U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE/NOAA FISHERIES
Pacific Islands Fisheries Science Center
2570 Dole St. • Honolulu, Hawai`i 96822-2396
(808) 983-5300 • Fax: (808) 983-2902

# CRUISE REPORT[1]

**VESSEL:** NOAA Ship *Oscar Elton Sette*, Cruise SE-11-04

**CRUISE PERIOD:** 1 July – 13 July 2011

**AREA OF OPERATION:** The lee coast of the island of Hawaii (Fig. 1)

**TYPE OF OPERATION:** An ocean glider was deployed off the Kona coast of Hawaii. Conductivity-temperature-depth (CTD) casts were deployed to a depth of 1000 m; acoustic transects, mid-water net trawls, and marine mammal observations were conducted at stations along a sampling grid. Surface temperature and salinity data were collected continuously.

**ITINERARY:**

1 July — 1430 Start of cruise. Embarked Evan Howell, Donald Kobayashi, Réka Domokos, Phoebe Woodworth, Noriko Shoji, Amy Comer, Aimee Hoover, Johanna Wren, Megan Duncan, John Denton, Patricia Bruno, Becky Moylan, Laura Lilly, Jonathan Davis, Jamie Barlow, Allan Ligon, Marie Hill, Laurie Richmond, and Jennie Mowatt. Proceeded to Station 1 at 21°10'N, 156°30'W.

2 July — Arrived at Station 1 at 21°10'N, 156°30'W at 0230. Conditions were deemed too rough for operations. Proceeded to alternate Station 1 at 19°40'N, 156°30'W. Arrived at Station 1 at 0500. At 0600 began preparations for Ocean Glider launch. Launched Ocean Glider at 0800. Deployed 17-ft Safe Boat for marine mammal observations at 1000. Performed acoustic transect from 1100 to 1300 followed by CTD #1 to a depth of 1000 m at 1300. Retrieved small boat at 1700 followed by

[1]PIFSC Cruise Report CR-11-005
Issued 2 September 2011

acoustic transect starting at 1700. Performed CTD #2 to a depth of 1000 m at 1930 followed by oblique Trawl #1 at 2100.

3 July — Performed Trawl #2 at 0100. Once completed, steamed to Station #2 at 19°40'N, 156°20'W. Arrived at Station #2 at 0600 and performed CTD #3 to a depth of 1000 m. Deployed small boat for marine mammal observations at 0730 followed by acoustic transect beginning at 0900 and headed towards Station #3 at 19°40'N, 156°10'W. Arrived at Station #3 and performed CTD #4 to a depth of 1000 m. At 1400, the small boat went into Honokohau harbor for fuel. Retrieved small boat at 1630 and steamed to Station #4 at 19°40'N, 156°05'W. Performed acoustic transect at 1700 followed by Trawl #3 at 2100. CTD #5, to a depth of 1000 m, was conducted at 2300.

4 July — Performed Trawl #4 at 0100 and once completed steamed to Station #5 at 19°50'N, 156°10'W. Arrived at Station #5 at 0600 and conducted CTD #6 to a depth of 1000 m at 0600. Deployed small boat for marine mammal observations at 0730. Performed acoustic transect to Station #6 at 19°55'N, 156°05'W. CTD #7, to a depth of 1000 m was conducted at 1030. Retrieved small boat at 1400 due to rough weather. Steamed to Station #7 at 20°00'N, 156°00'W. Performed CTD #8 to a depth of 1000m at 1800 followed by Trawl #5 at 2100.

5 July — Performed Trawl #6 at 0100 and once completed steamed to Station #8 at 20°00'N, 155°55'W. Performed CTD #9 to a depth of 1000 m at 0600 and once completed deployed the small boat for marine mammal observations at 0730. Began acoustic transect at 0800 followed by additional acoustic transect at 1600. Small boat was retrieved at 1630 followed by an acoustic transect at 1700. Trawl #7 was performed at 2100.

6 July — Trawl #8 was performed at 0000 and once completed the ship steamed to Honokohau Harbor for personnel transfer and refueling. At 0800, the small boat was deployed for personnel transfer and refueling. Disembarked Laurie Richmond, Jennie Mowatt and Marie Hill. Embarked Allen Shimada and Jessica Aschettino. Once passengers were on board, small boat was redeployed at 1000 for marine mammal observations and ship steamed to Station #9 at 19°30'N, 156°10'W. CTD #10, to a depth of 1000 m, was performed at 1300 and once completed ship steamed to Station #10 at 19°20'N, 156°10'W. CTD #11, to a depth of 1000 m, was performed at 1800 followed by Trawl #9 at 2100 and acoustic transect at 2300.

7 July — Trawl #10 was performed at 0100 and once completed the ship steamed to Station #11 at 19°20'N, 156°20'W where CTD #12 was conducted at 0600. An acoustic transect was performed at 0700 and following that the small boat was deployed for marine mammal observations at 0800. The

ship then steamed to Station #12 at 19°20'N, 156°40'W. CTD #13, to a depth of 1000 m, was performed at 1300. The small boat was recovered at 1630 followed by an acoustic transect at 1700 and Trawl #11 at Station #13 (19°20'N, 156°30'W) at 2300.

8 July — Trawl #12 was performed at 0100. The small boat was deployed for marine mammal observations at 0730. The ship then steamed to Station #14 at 19°30'N, 156°20'W. CTD #14, to a depth of 700 m was performed at 1400 and once completed the ship steamed to Station #15 at 19°30'N, 156°30'W. CTD #15 was performed to a depth of 1500 m at 1600. The small boat was recovered at 1630 followed by an acoustic transect at 1700 and Trawl #13 at 2300.

9 July — Trawl #14 was performed at 0100. At 0800, the small boat was deployed for personnel transfer and refueling. Embarked Michael Seki. Once passenger was on board, small boat was redeployed at 0900 for marine mammal observations and ship steamed back to Station #13 at 19°20'N, 156°30'W where CTD #16 was performed to a depth of 200 m at 1730. An acoustic transect was conducted at 1330 as the ship steamed to Station #16 at 19°20'N, 155°55'W where Trawl #15 was performed at 2100.

10 July — Trawl #16 was performed at 0100 and after completion CTD #17, to a depth of 1000 m, was conducted at 0600, and small boat was deployed for marine mammal observations at 0730. The ship then steamed to Station #17 at 19°20'N, 156°00'W where CTD #18 was performed to a depth of 1000 m at 1230. The small boat was recovered at 1630. The ship steamed to Station #18 at 19°30'N, 156°00'W and CTD #19 was performed to a depth of 1000 m at 1845 followed by an acoustic transect. Trawl #17 was conducted at 2100 and was followed by an acoustic transect at 2330.

11 July — Trawl #18 was performed at 0100 and after completion the ship then steamed to Station #19 at 19°30'N, 156°15'W. CTD #20 was performed to a depth of 1000 m at 0600. After completion of the CTD, a small boat was deployed for marine mammal observations at 0730, and the ship then steamed to Station #20 at 19°40'N, 156°15'W. CTD #21, to a depth of 1000 m, was performed at 1230 and following completion the ship steamed to Station #21 (replicate of Station #5) at 19°50'N, 156°10'W. The small boat was recovered at 1630 and CTD #22 was performed to a depth of 1000 m at 1800. Trawl #19 was conducted at 2100 and was followed by an acoustic transect at 2330.

12 July — Trawl #20 was performed at 0100 and after completion the ship then steamed to Station #22 at 19°50'N, 156°20'W. CTD #23 was performed to a depth of 1000 m at 0600. After completion of the CTD, a small boat was deployed for marine mammal observations at 0730, and the ship then steamed to Station #23 at 19°50'N, 156°30'W. CTD #24 was performed to

a depth of 1000 m at 1330. The ship then steamed to Station #24 at 20°00'N, 156°20'W. The small boat was recovered at 1630 and CTD #25 was performed to a depth of 1000 m at 1830. Trawl #21 was conducted at 2100 and was followed by an acoustic transect at 2330.

13 July Trawl #22 was performed at 0000 and after completion the ship then steamed back to Ford Island. 1400 returned to Ford Island, Pearl Harbor. Disembarked Evan Howell, Donald Kobayashi, Michael Seki, Allen Shimada, Jessica Aschettino, Réka Domokos, Phoebe Woodworth, Noriko Shoji, Amy Comer, Aimee Hoover, Johanna Wren, Megan Duncan, John Denton, Patricia Bruno, Becky Moylan, Laura Lilly, Jamie Barlow, and Allan Ligon. End of cruise.

**MISSIONS AND RESULTS:**

A. Collect oceanographic data from routine CTD casts, continuous acoustic Doppler current profiler (ADCP), and thermosalinograph (TSG) measurements along a predefined grid off the leeward coast of Hawaii.

A total of 25 CTD casts were conducted, with 22 casts to a depth of 1000 m, 2 casts to a depth of 500 m and 1 cast to a depth of 200 m. Twenty-three of the 25 casts were conducted using the full SBE CTD/Rosette system providing temperature, salinity, oxygen, and fluorometry profiles. A leak in the starboard J-frame resulted in movement of the CTD/Rosette system to the port side of the ship. During this transition period two of the 25 casts were conducted using the SBE19 portable CTD system providing temperature, salinity and fluorometry profiles. (Table 1). ADCP and TSG data were successfully collected continuously along the survey grid.

B. Perform CTD-mounted fluorometer measurements and laboratory determination of nutrients, chlorophyll and accessory pigment determinations from water samples collected during CTD operations.

Water samples were collected from all 23 casts conducted using the Rosette system (Table 1). Nutrient samples were taken and frozen for later laboratory analysis. One- and two-liter water samples were filtered at sea for analysis of chlorophyll-*a* and chloropigments, respectively. Chloropigment samples were retained on glass filters after filtration, wrapped in tin foil and stored in liquid nitrogen for later analysis. Chlorophyll samples were retained on glass filters and extracted in 10 ml of 90% acetone for a 24-48-h extraction period. All chlorophyll-*a* samples were processed after extraction using a Turner 10-AU fluorometer aboard the ship.

C. Monitor biological backscatter during trawl operations or along predefined transects using the Simrad EK60 echosounder system. This will be used to help characterize the micronekton faunal composition and densities as the forage base for larger pelagic nekton.

A total of 71 acoustic transects were conducted to collect bioacoustic data on micronekton during the cruise (Table 2). The 200 kHz frequency was inoperable, limiting echosounder data collection to 38, 70, and 120 kHz frequencies.

D. Conduct stern trawl operations at select stations, targeting the depths of high sonic scattering layers to better our understanding of echosounder signals collected by the EK60 echosounder.

A total of 22 trawl tows were conducted targeting the sound scattering layers to 200 m depth during the night period covering 2100−0300. Trawl operations were constrained to shallow night operations due to mechanical overheating. Samples were successfully retained from 20 tows. Samples were lost from two tows: (1) once from a zipper malfunction causing the cod end to break away during retrieval, resulting in an approximate 50% loss of sample; and (2) a second time due to numerous cookie cutter shark bites in the cod end, which resulted in a 100% loss of sample.

E. Deploy University of Hawaii seaglider for oceanographic monitoring.

The University of Hawaii seaglider was successfully deployed on July 3, 2011 and as of August 18, 2011, is still diving and transmitting temperature, salinity, and fluorometry data.

F. Conduct daytime visual surveys for cetaceans from a small boat platform to help develop habitat envelope models in the Kona region.

A total of 70 field hours of effort was conducted, covering over 900 km total distance (Table 3).

**SCIENTIFIC PERSONNEL:**

Evan Howell, Chief Scientist, Pacific Islands Fisheries Science Center (PIFSC), National Marine Fisheries Service (NMFS)
Donald Kobayashi, Research Fishery Biologist, PIFSC, NMFS
Phoebe Woodworth, Research Oceanographer, PIFSC, NMFS
Réka Domokos, Research Oceanographer, PIFSC, NMFS
Noriko Shoji, Supervisory Natural Resource Management Specialist, PIFSC, NMFS
Amy Comer, Research Associate, Joint Institute of Marine and Atmospheric Research (JIMAR), University of Hawaii (UH)
Aimee Hoover, Cooperating Scientist, PIFSC, NMFS
Johanna Wren, Cooperating Scientist, UH

Megan Duncan, Cooperating Scientist, UH
John Denton, Cooperating Scientist, American Museum of Natural History
Patricia Bruno, Cooperating Scientist, PIFSC, NMFS
Becky Moylan, Teacher-at-Sea, National Oceanic Atmospheric Administration
Laura Lilly, Cooperating Scientist, PIFSC, NMFS
Jonathan Davis, Cooperating Scientist, PIFSC, NMFS
James Barlow, Biological Science Technician, PIFSC, NMFS
Allan Ligon, Cooperating Scientist, JIMAR, UH
Marie Hill, Cooperating Scientist, JIMAR, UH
Laurie Richmond, Cooperating Scientist, JIMAR, UH
Jennie Mowatt, Cooperating Scientist, UH
Allen Shimada, Cooperating Scientist, NMFS
Jessica Aschettino, Cooperating Scientist, PIFSC, NMFS
Michael Seki, Supervisory Research Fishery Biologist, PIFSC, NMFS

Submitted by: _____
Evan Howell
Chief Scientist

Approved by: _____
Samuel G. Pooley
Science Director
Pacific Islands Fisheries Science Center

Table 1.--Date, time, and location of 1000-m CTD casts conducted during cruise SE-11-04. The Samples Collected column lists the analyses water samples were collected during the cast. Redundant sensors collected conductivity, temperature, dissolved oxygen, and fluorescence data during each cast.

| Station | CTD Cast | Date and Time | Latitude (˚N) | Longitude (˚W) | Cast Depth (m) | Samples Collected |
|---|---|---|---|---|---|---|
| 1 | 1 | 02 July 1332 | 19.67 | 156.49 | 1000 | HPLC, Nutr, Chl |
| 1 | 2 | 02 July 1951 | 19.62 | 156.53 | 1000 | HPLC, Nutr, Chl |
| 2 | 3 | 03 July 0620 | 19.66 | 156.32 | 1000 | HPLC, Nutr, Chl |
| 3 | 4 | 03 July 1302 | 19.67 | 156.07 | 1000 | HPLC, Nutr, Chl |
| 4 | 5 | 04 July 0017 | 19.67 | 156.16 | 1000 | HPLC, Nutr, Chl |
| 5 | 6 | 04 July 0611 | 19.83 | 156.16 | 1000 | HPLC, Nutr, Chl |
| 6 | 7 | 04 July 1228 | 19.92 | 156.08 | 1000 | HPLC, Nutr, Chl |
| 7 | 8 | 04 July 1811 | 20 | 156.16 | 1000 | HPLC, Nutr, Chl |
| 8 | 9 | 05 July 0619 | 20.01 | 155.99 | 1000 | HPLC, Nutr, Chl |
| 9 | 10 | 06 July 1330 | 19.49 | 156.19 | 1000 | HPLC, Nutr, Chl |
| 10 | 11 | 06 July 1808 | 19.33 | 156.16 | 1000 | HPLC, Nutr, Chl |
| 11 | 12 | 07 July 0614 | 19.39 | 156.33 | 1000 | HPLC, Nutr, Chl |
| 12 | 13 | 07 July 1211 | 19.33 | 156.66 | 1000 | HPLC, Nutr, Chl |
| 14 | 14 | 08 July 1400 | 19.5 | 156.33 | 500 | None |
| 15 | 15 | 08 July 1700 | 19.5 | 156.5 | 1000 | None |
| 13 | 16 | 09 July 1732 | 19.33 | 156.49 | 200 | HPLC, Nutr, Chl |
| 16 | 17 | 10 July 0625 | 19.33 | 155.92 | 500 | HPLC, Nutr, Chl |
| 17 | 18 | 10 July 1222 | 19.33 | 156 | 1000 | HPLC, Nutr, Chl |
| 18 | 19 | 10 July 1842 | 19.5 | 156 | 1000 | HPLC, Nutr, Chl |
| 19 | 20 | 11 July 0620 | 19.5 | 156.24 | 1000 | HPLC, Nutr, Chl |
| 20 | 21 | 11 July 1217 | 19.67 | 156.25 | 1000 | HPLC, Nutr, Chl |
| 21 | 22 | 11 July 1812 | 19.83 | 156.17 | 1000 | HPLC, Nutr, Chl |
| 22 | 23 | 12 July 0606 | 19.83 | 156.34 | 1000 | HPLC, Nutr, Chl |
| 23 | 24 | 12 July 1304 | 19.83 | 156.5 | 1000 | HPLC, Nutr, Chl |
| 24 | 25 | 12 July 1821 | 20 | 156.33 | 1000 | HPLC, Nutr, Chl |

Table 2.--Date, time, and location of acoustic transects conducted during cruise SE-11-04.

| Acoustic Transect | Date and Time | Latitude (˚N) | Longitude (˚W) |
|---|---|---|---|
| 1 | 02 July 1046 | 19.63 | 156.53 |
| 2 | 02 July 1640 | 19.63 | 156.53 |
| 3 | 02 July 2116 | 19.68 | 156.48 |
| 4 | 03 July 2342 | 19.7 | 156.45 |
| 5 | 03 July 0105 | 19.66 | 156.49 |
| 6 | 03 July 0338 | 19.68 | 156.43 |
| 7 | 03 July 0817 | 19.65 | 156.3 |
| 8 | 03 July 1645 | 19.73 | 156.11 |
| 9 | 03 July 2101 | 19.66 | 156.17 |
| 10 | 04 July 0141 | 19.68 | 156.1 |
| 11 | 04 July 0408 | 19.61 | 156.2 |
| 12 | 04 July 0727 | 19.85 | 156.16 |
| 13 | 04 July 1632 | 20.08 | 156.18 |
| 14 | 04 July 1916 | 19.65 | 156.16 |
| 15 | 04 July 2059 | 19.96 | 156.21 |
| 16 | 05 July 0102 | 19.96 | 156.21 |
| 17 | 05 July 0336 | 20 | 156.16 |
| 18 | 05 July 0657 | 20.01 | 155.98 |
| 19 | 05 July 0828 | 20.02 | 156.16 |
| 20 | 05 July 1047 | 20 | 156.18 |
| 21 | 05 July 1128 | 19.86 | 156.03 |
| 22 | 05 July 1349 | 19.8 | 156.11 |
| 23 | 05 July 1634 | 19.91 | 156.03 |
| 24 | 05 July 2059 | 20.01 | 155.95 |
| 25 | 06 July 2357 | 20.05 | 156 |
| 26 | 06 July 0224 | 19.95 | 156 |
| 27 | 06 July 1013 | 19.65 | 156.07 |
| 28 | 06 July 1433 | 19.5 | 156.18 |
| 29 | 06 July 1649 | 19.41 | 156.18 |
| 30 | 06 July 2056 | 19.28 | 156.13 |
| 31 | 07 July 2317 | 19.36 | 156.2 |
| 32 | 07 July 0052 | 19.28 | 156.15 |
| 33 | 07 July 0323 | 19.38 | 156.17 |
| 34 | 07 July 0806 | 19.3 | 156.35 |
| 35 | 07 July 1320 | 19.31 | 156.67 |
| 36 | 07 July 1700 | 19.36 | 156.48 |

| Acoustic Transect | Date and Time | Latitude (˚N) | Longitude (˚W) |
|---|---|---|---|
| 37 | 07 July 2100 | 19.36 | 156.51 |
| 38 | 07 July 2325 | 19.3 | 156.56 |
| 39 | 08 July 0045 | 19.31 | 156.51 |
| 40 | 08 July 0321 | 19.4 | 156.56 |
| 41 | 08 July 1005 | 19.33 | 156.5 |
| 42 | 08 July 1858 | 19.55 | 156.46 |
| 43 | 08 July 2051 | 19.5 | 156.45 |
| 44 | 08 July 2314 | 19.53 | 156.53 |
| 45 | 09 July 0049 | 19.43 | 156.5 |
| 46 | 09 July 1003 | 19.68 | 156.06 |
| 47 | 09 July 1241 | 19.83 | 156.35 |
| 48 | 09 July 1329 | 19.83 | 156.43 |
| 49 | 09 July 2151 | 19.31 | 155.91 |
| 50 | 10 July 0048 | 19.31 | 155.91 |
| 51 | 10 July 0838 | 19.36 | 156 |
| 52 | 10 July 1117 | 19.23 | 156 |
| 53 | 10 July 1352 | 19.33 | 155.98 |
| 54 | 10 July 1642 | 19.46 | 156 |
| 55 | 10 July 1801 | 19.53 | 156 |
| 56 | 10 July 1939 | 19.51 | 156 |
| 57 | 10 July 2100 | 19.53 | 156 |
| 58 | 10 July 2326 | 19.45 | 155.96 |
| 59 | 11 July 0056 | 19.53 | 156.01 |
| 60 | 11 July 0324 | 19.45 | 156 |
| 61 | 11 July 0918 | 19.5 | 156.18 |
| 62 | 11 July 1315 | 19.68 | 156.25 |
| 63 | 11 July 1939 | 19.85 | 156.18 |
| 64 | 11 July 2029 | 19.88 | 156.21 |
| 65 | 11 July 2056 | 19.86 | 156.2 |
| 66 | 11 July 2318 | 19.8 | 156.15 |
| 67 | 12 July 0052 | 19.86 | 156.2 |
| 68 | 12 July 0347 | 19.8 | 156.21 |
| 69 | 12 July 1616 | 20.03 | 156.33 |
| 70 | 12 July 2059 | 19.98 | 156.36 |
| 71 | 13 July 0000 | 19.98 | 156.38 |

Table 3.--Time and locations of surface water samples taken for total chlorophyll and chlorophyll-α analysis in the proximity of the chlorophyll front.

| Date | Vessel | Begin effort | End effort | Effort time | Distance surveyed (km) |
|---|---|---|---|---|---|
| 07/02/2011 | 17-ft Safeboat | 10:29 | 16:01 | 05:41 | 84.98 |
| 07/03/2011 | 17-ft Safeboat | 08:22 | 16:07 | 07:58 | 78.34 |
| 07/04/2011 | 17-ft Safeboat | 08:03 | 13:27 | 05:36 | 66.14 |
| 07/05/2011 | 17-ft Safeboat | 08:02 | 16:03 | 08:09 | 89.23 |
| 07/06/2011 | 17-ft Safeboat | 10:07 | 16:07 | 06:01 | 69.61 |
| 07/07/2011 | 17-ft Safeboat | 07:57 | 15:58 | 08:01 | 116.88 |
| 07/08/2011 | 17-ft Safeboat | 07:52 | 15:14 | 07:22 | 81.03 |
| 07/09/2011 | 17-ft Safeboat | 10:06 | 14:40 | 04:34 | 55.80 |
| 07/10/2011 | 17-ft Safeboat | 07:56 | 16:01 | 08:23 | 81.92 |
| 07/11/2011 | 17-ft Safeboat | 07:48 | 16:05 | 08:17 | 80.16 |
| 07/09/2011 | *Sette* | 15:15 | 17:05 | 01:55 | 38.34 |
| 07/12/2011 | *Sette* | 07:57 | 12:15 | 04:17 | 45.37 |
| 07/13/2011 | *Sette* | 07:23 | 9:00 | 01:37 | 24.26 |

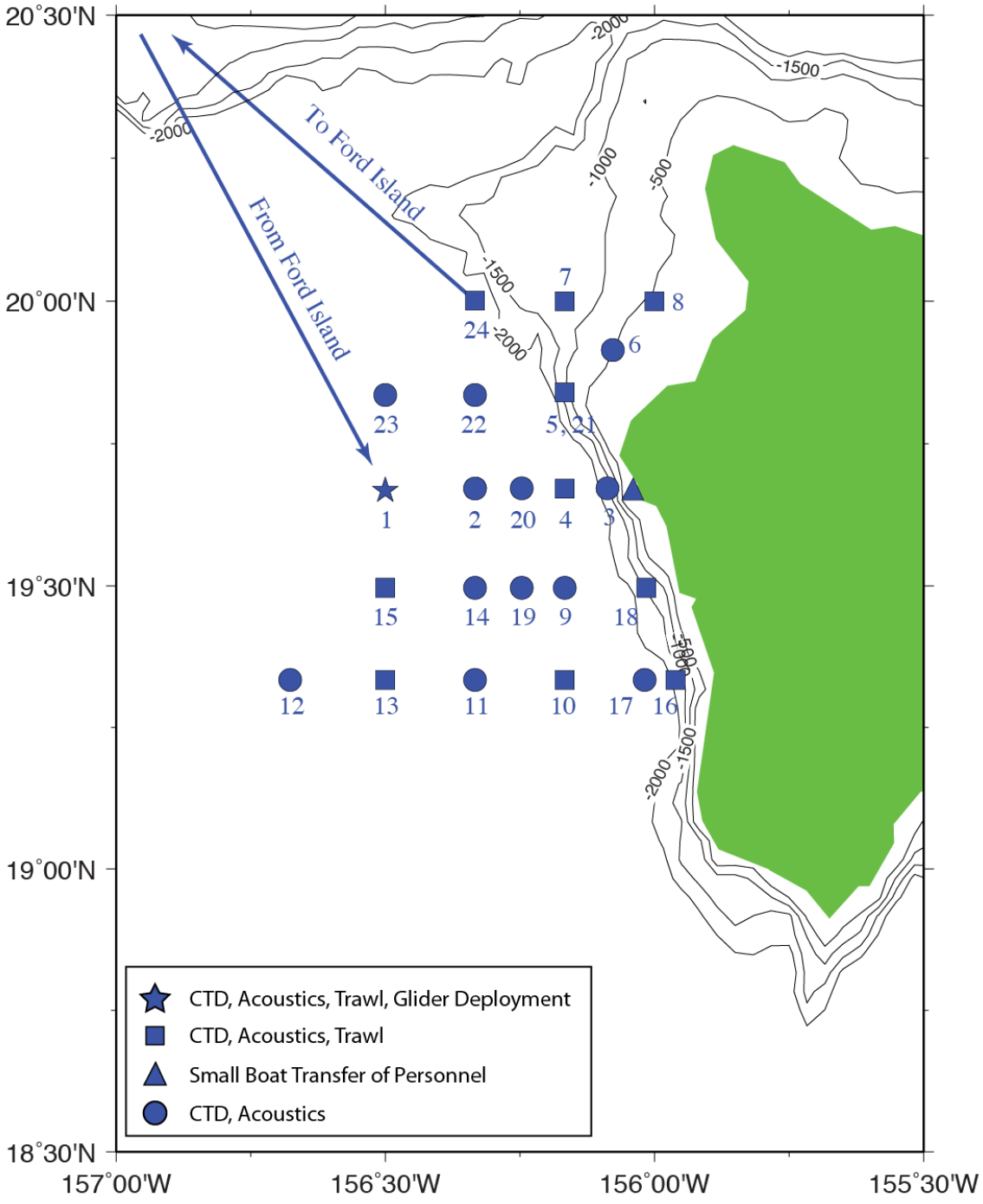


Figure 1.--Map of operations during *Oscar Elton Sette* cruise SE-11-04.