Latitude:** 41.68385

**Longitude:** -124.16775

**Collection Method:** Hook and Line

**Dates of Collection:** 9/10/2024

**Samplers:** Scot Lucas, Keagan Vasconcellos, Artemis Mavrakos



Black Rockfish, TL (mm)										
246	270	300	303	334	384	401	423	428	449	452

Brown Rockfish, TL (mm)							
370	395	395	395	400	430	443	455

Deacon Rockfish, TL (mm)				
318	328	339	345	381

Gopher Rockfish, TL (mm)
300

Jacksmelt, TL (mm)				
266	273	275	280	289

Kelp Greenling, TL (mm)		
320	335	350

Lingcod, TL (mm)				
530	610	700	720	780

Vermillion Rockfish, TL (mm)
455

Yellowtail Rockfish, TL (mm)				
203	258	262	265	276

**Comments:** Fishing locations in this zone were accessed from the boat ramp out of Crescent City Harbor, a well-protected marina. All fish were collected by hook and line from small but productive reefs within 10 miles of the harbor. Local knowledge and clean ocean conditions were helpful in focusing effort on specific inshore reefs for finding priority species.

## Crescent City Coast (10368CRCC)

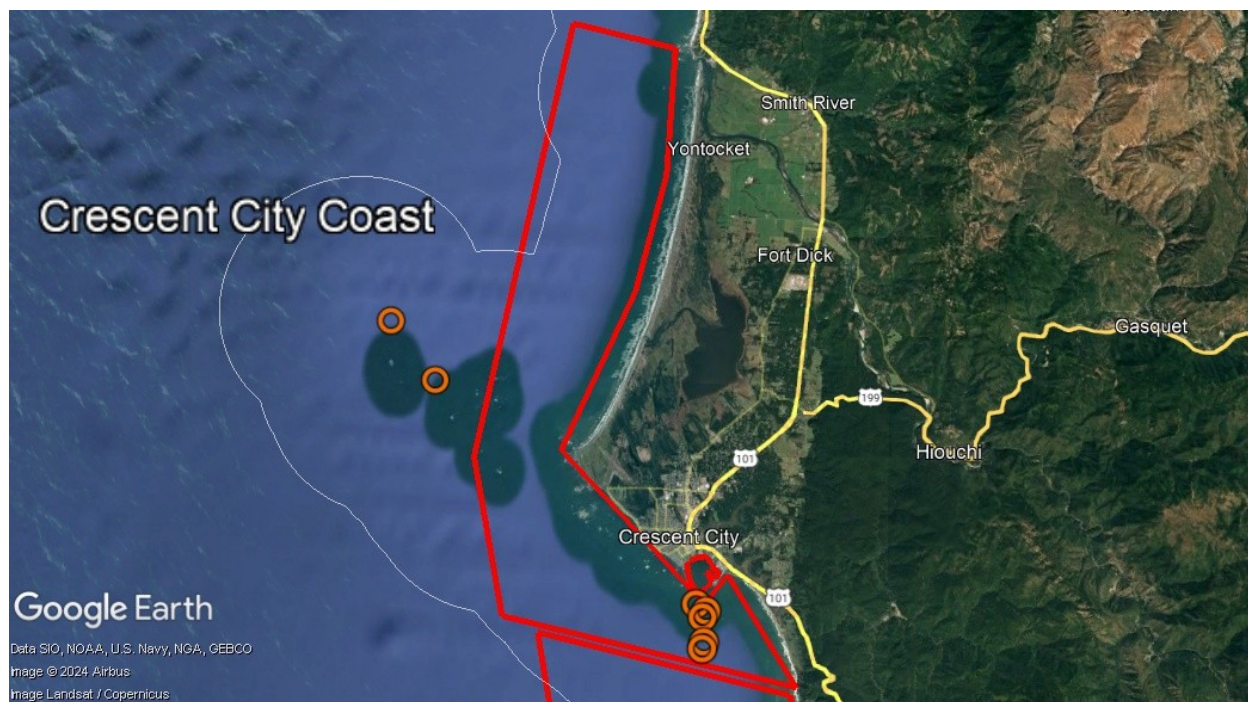
**Latitude:** 41.75954

**Longitude:** -124.24604

**Collection Method:** Hook and Line

**Dates of Collection:** 9/11/2024

**Samplers:** Scot Lucas, Keagan Vasconcellos, Artemis Mavrakos



Black Rockfish, TL (mm)										
240	281	315	322	326	343	364	377	383	394	422

Blue Rockfish, TL (mm)				
242	271	281	287	345

Canary Rockfish, TL (mm)					
321	337	346	352	415	475

Deacon Rockfish, TL (mm)				
235	257	301	318	362

Gopher Rockfish, TL (mm)	
295	

Jacksmelt, TL (mm)				
246	255	271	278	323



Lingcod, TL (mm)				
359	505	510	558	701

Vermillion Rockfish, TL (mm)			
303	370	400	420

Yellowtail Rockfish, TL (mm)		
234	253	278

**Comments:** Calm in the morning, weather and ocean conditions deteriorated by 10 am with high wind and rain. Crew were able to run up coast to St. George Reef Lighthouse, about 12 miles, but were forced to leave ideal fishing habitat up there after about an hour to work closer to the ramp after the swell came up. Fishing was also good in the safety of the small reefs nearer port.

## 1.7 Discussion

Unavoidable delays resulted in a 4-month late start in mid-July and left very little leeway to adapting to potentially dangerous weather and ocean conditions, seasonal fishing restrictions and access limitations. This affected the ability to thoroughly sample Point Arena Area; to eliminate Eureka Coast/Mendocino Areas (a combined zone); and to replace the combined Eureka Coast/Mendocino zones with Pacifica Coast Area to augment previously limited sampling efforts there.

Additionally, the US Fish and Wildlife Service listed San Francisco Bay-Delta longfin smelt as endangered on July 29, 2024, providing one-month notice to finish all zones (affecting eight zones from Pacifica, CA to Jenner, CA, including Bodega Bay and the Farallon Islands) within the closure area by August 30, 2024.

MPSL staff were able to collect 638 fish from 18 different species, including 106 lingcod. Five different primary or secondary species were collected in most zones, with about one third of the zones having the requested numbers (usually 5 or 11) of those species achieved. Overall, 17 of the 18 proposed zones were completed concluding the second statewide survey of bioaccumulation of California's coast.

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