

**MONTEREY BAY NATIONAL MARINE SANCTUARY  
LOST FISHING GEAR REMOVAL PROJECT  
FINAL CRUISE REPORT**  
September 15, 2010 – September 29, 2010



Submitted by  
Karen Grimmer  
Lisa de Marignac  
Sophie De Beukelaer



NOAA's Monterey Bay National Marine Sanctuary  
299 Foam Street  
Monterey, CA 93940  
(831) 647-4201  
[MBNMS Lost Fishing Gear Removal Project Webpage](#)



## OBJECTIVES

During September 2010, NOAA's Monterey Bay National Marine Sanctuary (MBNMS) staff and partners conducted the second year of a research mission to survey the deepwater habitats of MBNMS and test new methods to remove lost fishing gear from the seafloor using a Phantom HD2 remotely operated vehicle (ROV). The ROV was used to locate, document and retrieve lost fishing gear from the Monterey Bay. The objectives of the mission were to:

- 1) Reduce benthic and pelagic hazards to marine organisms posed by fishing gear lost in deepwater.
- 2) Develop and test deepwater gear retrieval procedures.
- 3) Reduce navigational hazards for fishermen and research gear such as submersibles.
- 4) Conduct site surveys and characterizations.
- 5) Provide outreach to the public through images and HD video.
- 6) Provide technical experience for staff and partners.
- 7) Provide opportunities to study and collect benthic continental shelf specimens.

The cruise was conducted aboard the F/V *Donna Kathleen* with operations within the sanctuary. Operations were focused on the edges of Monterey and Soquel Canyons, and within the Portuguese Ledge and Point Lobos State Marine Conservation Areas (SMCAs), which were designated as California State Marine Protected Areas (MPAs) in 2007. During the 2009 Lost Fishing Gear Removal cruise, the team focused efforts within these newly designated areas in an effort to reduce the potential for entanglement of living marine resources and to restore the area to pre-fishing conditions. In 2010, adding locations outside the state MPAs reas provided the opportunity to retrieve gear that was deemed a danger to research by NMFS and to search out newer gear, which is more effective at trapping fish and invertebrates. The locations of more recently lost fishing gear (in the past year or two) were identified by collaborations with fishermen through the captain of the F/V *Donna Kathleen*.

## BACKGROUND

MBNMS is working with partners to design and implement a multi-year project to remove lost fishing gear from the MBNMS. The National Marine Fisheries Service (NMFS) and MBNMS have documented lost fishing gear during *Delta* Submarine dives in 2003, 2004, 2007 and 2008. This gear includes long lines, gill nets, crab and fish traps, and trawling gear, which can become lodged or entangled on the seafloor and sometimes extends into the water column.

Lost fishing gear is identified as fishing nets, lines, pots, traps, and other commercial and recreational fishing gear that sits on the seafloor, gets caught on rocky reefs, or floats in the water column. Gear can create long-term entrapment mechanisms that continuously kill mobile fauna for many years. Net materials are constructed to be strong and resilient, thus preventing escape of entangled wildlife and persisting in the environment for decades. Their pliable form combined with water movement from storms and currents make them active entrapment systems. Lost cage traps continue to catch prey on a continuing cycle as predators enter the traps to feed on dead and dying entrapped organisms. Nets and traps can physically scrape organisms off of hard reef habitat or sweep immobile invertebrates from sandy areas. Nets and traps have been documented to entangle bottom feeding whales and other marine mammals, becoming ensnared on flukes and fins, causing stress and loss of energy that leads to exhaustion and death. Lost fishing gear can also cause hazards to fishermen. For example, lost traps may snag additional traps being set nearby.

The sanctuary funds this collaborative project through a federal settlement that focuses on mitigating impacts to benthic habitats, and a marine debris grant awarded to the UC Davis SeaDoc Society. Cordell Bank National Marine Sanctuary (CBNMS) provided the Phantom HD2 ROV and staff planning and mobilizing support. California Department of Fish and Game (CDFG) provided inkind, equipment support and deck support. California State University Monterey Bay (CSUMB) provided deck support and data analyses. Marine Advanced Technology Education (MATE) Center provided a volunteer intern for deck support. San Francisco State University, Romberg Tiburon Center provided a graduate student for specimen collection and study. Other key contributors included the F/V *Donna Kathleen*, Marine Applied Research and Exploration (MARE) and NMFS. A web page containing photos and a description of the project can be found at <http://montereybay.noaa.gov/resourcepro/resmanissues/lostgear.html>



*Two rockfish gill nets, two crab traps and a spot prawn trap laid out to dry on a dock.*

## METHODS

### Study Sites

ROV operations focused primarily on the edges of Monterey and Soquel Canyons, and within the Portuguese Ledge and Point Lobos SMCAs. Operational depths ranged from 40 to 300 meters.

Dive locations were selected based on lost fishing gear positions that had been previously documented by MBNMS and NMFS during *Delta* Submarine dives in 2003, 2004, 2007 and 2008, information provided by local fishermen, and locations documented during the 2009 Lost Fishing Gear Removal research mission. Targeted gear included long lines, gill nets, crab and fish traps, a clump weight and trawling gear.

### Cruise Personnel



*The Lost Fishing Gear Removal team (minus Lisa de Marignac, Donna Kline and Michael Carver) - Each and every person contributed to the success of the cruise.*

**Affiliations and Roles**

| <b>Name</b>         | <b>**Affiliation</b>        | <b>Role</b>                   |
|---------------------|-----------------------------|-------------------------------|
| Michael Carver      | CBNMS                       | Technical Coordinator         |
| Sophie De Beukelaer | MBNMS                       | Navigator, Data Manager       |
| Lisa de Marignac    | MBNMS                       | Project Coordinator, Floater* |
| Karen Grimmer       | MBNMS                       | Cruise Leader, Floater*       |
| Donna Maricich      | FVDK                        | Deck Operations               |
| Tim Maricich        | FVDK                        | Captain                       |
| Tyler Maricich      | FVDK                        | Deck Supervisor               |
| Andy Lauermann      | MARE                        | ROV Pilot                     |
| Donna Kline         | CSUMB                       | Deck Support (week 2)         |
| Ashley Knight       | CSUMB                       | Deck Support (week 1)         |
| Jessica Watson      | CSUMB                       | Deck Support Floater*         |
| Vanessa Guerra      | SFSU Romberg Tiburon Center | Taxonomist                    |
| Susan Meyer         | MATE                        | Deck Support Floater*         |
| Jason Vasques       | CDFG                        | Deck Support Floater*         |

\* Floater: HD camera, tether, topside camera

\*\*Affiliations:

- California State University Monterey Bay (CSUMB)*
- California Department of Fish and Game (CDFG)*
- Cordell Bank National Marine Sanctuary (CBNMS)*
- F/V Donna Kathleen (FVDK)*
- Marine Advanced Technology Education Center (MATE)*
- Marine Applied Research and Exploration (MARE)*
- Monterey Bay National Marine Sanctuary (MBNMS)*
- San Francisco State University – Romberg Tiburon Center*

**Role Descriptions**

- Captain - Tim Maricich: Responsible for oversight of overall operation; ensured safe working conditions; operated vessel.
- Cruise Leader - Karen Grimmer: Responsible for oversight of cruise preparation; responsible for decision-making in the field (location, methods, etc.), communications to science party and crew, and assisting the team as needed.
- Project Coordinator – Lisa de Marignac: Responsible for project planning and serving as an alternate cruise leader.

- Chief Pilot - Andy Lauermann: Responsible for piloting the ROV and supervising ROV operations.
- Navigator - Sophie De Beukelaer: Responsible for navigation including communications with the captain and deck crew; trouble shooting; managing digital and spatial data.
- Data Manager - Sophie De Beukelaer: Responsible for managing and mapping all sources of data, recording notes on transect starting and ending coordinates, special conditions, target locations, etc.
- Technical Coordinator - Michael Carver: Responsible for prepping and mobilizing ROV and associated equipment.
- Deck Supervisor - Tyler Maricich: Responsible for supervision of deck operations; operated winch and crane.
- Deck Support - Donna Kline, Ashley Knight: Responsible for deployment and recovery of ROV, including management of tether and clump weight; responsible for monitoring weather and sea conditions.
- Tether Handler - Jessica Watson, Susan Meyer: Assisted with handling tether during ROV deployment and recovery.
- HD Camera - Karen Grimmer: Responsible for oversight of HD camera operations in the galley.
- Taxonomist - Vanessa Guerra: Collected and identified (where possible) deepwater ascidians present on retrieved fishing gear.

**Cruise Schedule**

| Day | Weekday   | Date | Study Location           | ROV Pilot<br>Lauer<br>mann | MBNMS<br>Grimmer | MBNMS<br>de Marignac | MBNMS<br>De Beukelaer | CBNMS<br>Carver | CSUMB<br>Kline | CSUMB<br>Knight | CSUMB<br>Watson | CDFG<br>Vasques | SFSU<br>Guerra | MATE<br>Meyer | Total |
|-----|-----------|------|--------------------------|----------------------------|------------------|----------------------|-----------------------|-----------------|----------------|-----------------|-----------------|-----------------|----------------|---------------|-------|
| 1   | Wednesday | 9/15 | Mobilization in Monterey | X                          | X                |                      | X                     | X               | X              |                 |                 |                 |                |               | 5     |
| 2   | Thursday  | 9/16 | Mobilization in Monterey | X                          | X                | X                    | X                     | X               | X              | X               | X               |                 |                |               | 8     |
| 3   | Friday    | 9/17 |                          | X                          | X                | X                    | X                     |                 | X              |                 |                 |                 |                |               | 5     |
| 4   | Saturday  | 9/18 |                          | X                          | X                |                      | X                     |                 | X              |                 |                 |                 |                | X             | 5     |
| 5   | Sunday    | 9/19 | OFF                      |                            |                  |                      |                       |                 |                |                 |                 |                 |                |               |       |
| 6   | Monday    | 9/20 |                          | X                          | X                |                      | X                     |                 | X              |                 | X               |                 | X              | X             | 7     |
| 7   | Tuesday   | 9/21 |                          | X                          |                  | X                    | X                     |                 | X              |                 |                 |                 | X              | X             | 6     |
| 8   | Wednesday | 9/22 |                          | X                          | X                |                      | X                     |                 | X              |                 | X               | X               |                | X             | 7     |
| 9   | Thursday  | 9/23 |                          | X                          | X                | X                    | X                     |                 |                | X               |                 |                 |                | X             | 6     |
| 10  | Friday    | 9/24 |                          | X                          | X                | X                    | X                     |                 |                | X               | X               |                 |                | X             | 7     |
| 11  | Saturday  | 9/25 |                          | X                          | X                |                      | X                     |                 |                | X               |                 |                 |                | X             | 5     |
| 12  | Sunday    | 9/26 | OFF                      |                            |                  |                      |                       |                 |                |                 |                 |                 |                |               |       |
| 13  | Monday    | 9/27 |                          | X                          | X                |                      | X                     |                 |                | X               | X               |                 |                | X             | 6     |
| 14  | Tuesday   | 9/28 |                          | X                          |                  | X                    | X                     |                 |                | X               | X               |                 |                | X             | 6     |
| 15  | Wednesday | 9/29 |                          | X                          | X                | X                    | X                     |                 |                | X               | X               |                 |                | X             | 7     |
| 16  | Thursday  | 9/30 | Demob in Monterey        | X                          | X                |                      | X                     |                 |                | X               |                 |                 |                | X             | 5     |

\*FVDK crew onboard every day (Tim, Donna, Tyler)

## ROV Operations

The MBNMS ROV removal methods were built upon prior work supported by the NOAA Marine Debris Program in Cordell Bank NMS in August 2008. The Phantom HD2 ROV was retooled for a diversity of deepwater habitats to locate, document and retrieve lost fishing gear. Additional thruster power lights, an HD video camera, a hooking and cutting manipulator, and a spool with resilient Spectra line was added to enhance the ROV's fishing gear recovery capacity. Due to the accuracy of the NMFS and MBNMS target data, the project was able to achieve 95% success rate in finding targets and putting the ROV onto identified nets and traps, usually in less than 30 minutes of searching on the seafloor.



*Deck Manager Donna Kline and ROV Pilot Andy Lauermann land the Phantom HD2 ROV safely back onboard the Fishing Vessel Donna Kathleen. The ROV is used to locate the fishing gear targets, and then using a hook attached to a manipulating arm, it clips onto the gear. The spool line (located above the arms) will feed out line as the ROV is retrieved, and then the line is transferred over to the boat winch and the gear is hauled up on to deck.*

The ROV was launched from the F/V *Donna Kathleen* along with a clump weight from the crane, boom and winch. The vessel was set up to drift with the wind and current towards the general target area. The ROV was lifted by the crane and boom, lowered into the water, released from the winch line, and swum out 40 meters of the vessel prior launching the 600-lb. clump weight that was attached to the winch cable and lowered into the water a few meters. At this point, the ROV tether was secured to the clump weight down line (winch line), and thereafter every 3 meters until the clump weight reached 5 to 10 meters from the bottom (more in high relief areas) to prevent contact with the seafloor. Depending on visibility, the ROV operated 0.5 to 2 meters from the seafloor at speeds ranging from .5 to 1.5 knots. The ROV proceeded along a determined transect or search



pattern, but its course was altered depending on the bottom relief, slope, or currents and items that would indicate the nearby presence of lost fishing gear such as ground lines. Observations of gear were recorded and potential targets of interest carefully documented in the cruise log and digitally within Hypack.

The following criteria were used to decide on removal of fishing gear: Impacts to animals and habitat with a high priority given to endangered or protected species and sensitive habitats; threats to fishing operations (increases risk for more gear to be snagged) or research operations; impacts to habitat as a result of removal; and feasibility of removal.

One of two retrieval methods was employed: 1) a snipping device attached to the manipulating arm cut the line and the grabbing device grasped the net fragment and pulled it up as the ROV was retrieved; and 2) a carabineer (metal hook) was clipped onto the net or trap with the grabbing arm, and as the ROV was retrieved, the spool line paid out to the surface. The spool line was then transferred to the boat's hydraulic winch and the gear was hauled up to the surface.

At the completion of the dive, the deck supervisor, in concert with the captain and ROV pilot, directed the recovery of the ROV. The ROV began its ascent while the winch raised the clump weight, with the tether handler and another scientist managing the umbilical. Once recovered, the crane boomed in to place the clump weight on the deck. It boomed back out for ROV recovery. While the tether handler recovered the ROV, a scientist managed the tending and coiling of the umbilical. The deck supervisor operated the crane and boom, and provides oversight of deck operations.



*The fishing vessel Donna Kathleen makes an excellent platform for ROV and other marine research projects. Captain Tim Maricich and his son Tyler and wife Donna are an ideal crew for this particular project due to their knowledge and understanding of fishing gear as well as the local sites.*

## Data Recording and Management

Navigation data, two video streams--one that was HD video--and HD photographs were collected on every dive. The position of the ROV was monitored in Hypack which received navigation feed from a Trackpoint II system that provided the correct offsets to the GPS feed of the ship's location. Geo-referenced brief annotations at locations where gear was seen or collected were entered into Hypack and a detailed cruise log was kept in a notebook. The digital location files of each ROV dive were saved for future import into GIS. Non-HD video from the front-facing video camera on the ROV was recorded on mini digital videotapes. ROV depth, date and time were overlaid on the ROV video feed which can be used to cross-reference the video and navigational data. HD Video and HD stills were recorded from the other front-facing camera. This data was recorded on a hard-drive in the camera itself and downloaded to another hard-drive after each dive. The HD video does not have any information such as the depth or time embedded in the video. The HD video and the regular ROV video captured the same view but the HD video has a narrower field of view. The HD stills were collected using a touch-screen application on a Toughbook that was wired to the camera on the ROV so that the user of the Toughbook could decide when to capture images. We also mounted a black and white rear-facing camera, but only turned it on when we needed to ensure that the ROV would not become entangled in gear. This rear-facing video was not recorded.

Data collection, recording protocols and checklists were developed and followed for all aspects of the field operations including:

- Pre-dive checklist including data to be collected (includes data to be recorded on the fly); data recording procedures, including naming conventions (tape labels, sequential dive names, etc.);
- Post-dive checklist including a dive review and evaluation, data download and storage, charging equipment, ensuring that the gear is stored properly before transiting to next site, etc.

## Specimen Collection

This project provided a unique opportunity to characterize encrusting invertebrate communities associated with lost fishing gear. In state MPAs, invertebrates were removed by hand when possible, photographed on deck, and then returned to the water, as well as any entrapped fish. At locations outside state MPAs, unusual or interesting specimens found on the nets or in traps were collected for educational or scientific purposes. Selected invertebrates associated with the retrieved gear were collected and/or photographed. Some selected specimens were preserved in a 90% ethanol solution. The preserved specimens were brought for identification to the Cohen Laboratory at Romberg Tiburon Center for Environmental Studies at SFSU and Moss Landing Marine Laboratories.



*A glass sponge species found on a net from Soquel Canyon. Amanda Kahn, a graduate student from Moss Landing Marine Labs has identified this sponge down to Subfamily Corbitellinae.*



*Two specimens of red gorgonian (*Euplexaura marki*) seen in above photo were collected and identified by Dr. Gary Williams of California Academy of Sciences who states that the California species has red-orange sclerites (always colored), and prefers colder temperate waters such as these.*



Graduate student Vanessa Garcia collects a variety of tunicates for later study at Romberg Tiburon. From her information and that of other experts, we are developing a species list for organisms that encrust specific nets and traps.

## DAILY CRUISE LOG

### Day 1

**Wednesday, September 15:** Mobilization in Monterey.

8:00 am: Began mobilization at the Wharf 2 public hoist and moved over to guest dock at Fishermen's Wharf.

5:30 pm: Ended operations for the day.

#### Science Personnel:

1. Michael Carver
2. Karen Grimmer
3. Sophie De Beukelaer
4. Andy Lauermann
5. Donna Kline
6. Lorraine Anglin

### Day 2

**Thursday, September 16:** Continued mobilization in Monterey at guest dock.

7:00 am: Met back at guest dock to continue work on mobilization. This took most of the day. One dive was conducted at dock to test ROV. Ashley, Jessica and Donna trained on the dive.

6:30 pm: Ended operations for the day.

Science Personnel:

1. Michael Carver
2. Karen Grimmer
3. Lisa de Marignac
4. Sophie De Beukelaer (1pm)
5. Andy Lauermann
6. Donna Kline
7. Ashley Knight (1pm)
8. Jessica Watson (1pm)

**Day 3**

**Friday, September 17:** Completed mobilization. Survey and retrieval for Target 1 in southern Monterey Bay Canyon.

7:00 am: Completed mobilization; collected emergency dive gear.

10:30 am: Departed harbor for Target 1 (gill net) in southern Monterey Bay Canyon.

10:45 am: Dive #1: found net within 30 minutes and surveyed site;

Found and removed a crab pot (not documented at site) using carabineer and spool line; Photo-documented specimens on pot including two large basket stars; pot was illegally zip tied closed.

Dive #2: Went back to Target 1 and surveyed net – it took some time to find again; Decided not to retrieve net that day.

3:45 pm: Retrieved ROV and returned to port. Cruise leader and group debriefed en route, with a particular focus on improving communications.

4:15 pm: Arrived at Monterey harbor.

Science Personnel:

1. Karen Grimmer, Cruise Leader
2. Lisa de Marignac
3. Sophie De Beukelaer
4. Andy Lauermann
5. Donna Kline

**Day 4**

**Saturday, September 18:** Retrieved 50-foot section of rockfish gill net (Target 1); Located Target 2 and found 50-foot sailboat wreck incorrectly identified as a trawl net.

6:50 am: Science crew aboard F/V *Donna Kathleen*.

6:55 am: Cruise leader and captain reviewed and modified plan of the day as necessary.

7:00 am: Departed for Target 1 and/or 2 (Gill net & trawl net) in southern Monterey Bay Canyon.

8:00 am: Arrived at site and began survey and retrieval operations.

Dive #1: 140-110 meters depth; started line at Target 2, which NMFS had identified as a large trawl net. However, after surveying the area and reviewing the NMFS video, we decided this was a mistaken identification, as the target was a sunken sailboat wreck.

Sails were attached and metridium covered mast and hull.

2:15pm: Dive #2: At 140-meter depth, we recovered a large section of Target 1, a rockfish gill net. Later measurement of the net fragment was 112 meters.

TIME? Dive #3: Went back down to survey net, and net fouled in thrusters. So, retrieved ROV after 10 minutes.

3:30 pm: Retrieved ROV and returned to port. Cruise leader and captain debriefed en route.

5:00 pm: Arrived at Monterey harbor.

Science Personnel:

1. Karen Grimmer, Cruise Leader
2. Sophie De Beukelaer
3. Andy Lauermann
4. Donna Kline
5. Susan Meyer

**Day 5**

**Sunday, September 19:** Rest day—no science operations.

**Day 6**

**Monday, September 20:** Survey and retrieval of crab pot on western Portuguese Ledge SMCA; survey of eastern PL SMCA from last year's net retrieval.

6:50 am: Science crew aboard F/V *Donna Kathleen*.

7:00 am: Departed for western Portuguese Ledge SMCA.

8:30 am: Arrived at site and begin survey and retrieval operations;  
Dive #1: conducted search for crab pot.

10:45 am: Located pot at 228 meters and carefully hooked with carabineer.

11:30 am: Retrieved ROV and then crab pot and ended dive #1.

12:00 pm: Photo catalogued specimens; there were MANY cat shark egg cases with hatching embryos attached to crab pot. Placed hatching sharks into cooler and later released; Collected 2 species of tunicates (one introduced) for Vanessa Guerra, a graduate student with Sarah Cohen at Romberg Tiburon Lab; Other species logged included brittle stars (many), small urchins (2 spp.), tube worms, sponges, squat lobsters (many), worm spp.

1:30 pm: Dive #2: Goal of this dive was to resurvey last year's net retrieval site at eastern Portuguese Ledge SMCA, and collect HD video and still images of the area. This is a very diverse site with some ledges at 100% coverage with corynactis spp, sponges and gorgonians.

2:40 pm: Retrieved ROV and return to port. Cruise leader and captain debriefed en route.

4:00 pm: Arrived at Monterey harbor.

Science Personnel:

1. Karen Grimmer, Cruise Leader
2. Sophie De Beukelaer
3. Andy Lauermann
4. Donna Kline
5. Jessica Watson
6. Susan Meyer
7. Vanessa Guerra

**Day 7**

**Tuesday, September 21:** Poor weather conditions outside Monterey Bay so surveyed for Sullivan's crab pots and trained staff on ROV.

6:50 am: Science crew aboard F/V *Donna Kathleen*.

6:55 am: Cruise leader and captain reviewed and modified plan of the day as necessary.

7:00 am: Departed for crab pot locations.

8:00 am: Dive #1-Arrived at site and began survey operations at 90 meters. Did not find crab pots but collected HD stills and video of soft bottom habitat and conducted ROV trainings. Species observed included large nudibranchs (tritonias diomedea and dendronotus iris) and their egg cases, large orange sea stars and many octopi.

3:30 pm: Retrieved ROV and returned to port. Cruise leader and captain debrief en route.

5:00 pm: Arrived at Monterey harbor.

Science Personnel:

1. Lisa de Marignac, Cruise Leader
2. Sophie De Beukelaer
3. Andy Lauermann
4. Donna Kline
5. Susan Meyer
6. Vanessa Guerra

**Day 8**

**Wednesday, September 22:** Surveyed Point Lobos SMCA for Targets 4 & 5 (spot prawn traps) and Carmel Bay to retrieve DFG clump weight and collected red gorgonian.

6:50 am: Science crew aboard F/V *Donna Kathleen*.

7:10 am: Departed for Targets 4 and 5 (traps) in Point Lobos SMCA.

8:45 am: Arrived at site and began Dive #1 – depth at 267 meters.

After surveying for 10 minutes, located a trap in muddy, benthic area; Hooked onto trap with carabineer, and did not release with spool; pulled up trap attached to ROV.

10:30 am: ROV retrieved with trap attached and some line; collected specimens from trap included: large, squat lobster, a large white glass sponge (graduate student at Moss Landing Marine Labs identified as Subfamily Corbitellinae), 2 small sponges, brittle stars, cat shark egg cases, empty rat fish egg case, cup coral, 2 nudibranchs, small fragile urchin, worms.

10:40 am: Dive #2 – Depth at 284 meters; looking for second trap;

11:15 am: Hit bottom on dive; species list includes: pink, fragile urchins on bottom; many jellies in water column; thorny head rockfish (many); poachers; cookie cutter star; pleurobranchia (large sea slug); red rock crab; stylasterias (fish eating sea star at 19.13.45).

12:45 pm: Retrieved ROV without finding trap; transited to Carmel Bay to search for lost DFG clump weight (3 yrs prior).

2:00 pm: Deployed ROV – Dive #3; depth at bottom – 40 meters. Species list included black eye gobies, and nipple sponges.

2:40 pm: Found and retrieved 600-700 lbs clump weight; stowed aboard for use as back up for future ROV ops; weights had some growth such as tube worms, cup corals and a scallop.

3:00 pm: Dive #4 to collect red gorgonian for Dan Gotshall, DFG staff. Site picked was just outside Carmel Bay SMCA – depth 32 meters; Successfully collected two specimens using manipulator arms; they were later preserved in ethanol and identified as “*Euplexaura*” marki, which was originally described from central California by Willy Kükenthal in 1913.

5:00 pm: Arrived back at Monterey harbor; did a tour for Bob Lea.

Science Personnel:

1. Karen Grimmer, Cruise Leader
2. Sophie De Beukelaer
3. Andy Lauermann
4. Donna Kline
5. Jessica Watson

6. Susan Meyer
7. Jason Vasques

### Day 9

**Thursday, September 23:** Returned back to Targets 1 (gill net) and 2 (sunken sailboat) in Southern Monterey Bay to retrieve net and get better footage of sailboat wreck.

6:50 am: Science crew aboard F/V *Donna Kathleen*.

7:00 am: Departed for Targets 1 (gill net) and 2 (sunken sailboat).

9:00 am: Arrived at Target 1 site and began Dive #1 at 115 meters depth.

Species at site included big nose skate, lingcod, flat fish, metridium, crinoids.

9:30 am: Net sighted and we hooked on with carabineer to the netting only (no line); retrieved ROV and started pulling up net with boat winch; net got stuck on rock, and we pulled up a very small fragment of net.

10:30 am: Dive #2 – dropped back onto net at 123 meters depth; net was wrapped on rock and we were not able to retrieve; we moved over 30 meters to original target site and found gill net; snipped with clippers and then hooked onto net; pulled up a good large piece of net (this is the 50 meter fragment).

1:30 pm: Dive #3 – Sunken sailboat wreck (Target 2) – depth 100 meters; Surveyed around the perimeter of the entire debris field with HD; filmed some juvenile yelloweye and cowcod.

2:10 pm: Took sonar reading to determine length on sailboat; vessel is 50 feet and has many metridium growing on hull; main mast is still intact and jib is broken; 2 sails; forward and mid hatch with 3 hatches in rear at stern.

3:00 pm: Retrieved ROV and returned to port. Cruise leader and captain debriefed en route.

5:00 pm: Arrived at Monterey harbor.

#### Science Personnel:

1. Karen Grimmer, Cruise Leader
2. Lisa de Marignac
3. Sophie De Beukelaer
4. Andy Laueremann
5. Ashley Knight
6. Susan Meyer

### Day 10

**Friday, September 24:** Detailed ROV Survey at eastern Portuguese Ledge SMCA to take video transects of the feature for potential use in CSUMB project for SCID (Sanctuary Characterization & Image Display) or other visualizations.

6:50 am: Science crew aboard F/V *Donna Kathleen*.

6:55 am: Cruise leader and captain reviewed and modified plan of the day as necessary. Plan was to work through a transect grid of nine lines to collect continuous imagery for this interesting feature. Conditions were clear and breezy with wind picking up in pm.

9:00 am: Dive #1 – depth at bottom 96.6 meters.

**Transect #1 (line 1 east);** start time:15:32:06:15

HD still images set at 30 second intervals

Species listed: Yellowtails, olives, flags, lincod

Bundle of line: 16:12:14

End transect: 16:12:03



- 9:30 am      **Transect #2 (line 3 south);** start time::16:24:31:02; Depth: 99.5m; Direction: south  
 Species listed: vermillion; yellowtail, flag, starry flounder, orange seastar,  
 Debris line seen at 16:35:10 and 16:43:23 (trawl net?)  
 Restart line at 16:46:48  
 Species included gorgonian, yellowtail, ratfish,  
 End of line at 16:53:28
- 10:08 am      **Transect #3 (line 5 south);** depth at 90m; start time: 17:06:01  
 Followed rockfish net buoy line  
 Images included cool habitat (17:10:29); metridium; vermillion, copper  
 End of line at 17:37:45  
**Transect #4 (line 1 east);** Start at 17:48:45  
 Species list included: sea whip, mediaster, metridium, poacher, sunstar, flatfish,  
 nudibranch, half band rockfish, lingcod, yellowtail, gorgonian, rosy, cucumber,  
 crynoid, YOY rockfish (many), 3D sponges, basket star, green striped, octopus,  
 Dungeness, flag, vermillion, metridium field at 18:01:12  
 End of transect at 18:17:44  
**Transect #5 (line 3 west);** depth 87m; start transect at 18:30:25  
 Species list included: sea whip, mediaster, metridium, sunstar, canary, nudibranch,  
 half band rockfish, Lg lingcod, gorgonian, rosy, cucumber, crinoid, YOY rockfish  
 (many), Lg white glass sponges, basket star, flag, vermillion, metridium, ratfish  
 End transect at 19:03:08  
**Transect #6 (line 5 east);** depth 97m (start) to 85m; start time: 17:10:11  
 Species list included: YOY (many), gorgonian, sponges (white & yellow), yellowtail  
 (many), seastars (many), cucumbers (many), crinoids, blues, canary, tunicates  
 (colonial), corynatis anemones, orange seastar, rock crab, sea pens  
 End time: 19:49:35 (12:47pm actual time)  
 Anchovies seen transiting to next transect
- 12:47 pm      **Transect #7 (line 4 west);** Depth 100.9m; start time 19:54:33  
 Species list included: brittlestar carpet, canary,  
 End time: 20:38:54  
**Transect #8 (line 2 east);** depth 96m; start time: 20:55:04  
 Species list included: yellowtail, red gorgonian, corals, canary, vermillion, flatfish,  
 seastars, crinoids, metridium, sponge and monofilament line  
 End time: 21:30:19
- 2:50 pm      **Transect #9 (line 2 south);** depth 97.8m; start time 21:47:05  
 Species list included: vermillion, gopher, octopus, flatfish, brittlestars, corals, lingcod,  
**yelloweye #1 (22:24:41)** lingcod, **yelloweye #2 (22:30:12)**  
 End time: 22:36:40
- 3:30 pm      End of Dive #1

Science Personnel:

1. Karen Grimmer, Cruise Leader
2. Lisa de Marignac
3. Sophie De Beukelaer
4. Andy Laueremann
5. Ashley Knight
6. Jessica Watson
7. Susan Meyer

### Day 11

**Saturday, September 25:** Survey for Della C - location is 7 miles south of Ano Nuevo.

Was not able to find wreck site

5:00 am: Science crew aboard F/V *Donna Kathleen* and depart for long transit to study site. Conditions were good, not too breezy. Coordinates are from fishermen who visited the wreck one day after the vessel sunk. Site has some rocky habitat. Prior to dives, we took sonar readings on the target and saw a feature that could have been a boat hull; Transit took approximately 4.5 hours.

10:30 am: Dive #1; proceeding carefully to find any sign of debris field. Found nothing at sonar reading, so move south with ROV and started doing transects north of target. We completed a set of transects in a grid that were 1km in each direction from target. Did not find any sign of debris field. Ended Dive and returned to port.

#### Science Personnel:

1. Karen Grimmer, Cruise Leader
2. Sophie De Beukelaer
3. Andy Laueremann
4. Ashley Knight
5. Susan Meyer

### Day 12

**Sunday, September 26:** Rest day—no science operations

### Day 13

**Monday, September 27:** Survey and retrieval east of Soquel Canyon SMCA for Target 6 (net on steep canyon slope) – this is the deepest dive attempted and tested the ROV, tether and boat winch line to their max limits.

6:50 am: Science crew aboard F/V *Donna Kathleen*.

6:55 am: Cruise leader and captain reviewed and modified plan of the day as necessary.

7:00 am: Departed for Target #6 east of Soquel Canyon SMCA.

9:19 am: Arrived at site and began Dive #1.

9:51 am: ROV reached bottom at 286 meters; moved slowly deeper as we surveyed; lots of krill and bright orange rockfish; ROV at 298 m and found target.

10:20 am: Target found and we hooked onto top of net and released carabineer; Spectra line began to spool out and pilot grabbed line with ROV manipulator; ROV was retrieved with net attached; at 60 feet from bottom, ROV lost all power and had to be brought to the surface manually; we retrieved ROV and switched spectra to boat winch; pulled up the old, rockfish gill net with some organisms still attached. The rockfish gill net was later measured at 250 feet in length; crew proceeded to photocatalog all specimens in net. Species list from 300 meter depth included: brittle stars (many), 2 large orange anemones, glass and colonial tunicates (later preserved); a large glass sponge, spider crabs, 2 nudibranchs, tube worms, fish skull and bones.

3:00 pm: Retrieved ROV and returned to port. Cruise leader and captain debriefed en route.

5:00 pm: Arrived at Monterey harbor.

#### Science Personnel:

1. Karen Grimmer, Cruise Leader
2. Sophie De Beukelaer

3. Andy Lauermann
4. Ashley Knight
5. Jessica Watson
6. Susan Meyer

#### Day 14

**Tuesday, September 28:** Contingency day –searched for net marked by CSU Monterey Bay in Point Lobos SMCA.

6:50 am: Science crew aboard F/V *Donna Kathleen*.

6:55 am: Cruise leader and captain reviewed and modified plan of the day as necessary.

7:00 am: Departed for Point Lobos SMCA.

9:40 am: Arrived at site and began Dive #1; depth at bottom was 135-140 meters.

Conditions were windy and clear; benthic habitat is cobble beds and full of brachiopods (bivalves). Species list includes: Brachiopods beds (many), tunicates, crinoids, urchins, lingcod, widow rockfish (many), half banded rockfish (few), adult yelloweye (one), green strip rockfish (16:53:04).

12:00 pm: Retrieved ROV and headed back to port; began demobilization by organizing all equipment and labeling items.

#### Science Personnel:

1. Lisa de Marignac,
2. Karen Grimmer
3. Sophie De Beukelaer
4. Andy Lauermann
5. Ashley Knight
6. Jessica Watson
7. Susan Meyer
8. Nicole Capps

#### Day 15

**Wednesday, September 29:** Demobilization in Monterey

9:00 am: Began demobilization and proceeded to Wharf 2 public hoist to offload gear.

5:30 pm: End of cruise.

#### Science Personnel:

1. Karen Grimmer
2. Sophie De Beukelaer
3. Andy Lauermann
4. Ashley Knight
5. Susan Meyer

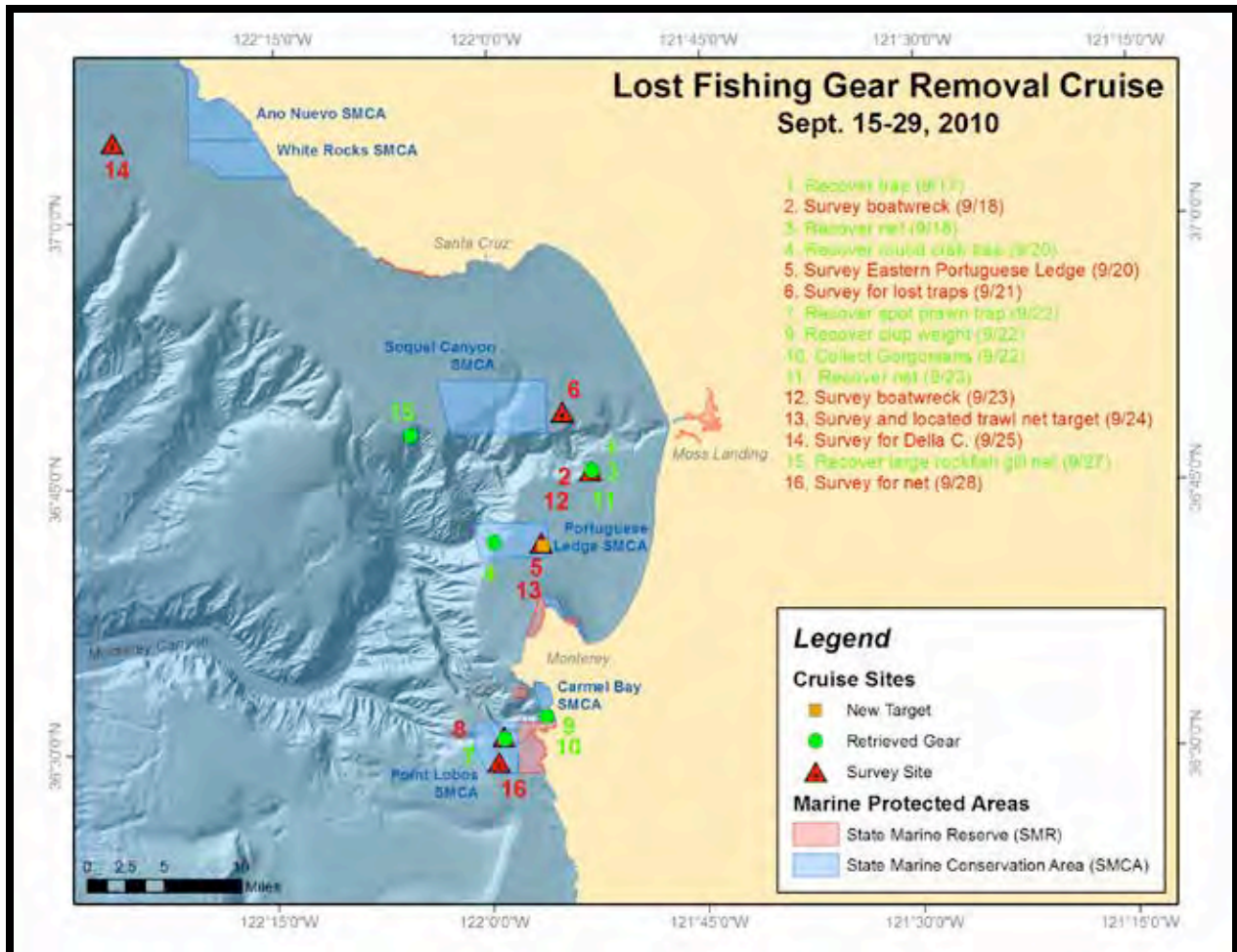
## RESULTS

During September 15-29, 2010, the team completed 20 ROV dives over ten days and took approximately 30 hours of video. Dives were conducted in five main study areas which included the edges of Monterey Canyon, the edge of Soquel Canyon, seven miles from Ano Nuevo, in Carmel Bay and at Point Lobos (see map below). Roughly 50% of the effort was focused in state MPAs and 50% in currently fished areas. The team retrieved 450 feet of rockfish gillnet in 130-300 meters

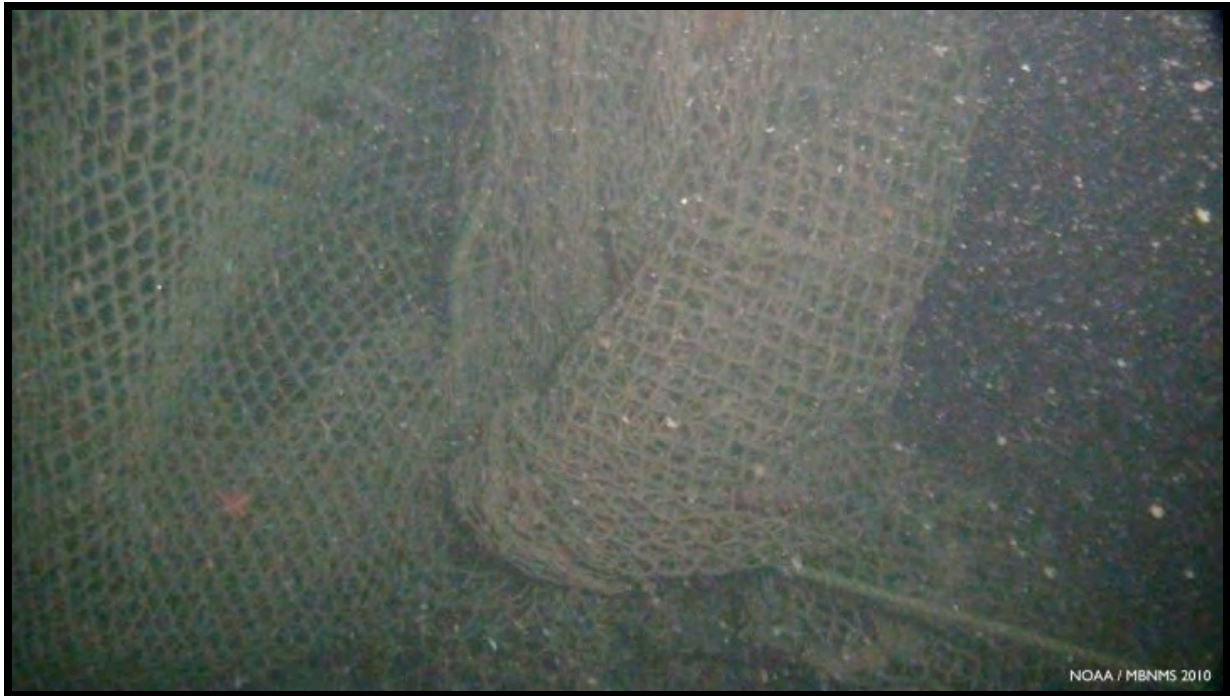
depth, two crab pots, one in 113 m and one in 225 meters, a spot prawn trap in 275 meters and 600 pounds of lead weights in 40 meters. During HD video surveys, additional gear found included a large, intact trawl net and a 50-foot sunken sailboat. The large trawl net, complete with headline, steel cabled footline and both doors, weighing approximately 2,200 pounds and located in a state marine conservation area, has been identified as a priority target for future removal operations.

Retrieved gear was either lightly or heavily encrusted, yet did not appear to be actively fishing. Documented species included brittle stars, urchins, tube worms, bristle worms, octopi, brachiopods, nudibranchs, glass sponges, nipple sponges, shrimp, squat lobsters decorator crabs, cat shark egg cases, chitons, cup corals, cookie cutter stars, sun stars, metridium anemone sp., crinoids, flatfish, and numerous rockfish spp (including cowcod and yelloweye).

Collection of real time data imagery via HD video camera, navigation files, and HD photographs of the invertebrates associated with the recovered gear are being post processed and cataloged. Video and photo highlights have been created, posted on-line and distributed for outreach and educational purposes.



This map portrays results from the September 15-29, 2010 cruise to remove lost fishing gear from the Monterey Bay National Marine Sanctuary. The green dots represent nets, traps or other types of gear that were retrieved during this cruise. The red triangles represent sites that were surveyed with HD video for gear targets. The orange square represents the intact, trawl net (see photo below) that was found during a transect line survey and will be a priority for removal next year.



*Part of the intact trawl net found at Portuguese Ledge SMCA on 9/20/10 while conducting transect lines to search for new gear targets and image the site with HD video.*



*This crab pot was found and retrieved at So Monterey Canyon. The animals were photographed and cataloged and then released back to the water.*



*Lophelia Pertusa*, a species of deepwater coral found encrusting a net in Monterey Bay; it is rarely seen in the Pacific Ocean.

### RESULTS (continued)

The education and outreach associated with this cruise was a very important element, and complimented the research and resource protection components. The following outreach elements were accomplished:

1. A press release was issued on September 28, 2010 to announce the preliminary results of the cruise. Newspapers that covered the cruise included:
  - 9/29/10 – Robot pulls lost fishing gear from bay  
(<http://www.kcra.com/news/25216554/detail.html>) - KCRA 3 Sacramento
  - 9/30/10 – Researchers comb Monterey Bay for ghost fishers  
([http://www.montereyherald.com/local/ci\\_16214219?nclick\\_check=1](http://www.montereyherald.com/local/ci_16214219?nclick_check=1)) – Monterey County Herald
  - 9/30/10 – Monterey Bay Sanctuary robot clears underwater debris  
(<http://www.thecalifornian.com/article/20100930/NEWS01/9300312>) - Salinas Californian
2. News coverage also included a local news interview for KSBW Channel 6
3. The Lost Fishing Gear Project web page was updated. The link is:  
<http://montereybay.noaa.gov/resourcepro/resmanissues/lostgear.html>
4. A two-page handout was developed for a presentation for NOAA requests and other information requests by the public.