



U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE/NOAA FISHERIES
Pacific Islands Fisheries Science Center
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CRUISE REPORT¹

VESSEL: *Oscar Elton Sette*, Cruise SE-10-06 (SE-82)

**CRUISE
PERIOD:** July 7-17, 2010

**AREA OF
OPERATION:** Main Hawaiian Islands (Fig. 1)

**TYPE OF
OPERATION:** Conducted instrument recovery, diving operations, remote camera surveys, EK60 calibration, and hydroacoustic surveys in support of a Pacific Islands Fisheries Science Center research project.

ITINERARY:

- July 07 Embarked scientists Rooney, Parrish, Boland, Blyth-Skyrme, Donham, Williams, Goldberg, and Davis and departed Ford Island at 0700 to refuel the *Sette* at Pearl Harbor. Held a diving safety stand down while ship was refueling. Upon completion of refueling, the ship departed for Penguin Bank. After clearing the sea buoy, a welcome aboard briefing was held for all scientists and new personnel followed by fire and abandon ship drills. Conducted one towed camera sled (TOAD) dive near the northeastern corner of Penguin Bank. Conditions were evaluated for another TOAD dive off northwestern Lanai, but the current was too strong, so the *Sette* proceeded to the Auau Channel.
- July 08 Arrived in the channel waters of Maui and began conducting operations to recover moorings, which was completed by early afternoon. Began conducting TOAD dives at 1400 off west Maui and held a pre-dive safety briefing in preparation for mixed gas diving operations.
- July 09 Began conducting mixed gas diving operations during morning hours, followed by light profiles from the *Sette*'s 15-ft Safeboat (SE-4) and shipboard conductivity-temperature-depths (CTDs) at noon. TOAD camera sled dives were conducted in the afternoon and evening.

¹ PIFSC Cruise Report CR-10-008
Issued 17 September 2010



- July 10 Operations continued as before, until TOAD dives were terminated at 1630. Scientists Domokos and Comer were picked up at Lahaina Harbor by SE-4 and both embarked on the NOAA Ship *Oscar Elton Sette*. Proceeded to Kealahou Bay.
- July 11 Arrived at Kealahou Bay and anchored using a 2-point moor at about 0500, at which time lines were deployed for suspending the calibration sphere underneath the EK60 transducer. Calibration was completed by 1630, at which time the ship weighed anchor and proceeded to Kailua-Kona, where scientist Domokos disembarked by small boat. Continued transiting back to the Auau Channel and held a pre-dive safety briefing in the evening.
- July 12-13 Resumed mixed gas diving operations during morning hours. Light profiles were conducted off SE-4 at noon, while CTD casts were conducted onboard the *Sette*. TOAD dives were performed in the afternoon and evening. Hydroacoustic surveys were conducted in the early morning hours and attempted in conjunction with TOAD dives.
- July 14 Hydroacoustic surveys were conducted from ca. 0030-0500. At approximately 0500, scientist Parrish reported to Medical Officer LCDR Tran that earlier in the evening he had lost his balance and fallen and hit his head while getting out of bed. Unaware that he had a cut in the back of his head, he returned to bed. In the morning, he discovered the bleeding and other effects from the fall. The Captain decided that Parrish should go to the nearest hospital; therefore, the Chief Scientist was notified. The *Sette* proceeded to the vicinity of Lahaina Harbor, where scientist Parrish was brought, accompanied by LCDR Tran, by small boat to an ambulance waiting on shore to take him to Maui Memorial Hospital. Although Parrish had last dived 3 days earlier, the Divers Alert Network, the Diving Medical Officer for the NOAA Diving Program, and the Hyperbaric Treatment Center at Kuakini Hospital on Oahu were all consulted, as well as the attending physician at Maui Memorial. Eventually, all parties concurred that Parrish's injuries were not related to scuba diving, but rather from a "sleepy fall" sustained on the night of July 13. The *Sette* remained in the vicinity of Lahaina Harbor with scientist Boland and LCDR Tran attending to scientist Parrish until he was released from the hospital in the late afternoon into the care of his wife. . After Tran and Boland returned to the ship, TOAD dives were conducted until midnight.
- July 15-16 Only three certified mixed gas divers remained on the cruise, and a minimum of four are required by NOAA dive regulations to field a mixed gas dive team. Accordingly, the Chief Scientist and Captain concurred that mixed gas diving operations had to be suspended for the remainder of the cruise. Hydroacoustic surveys were conducted, both with and without the TOAD. CTD and light profiles were conducted at noon, followed by

TOAD camera sled operations. TOAD operations were terminated at 1900 on July 16 to commence transiting to Pearl Harbor.

July 17 Returned to Pearl Harbor at 0830. End of cruise.

MISSIONS AND RESULTS:

A. Oceanographic moorings

1. Two oceanographic moorings, each with a total length of approximately 30 m and deployed in August 2009, were recovered. They consisted of a 250-lb anchor, a pair of ORE SWR acoustic releases, an SB-39 temperature recorder with a pressure transducer, an Aanderra acoustic current meter, additional Onset Tidbit temperature loggers in the middle and near the top of each mooring, glass floats in plastic hardhats, attached to a stainless steel mast, an acoustic pinger, and a strobe/RF beacon. One of the moorings also had a Vemco receiver for recording the passage of tagged fish. One of these arrays was deployed in 68 m of water and the other in 55 m to recorded information on shallower mesophotic coral ecosystems. The top of the shallower mooring was at a depth of 24 m (80 ft), and the deeper one had a lifting line floating up at the same depth with a trawl float so that both moorings could be reached by scuba divers using conventional methods and equipment.

The pairs of acoustic releases, arranged in parallel on both arrays, failed to release as a result of biofouling. For the first mooring, divers attached a 500-lb capacity lift bag to bring the mooring to the surface, where it was recovered by small boat. In the other case, divers clipped a line from the PIFSC 19-ft Safeboat (SE-6) to the lifting line, and the mooring was manually pulled to the surface and onboard the boat.

2. A third mooring with a total length of ca. 10 m and consisting of an ORE SWR acoustic release, a Tidbit temperature logger, and a Vemco acoustic receiver was located at a depth of 72 m. This mooring had no lifting eye in shallower waters, but the acoustic release on it worked as designed, and the mooring was easily recovered with the SE-6.
3. Three additional pairs of Tidbit temperature loggers were deployed during the cruise to continue the existing time series of in situ temperature data. Tidbits were attached to markers deployed to mark the beginning and end of selected dive transects. After dive operations were suspended, the last marker was deployed from the surface over a planned dive position.

B. Mixed-gas diving surveys

Four mixed gas dives were conducted (Table 1) on mesophotic reef sites identified from remotely operated vehicle and TOAD dives (Fig. 2). On each dive, a 25-m transect tape was laid out, and markers were deployed at each end to facilitate resurveying in the future. Numbers and species of fish were recorded, and benthic communities were videotaped along each transect. Divers also collected a sample of sand and gravel at each site that will be analyzed later for the presence of amphipods by collaborators at the Bishop Museum. Colonies of the coral *Leptoseris hawaiiensis* were collected for a study of their reproductive characteristics, at the request of Professor Rhian Waller in the Oceanography Department at the University of Hawaii. Dive sites were selected to fill gaps in coverage at different depths from the existing collection of transect data. Dive depths were designed to continually increase from one dive to the next over the course of the cruise, as dive teams accumulated more recent experience with mixed gas dive operations.

Mixed gas dives started in reefs composed of a dense network of branching colonies of *Montipora capitata*. As dive depth increased, the dives gradually transitioned into habitats dominated by *Leptoseris* sp. corals. During the dive on July 12, divers Ray Boland and Ens. Mike Merino encountered a large cylindrical object stuck upright in the seafloor (Fig. 3) that appears to resemble an encapsulated torpedo. Photographs and a site description were forwarded to Pacific Islands Fisheries Science Center Safety Officer Bill Putre. A former Explosives Ordnance Disposal team member, Bill sent the information to appropriate U.S. Navy personnel.

C. Camera sled surveys

Habitat was appraised to look for patches of mesophotic coral using a live feed video camera to survey the habitat of the contours between 50 and 160 m. One goal of this work was to expand surveying to areas outside of the immediate confines of the Auau Channel (Fig. 2). Unusually light wind conditions facilitated this, enabling dives to be completed on Penguin Bank, along the northwest coast of Maui, in the Kalohi Channel between Lanai and Molokai, and along the north and northwestern coast of Lanai. Dives were also completed off the Kihei Coast of Maui and in the Alalakeiki Channel between Maui and Kahoolawe. A total of 33 dives were completed, logging more than 35 hours of surveying the bottom and covering an estimated 50 km of seafloor (Fig. 2 and Table 2).

D. Water column profiling

1. Water column profiling was conducted with an instrument designed to measure photosynthetically active radiation (Table 3 and Fig. 2). Light profiles were conducted at noon, and from SE-4 to minimize vessel

2. shadow effects in the upper water column. The pressure transducer on the light meter was not functioning and could not be repaired. However, the Seabird SBE-39 temperature loggers recovered along with the 30-m long instrument moorings' pressure transducers. The *Sette's* Survey Technician, Stephanie Floyd, downloaded one of the SBE-39s and then re-programmed it to record pressure at the highest frequency possible. It was strapped to the light meter casing, their clocks were synchronized, and the SBE-39 subsequently provided a depth record to accompany the light measurements.
2. Water column profiling was also conducted with a Seabird SBE-19 CTD deployed from the *Sette's* port side J-frame (Table 4, Fig. 2). Casts were conducted daily around noon at depths slightly above the seafloor to characterize the structure of the water column in the Auau Channel.

E. EK60 Calibration and Surveys

1. This cruise was selected as an opportunity to calibrate the EK60, because of its proximity to the calibration site at Kealakekua Bay, Hawaii. Accordingly, in the afternoon of July 10, regular cruise operations were halted and two additional scientists were embarked via small boat from Lahaina Harbor. The *Sette* proceeded to Kealakekua Bay, anchoring there at approximately 0500 on July 11. A calibration of the EK60 was successfully completed by 1630 that day, except for the 200 kHz, which was unable to effectively detect the seafloor.
2. After returning to the Auau Channel, hydroacoustic surveys were added into the mix of operations (Table 5, Fig. 2). The objective was to collect bioacoustics data for the assessment of the density, distribution, and composition of micronekton in the Auau Channel. A transect that was run during a previous cruise in 2008 was resurveyed several times. Preliminary analysis suggests that a high density of micronecktonic organisms is found near the southeastern end of the transect. This area was categorized as having a high density during the 2008 survey as well. Further analysis is required to identify any other patterns and determine their statistical significance.
3. The secondary objective of acoustic surveying was to combine TOAD and EK60 operations with the hope of groundtruthing the acoustic data to match acoustic signatures with organisms seen in the TOAD imagery. The 70kHz retrieval pinger and altimeter had to be removed from the TOAD as their pinging frequencies interfered with the acoustic data. The EK60 appeared to pick up acoustic signatures seconds before organisms were seen on the TOAD cameras. The difference in time is presumably as a result of the horizontal offset between the EK60 acoustic pod on the ship's hull and the TOAD being towed aft on the starboard side. This

method needs to be further analyzed to determine its value. However, the preliminary findings are promising.

**SCIENTIFIC
PERSONNEL:**

John Rooney, Chief Scientist, Joint Institute for Marine and Atmospheric Research
(JIMAR), University of Hawaii (UH)

Frank Parrish, Fishery Biologist, Pacific Islands Fisheries Science Center (PIFSC),
National Marine Fisheries Service (NMFS)

Raymond Boland, Biologist, PIFSC, NMFS

Emily Donham, Optical Mapping Specialist, JIMAR, UH

Vivian Blyth-Skyrme, Optical Mapping Specialist, JIMAR, UH

Austin Williams, Seafloor Video Analyst, University of Hawaii

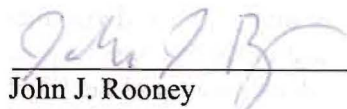
Brian Goldberg, Seafloor Video Analyst, University of Hawaii

Reka Demokos, Research Oceanographer, PIFSC, NMFS

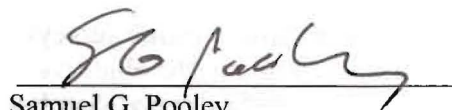
Amy Comer, Research Associate, JIMAR, UH

Sarah Davis, Hollings Scholar, PIFSC, NMFS

Submitted by:


John J. Rooney
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Approved by:


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Science Director
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Attachments

Table 1.--Mixed gas, decompression scuba dives conducted on cruise SE-10-06.

Date	Lat. (deg)	Lat. (min)	Long. (deg)	Long. (min)	Max Depth (m)	Bottom Gas Mix	Bottom Divers	Safety/Support Divers	Notes
7/9/10	20	50.493	156	41.188	50.3	18/50/32	Ray Boland, John Rooney	Mike Merino, Emily Donham, Neil Beckworth	Deco trimix dive on branching coral reef ~2.3 nm SSW of Lahaina; deployed transect markers "SE10-06, CRES-01" & "SE10-06, CRES-02". Did 25 m benthic video & fish surveys; collected sand/gravel sample for amphipods.
7/10/10	20	51.508	156	42.224	56.1	18/50/32	Ray Boland, Frank Parrish	Mike Merino, Emily Donham, Stephanie Floyd	Deco trimix dive on branching coral reef ~1.6 nm SW of Lahaina; deployed transect markers "SE10-06, CRES-03" & "SE10-06, CRES-04". CRES-03 has tidbits #1 & #2, and was deployed as close as possible to the targeted dive site. Did 25 m benthic video & fish surveys; collected sand/gravel sample for amphipods.
7/12/10	20	49.258	156	40.356	60.1	18/50/32	Ray Boland, Mike Merino	John Rooney, Emily Donham, Mills Dunlap	Branching coral reef with some Leptoseris & ~15% macroalgae. Deployed markers "SE10-06, CRES-09" and "SE10-06, CRES-10". Found a large cylindrical object stuck upright in the bottom (Mk60 Encapsulated Torpedo?).
7/13/10	20	56.437	156	45.619	76.8	16/60/24	Ray Boland, John Rooney	Mike Merino, Emily Donham, Stephanie Floyd	Pinnacle at north end of Keyhole; transect was actually run at 239' (72 m). Strong current made it hard to get up from 252' to 239'. Leptoseris reef with lots of L. yabei, L. hawaiiensis, algae and other components. Deployed markers and tidbits.

Table 2.--Towed camera sled dives made during SE-10-06.

Tow ID	Start Date (UTC)	Tow duration	Min Lon (W)	Max Lon (W)	Min Lat (N)	Max Lat (N)	Min Depth (m)	Max Depth (m)
Molokai								
MOL10001	7/8/10	0:55:00	156.465	157.449	21.109	21.126	66	95
Maui								
MAI10001	7/9/10	1:54:00	156.659	156.653	21.026	21.032	64	76
MAI10002	7/9/10	1:11:00	156.698	156.686	21.003	21.006	80	108
MAI10003	7/9/10	1:15:00	156.745	156.721	20.964	20.971	71	149
MAI10004	7/10/10	2:08:00	156.73	156.722	20.773	20.779	88	101
MAI10005	7/10/10	2:35:00	156.744	156.734	20.84	20.866	58	72
MAI10006	7/14/10	0:59:00	156.862	156.842	20.956	20.968	63	86
MAI10007	7/14/10	1:04:00	156.809	156.802	20.93	20.936	52	95
MAI10008	7/15/10	2:02:15	156.73	156.72	20.803	20.817	56	81
MAI10009	7/15/10	1:50:20	156.713	156.693	20.775	20.791	86	92
MAI10010	7/15/10	0:22:00	156.623	156.615	20.778	20.779	55	56
MAI10011	7/15/10	0:29:05	156.621	156.611	20.773	20.775	60	97
MAI10012	7/16/10	0:48:15	156.471	156.46	20.614	20.635	62	86
MAI10013	7/16/10	1:06:15	156.477	156.465	20.649	20.679	90	100
MAI10014	7/16/10	0:49:30	156.492	156.481	20.671	20.695	82	94
MAI10015	7/16/10	1:24:14	156.498	156.479	20.677	20.717	75	90
MAI10016	7/16/10	0:22:00	156.62	156.617	20.774	20.775	62	63
MAI10017	7/16/10	0:28:20	156.622	156.618	20.773	20.777	57	64
MAI10018	7/16/10	0:57:20	156.629	156.613	20.774	20.777	56	62
MAI10019	7/16/10	1:52:45	156.559	156.533	20.716	20.758	60	115
MAI10020	7/17/10	0:51:30	156.625	156.622	20.78	20.781	56	61
MAI10021	7/17/10	1:13:30	156.621	156.595	20.775	20.781	56	63
MAI10022	7/17/10	1:09:30	156.598	156.58	20.76	20.772	56	74

Tow ID	Start Date (UTC)	Tow duration	Min. Long. (°W)	Max. Long. (°W)	Min. Lat. (°N)	Max. Lat. (°N)	Min. Depth (m)	Max. Depth (m)
Lanai								
LAN10001	7/13/10	1:03:00	156.951	156.908	20.984	20.994	73	110
LAN10002	7/13/10	0:42:00	156.947	156.916	20.996	21.001	70	110
LAN10003	7/13/10	1:07:30	156.941	156.899	20.947	20.953	45	81
LAN10004	7/13/10	1:36:00	156.937	156.95	20.95	20.971	50	116
LAN10005	7/13/10	1:44:00	157.003	157.008	20.952	20.967	70	114
LAN10006	7/14/10	0:15:00	157.072	156.071	20.89	20.891	72	84
LAN10007	7/14/10	0:56:00	157.074	157.08	20.895	20.901	81	102
LAN10008	7/14/10	0:31:32	157.08	157.069	20.918	20.921	76	111
LAN10009	7/14/10	0:21:00	157.047	157.035	20.949	20.949	84	161

Table 3.--Locations of light meter casts performed on cruise SE-10-06.

Cast #	Date	latitude (minutes N of 20°)	Longitude (minutes W of 156°)	bottom depth (feet)	bottom depth (meters)
1	7/9/10	47.905	41.182	232	70.7
2	7/10/10	47.911	41.162	238	72.5
3	7/12/10	58.242	54.787	597	182.0
4	7/13/10	59.636	54.458	249	75.9
5	7/14/10	45.510	34.503	243	74.1
6	7/16/10	45.302	36.742	255	77.7
7	7/16/10	45.296	36.740	259	78.9

Table 4.--Locations of SBE-19 CTD casts performed on cruise SE-10-06.

Serial No.	Cast No.	Date	Time	Max. Depth (m)	Latitude 'N	Longitude 'W
3029	1	7/9/10	19:04:48	49.8	20° 50.20'	156° 42.13'
1791	2	7/10/10	22:17:54	49.9	20° 50.91'	156° 42.15'
1791	3	7/12/10	22:26:24	70.0	20° 58.80'	156° 54.17'
1791	4	7/13/10	22:21:41	108.8	20° 59.309'	156° 53.945'
1791	5	7/14/10	22:21:24	71.8	20° 45.235'	156° 34.570'
1791	6	7/15/10	22:21:37	49.0	20° 46.434'	156° 37.359'
1791	7	7/16/10	22:17:08	72.2	20° 45.260'	156° 36.573'

Table 5.--Hydroacoustic survey activities conducted on cruise SE-10-06.

ACTIVITY	Date (GMT)			Time (GMT)		Location			
Type	LOG	Start	End	Start	End	Start		End	
ACOUST_1	002	7/13/10	7/13/10	10:03	16:29	20 57.783N	156 56.785W	20 55.616N	156 46.800W
ACOUST_1	003	7/14/10	7/14/10	10:43	15:01	21 57.783N	156 56.785W	20 56.326N	156 49.160W
ACOUST_2	004	7/15/10	7/15/10	15:13	19:30	20 43.745N	156 34.464W	20 46 140N	156 42.288W
TOAD_ACOUST	005	7/15/10	7/15/10	20:30	21:05	20 46.627N	156 37.213W	20 46.432N	156 37.101W
TOAD_ACOUST	006	7/15/10	7/15/10	21:24	22:03	20 46.627N	156 37.213W	20 46.432N	156 37.101W
TOAD_ACOUST	007	7/16/10	7/16/10	8:28	9:03	20 46.627N	156 37.213W	20 46.432N	156 37.101W
TOAD_ACOUST	008	7/16/10	7/16/10	9:19	9:33	20 46.627N	156 37.213W	20 46.432N	156 37.101W
ACOUST_2	009	7/16/10	7/16/10	10:40	15:00	20 43.745N	156 34.464W	20 47.302N	156 41.139W
TOAD_ACOUST	010	7/16/10	7/16/10	15:40	16:15	20 46.627N	156 37.213W	20 46.432N	156 37.101W
TOAD_ACOUST	011	7/16/10	7/16/10	16:32	17:40	20 46.627N	156 37.213W	20 46.432N	156 37.101W
TOAD_ACOUST	012	7/17/10	7/17/10	0:18	1:19	20 46.627N	156 37.213W	20 46.432N	156 37.101W
TOAD_ACOUST	013	7/17/10	7/17/10	1:37	2:51	20 46.627N	156 37.213W	20 46.432N	156 37.101W

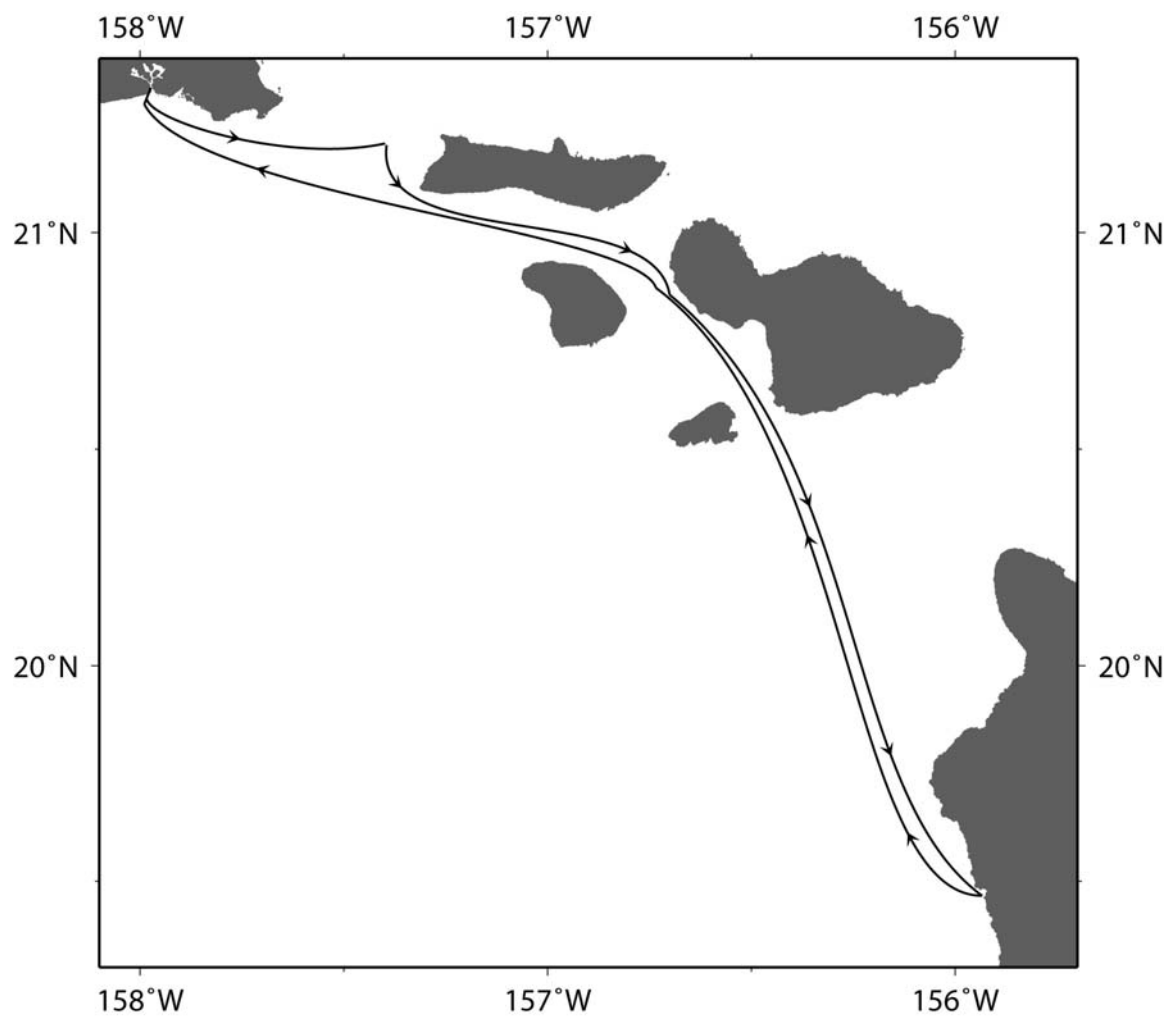


Figure 1.--Track for *Oscar Elton Sette* cruise SE-10-06.

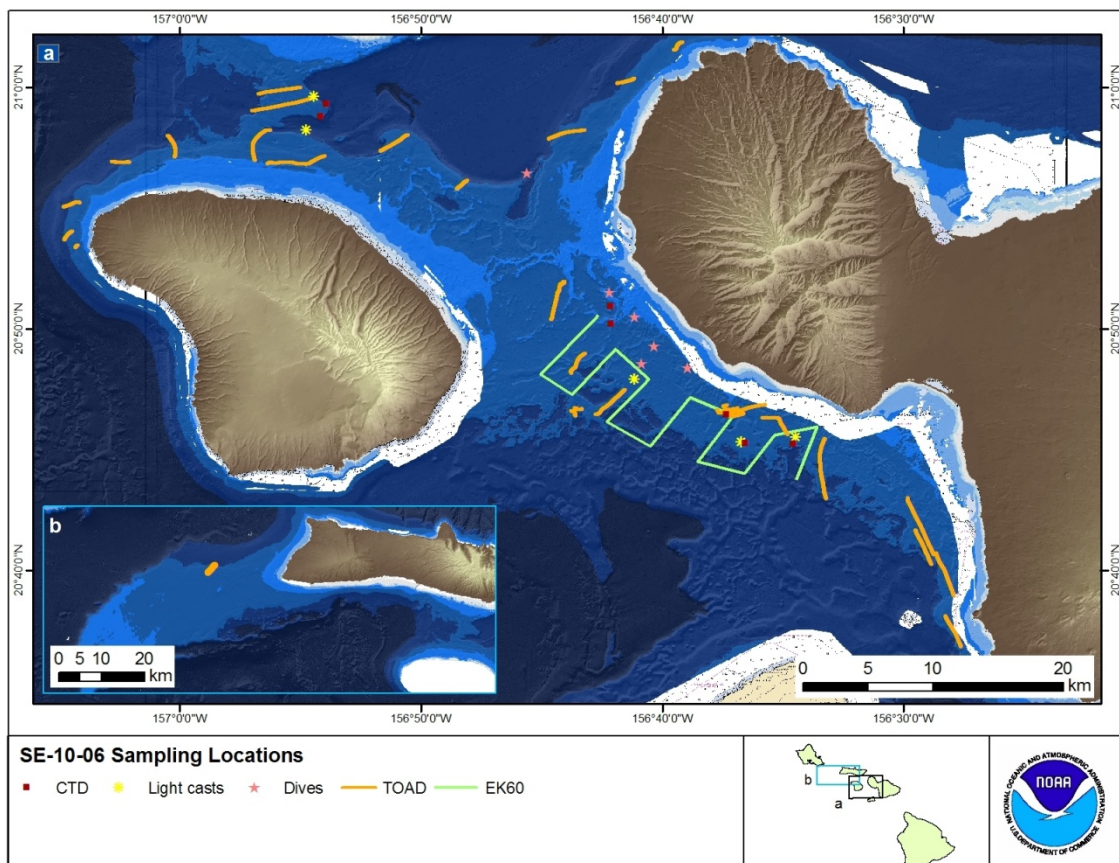


Figure 2.--Map of scientific surveying, dives, and other activities on cruise SE-10-06.

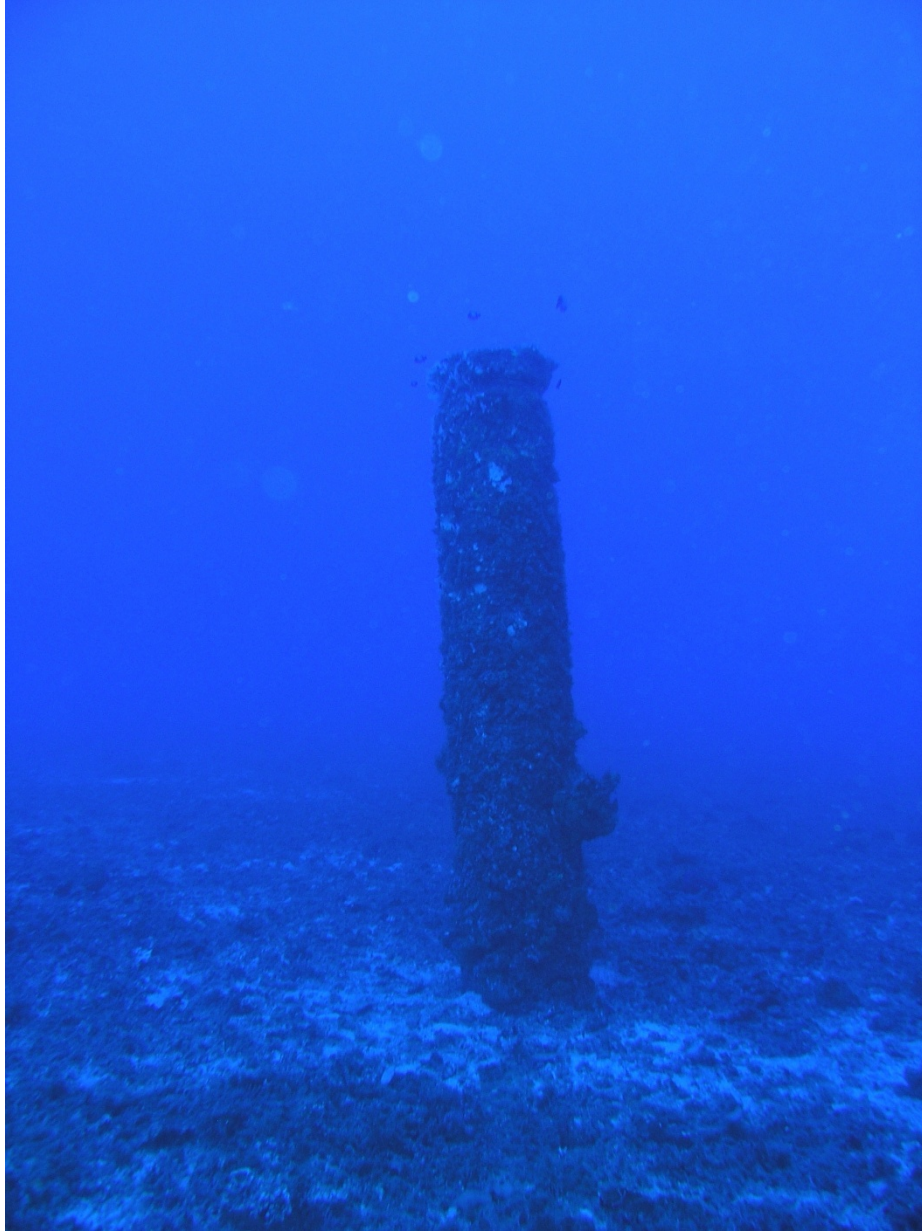


Figure 3.--Cylindrical object encountered outside of Lahaina Harbor during a mixed gas dive to a depth of 60 m (197 ft).