



**U.S. DEPARTMENT OF COMMERCE**  
**National Oceanic and Atmospheric Administration**  
**NATIONAL MARINE FISHERIES SERVICE**

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## **CRUISE REPORT<sup>1</sup>**

**VESSEL:** *Oscar Elton Sette*, Cruise SE-08-03 (SE-60)

**CRUISE PERIOD:** April 15–May 9, 2008

**AREA OF OPERATION:** Kealakekua Bay, Island of Hawaii, Cross Seamount, and Control Site (Fig. 1)

**TYPE OF OPERATION:** Trawl testing operations were conducted off the south coast of Oahu. The calibration of the Simrad EK60 echosounder’s transducers was attempted at Kealakekua Bay, while oceanographic survey operations were conducted at Cross Seamount and at a Control Site (Fig. 1). All survey operations consisted of conductivity-temperature-depth (CTD) casts down to a maximum of 1000 m, as well as “deep” (~ 500 m) and “shallow” (~ 120 m) Cobb trawls at predetermined stations. Bioacoustic backscatter and currents were continuously monitored during the entire cruise.

**ITINERARY:**

15 April At 1300, start of cruise. Embarked Réka Domokos, Eric Cruz, Doug Dixon, Pollyanna Fisher, Lisa De Forest, Donald Hawn, Dale Mincel, Karen Neely, Kelsea Peterman, Michael Seki, and Jerome Taylor. Departed Pearl Harbor, Honolulu, and proceeded off shore and commenced trawl testing operations.

16 April Finished trawl testing operations and proceeded to near harbor. Disembarked Doug Dixon, Pollyanna Fisher, Dale Mincel, Michael Seki, and Jerome Taylor. Departed Honolulu (approx 1600) and proceeded to Kealakekua Bay.

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<sup>1</sup> PIFSC Cruise Report CR-08-007  
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17 April	Arrived at Kealakekua Bay at 1000 and began EK60 calibration operations.
17 April	Aborted calibration operations approximately at 1600.
18 April	At 1000 began transit to Cross Seamount.
19 April	Arrived at Cross Seamount and began oceanographic survey operations.
20 April–06 May	Continued oceanographic survey operations at Cross Seamount.
06 May	Completed oceanographic survey operations at Cross Seamount and transited to Control Site.
06 May	Arrived at Control Site and commenced survey operations.
07–08 May	Continued oceanographic survey operations at Control Site.
09 May	Completed operations at Control Site and transited to Pearl Harbor, Oahu
09 May	At 1400 arrived at Pearl Harbor, Honolulu. Disembarked Réka Domokos, Eric Cruz, Lisa De Forest, Donald Hawn, Karen Neely, and Kelsea Peterman. End of cruise.

## **MISSIONS AND RESULTS:**

### **A Calibrate the Simrad EK60 echosounder.**

1. Kealakekua Bay was chosen as an ideal site for the calibration of the 38 kHz, 70 kHz, and 120 kHz EK60 transducers due to the bay's shallow, usually protected waters with no waves and minimal currents, especially during morning hours. Calibration of the EK60's transducers was successfully carried out on four occasions (September 18, 2004, April 12, 2005, November 16, 2005, and April 22, 2007) in the same location. The calibration site was chosen in ~ 50-m waters with sandy, flat bottom, corresponding to the site used during the previous calibrations. Prior to calibration, both the bow and stern anchors were deployed to maintain a stable position during the procedure.

The calibration involves the placement of a metal calibration sphere — with known acoustic characteristics — underneath the ship's hull-mounted transducers and recording the acoustic return from the sphere at positions that cover the entire circle of the transducers' beam. Since the 38 kHz and 120 kHz transducers are installed next to each other on a "pod" attached to the bottom

of the ship's hull, the calibration recordings on the *Oscar Elton Sette* can be carried out together for both frequencies, once for each pulse width. However, because the 70 kHz transducer is installed further aft on the transducer pod, that transducer has to be calibrated separately. The position of the sphere is controlled by a three-reel electric system with monofilament lines leading from the reels to the sphere. The sphere can be centered below the transducers by placing two reels on the starboard side and one reel on the port side of the ship.

The positioning of the calibration sphere within the transducers' beam involved NOAA certified divers from the *Sette* bringing the line from one side of the ship to the other underneath the hull, so when the line was pulled up on board, the calibration sphere and the weight could be attached to all three lines then lowered back into the water. However, we arrived approximately 4 hours later than planned, at which time the water was choppy and there was a current due to west winds, unusual at this time of the year. In addition, there was a south swell, affecting the waters within the bay. We began operations at approximately 1100; however, we were having difficulties with the calibration reels. After about 1 hour, while we attempted to position the sphere below the 70 kHz transducer with the help of the divers, we decided to let the divers come out of the water while we were fixing the reels. The divers went back in the water at around 1500 for another attempt to position the sphere under the transducer. However, diving operations were aborted and could not be resumed even the next morning, resulting in our inability to calibrate the EK60 instrument.

B. Estimate tuna biomass and obtain information on tuna movement patterns and distribution using the Simrad EK60 echosounder system.

A total of 83 transects were completed to collect bioacoustic data for the assessment of biomass, distribution, and movement patterns of both bigeye tuna and micronekton: 69 transects at Cross Seamount, 6 at the Control Site, and 8 during transits between locations. Because of excessive bubble noise, both vessel speed and heading direction were severely limited about half the survey time, resulting in limited spatial and temporal resolution of data obtained during the cruise. The impact of bubble noise was exacerbated by the presence of fishermen, further limiting the spatial resolution by reducing access to the southeast region of the Cross Seamount plateau. However, the fishermen were willingly cooperative in general, resulting in that the effects of their presence was kept to a minimum. As a result, our ability to estimate bigeye tuna biomass at Cross Seamount is reduced by inadequate quantity of quality data. However, the data will provide quality information on the movement patterns and distribution of bigeye and micronekton at the study site, as well as the effects of the physical environment.

C. Estimate bottom fish biomass at Penguin Banks.

This part of the scientific mission of the cruise failed due to our earlier than scheduled return to Pearl Harbor.

D. Assess the influence of the physical dynamics on the density and distribution of micronekton and primary productivity in the region. Accomplish this assessment by comparing information obtained on micronekton and primary productivity to results on the study of physical environment by conducting CTD casts and continuous acoustic Doppler current profiler (ADCP) and thermosalinograph measurements.

1. A total of 44 CTD casts were conducted to obtain information on temperature, salinity, dissolved oxygen, and chlorophylls. Out of the 44 casts, 4 were conducted during the transit from Kealakekua Bay to Cross Seamount, 36 at Cross Seamount, and 4 at the Control Site. The first CTD cast was taken down to 500 m depth to successfully test the performance of an instrument pressure housing. During the rest of the casts, the CTD rosette with the instruments was taken down alternately to 500 m and 1000 m depth. Limiting the depth of some of the casts was necessary in order to obtain fluorescence recordings, since the fluorometer was rated to only 500 m depth. All CTD operations were completed successfully. However, after CTD #37, we noticed that the frame was cracked open at a previous welding site. Since the ship did not carry welding material for aluminum, the frame was clamped together and we were able to complete the remaining CTD cast without any more problems.
2. During the cruise, a total of 83 transects were completed with continuous ADCP recordings.
3. Sea-surface salinity information was collected during the entire cruise after leaving Kealakekua Bay. Prior to Kealakekua Bay, the thermosalinograph was not correctly connected to the computer recording the data.

E. Conduct stern trawl operations targeting the depths of high sonic scattering layers to better our understanding of echosounder signals collected by the three frequencies of the EK60 echosounder system and to characterize the micronekton faunal composition and densities as the forage base for larger pelagic nekton.

A total of 20 Cobb trawls were conducted during the cruise, 16 at Cross Seamount and 4 at the Control Site. All planned trawling operations were conducted successfully. However, during Trawl #16, the last trawl at Cross Seamount, the port transfer cable broke, which was temporarily reattached to the reel so the trawl could be completed. During our transit to the Control Site, the broken transfer cable was replaced by a brand new one, so the collection of micronekton samples was not affected by the incident. In addition, the sewing connecting the codend to the net was coming apart and had to be repaired.

During Trawl #14, we lost one of the Netmind sensors. The sensor lost was one of the pair attached to the footrope, which was always outside of the reach of the sensor communicating with the transducer, so the loss did not affect the operational capability of the Netmind. During all but the first two trawls, the Netmind recorded depths exceptionally well. However, during the first two tows, we were not able to obtain the vertical position of the net due to an inappropriate connection between the computer hosting the netmind software and the sensor communicating with the computer.

**SCIENTIFIC  
PERSONNEL:**

Réka Domokos, Chief Scientist, Pacific Islands Fisheries Science Center (PIFSC),  
National Marine Fisheries Service (NMFS)  
Eric Cruz, Cooperating Scientist, Joint Institute for Marine and Atmospheric Research  
(JIMAR), University of Hawaii (UH)  
Doug Dixon, Consultant, Marco Global, Inc.  
Pollyanna Fisher, Contractor, Hawaii Institute of Marine Biology  
Lisa De Forest, Cooperating Scientist, UH  
Donald Hawn, Cooperating Scientist, JIMAR, UH  
Dale Mincel, Tech. Representative, Marco Global, Inc.  
Karen Neely, Cooperating Scientist, Duke University  
Kelsea Peterman, Cooperating Scientist, W. Washington University  
Michael Seki, Deputy Director, Pacific Islands Fisheries Science Center (PIFSC),  
National Marine Fisheries Service (NMFS)  
Jerome Taylor, Chief Boatswain *Gordon Gunter* (National Marine Operations)

**DATA COLLECTED:**

The following forms, logs, charts, and data records were kept and given to the PIFSC upon termination of the cruise. These include all data captured onto computer storage media during the cruise. All the records are filed there unless indicated otherwise in parentheses.

CTD Station Log Sheet  
Seabird CTD data files on DVD-R\*  
Marine Operations Log  
Deck Log  
Cobb Trawl Log  
Northstar Netmind data files on DVD-R\*  
ADCP data files on DVD-R\*  
SCS data files (raw and compressed) on DVD-R\*  
XBT (SEAS) data files on DVD-R\*

\*All data files together on the same (1) DVD-R

Submitted by: (/s/Réka Domokos)  
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Réka Domokos  
Chief Scientist

Approved by: (/s/Samuel G. Pooley)  
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Samuel G. Pooley  
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Attachments

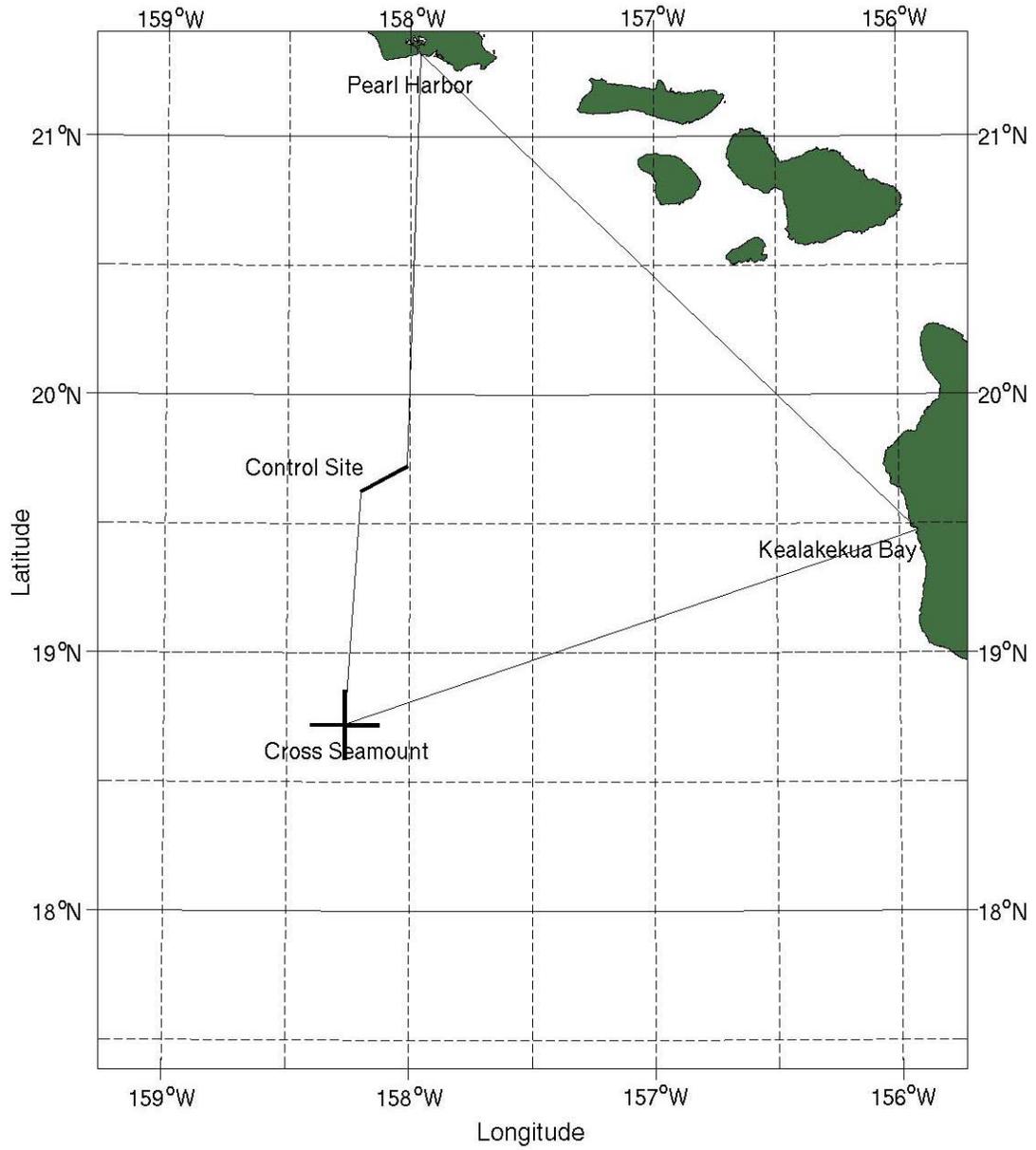


Figure 1.--Track of NOAA Ship *Oscar Elton Sette* cruise SE 08-03 (SE-60), April 15–May 09, 2008.