U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
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Pacific Islands Fisheries Science Center
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CRUISE REPORT[1]

VESSEL: *Oscar Elton Sette*, Cruise 09-08 Leg II (SE-76)

CRUISE PERIOD: October 6 – 30, 2009

AREA OF OPERATION: Papahānaumokuākea Marine National Monument (PMNM)

TYPE OF OPERATION: In support of Pacific Island Fisheries Science Center (PIFSC) marine debris removal operations

ITINERARY:

October 6

After completing refueling operations at the Pearl Harbor fuel pier from 0900 to 1300, the NOAA Ship *Oscar Elton Sette* embarked on a 25-day mission to the Northwestern Hawaiian Islands (NWHI) to remove derelict fishing gear from the remote coral reef habitats of the Papahānaumokuākea Marine National Monument (PMNM). This is the NOAA Pacific Islands Fisheries Science Center (PIFSC), Coral Reef Ecosystem Division's (CRED) second cruise of two such expeditions this calendar year directed towards removing derelict fishing gear. A crew of 17 scientists, with specialized dive training, from CRED and 1 observer from the NOAA Marine Debris Program conducted in water and shoreline surveys and removals at French Frigate Shoals (FFS) and Pearl and Hermes Atoll to reduce the risk of entanglement of protected marine mammals and other wildlife.

Departed Pearl Harbor, Oahu at 1300 en route to French Frigate Shoals. Embarked Scientists Kyle Koyanagi, Kevin O'Brien, Max Sudnovsky, Russell Reardon, Kaylyn McCoy, Marie Ferguson, Derek Levault, Guy Bennallack, Megan Cook, Louise Giuseffi, Andrew Gray, Mark Manuel, Jeffery Milisen, Brooke Hoffman, James Moriarty, Jessica Moye, Tony Perry, and Kris McElwee.

[1] PIFSC Cruise Report CR-10-003
Issued 28 May 2010

October 7	While in transit to French Frigate Shoals, the *Oscar Elton Sette* successfully deployed a High Frequency Autonomous Acoustic Recording Package (HARP) at 0218 at the location between Kauai and Niihau. In addition to the HARP deployment, the Nihoa conductivity-temperature-depth (CTD) cast was successfully completed.
October 8	While in transit to FFS the Necker, French Frigate Shoals, and Gardner CTD cast was successfully completed. In order to maximize our operational hours after completing the FFS CTD cast, the *Oscar Elton Sette* continued on to complete the Gardner CTD cast at night and then returned to the following morning to FFS for a full day of operations.
October 9	The *Oscar Elton Sette* arrived at FFS to deliver supplies for the U.S. Fish and Wildlife Service (USFWS). During the transfer of supplies, 988 kg of land debris was also removed from Tern Island. In addition to the derelict fishing gear transfers at Tern Island, land debris cleanup efforts were also attempted at Trig Island; however the tide and the presence of a Hawaiian monk seal along the shoreline made removals unsuccessful. In water surveys were conducted near Tern Island, and 142 kg were removed from the shallow coral reef environment. The total debris removal operation at FFS removed 1130 kg. During the marine debris survey and removal operations at FFS conducted by two-boat teams, the additional two-boat teams conducted oceanographic instrument inspections, deployment and removals. Three subsurface temperature recorders (STRs) were successfully deployed, an ecological acoustic recorder (EAR) was inspected, and a sea surface temperature (SST) buoy was restarted. A search was conducted for a missing oceanographic anchor that was not located on the last cruise. The anchor was relocated and the STR connected to it was successfully recovered. The *Oscar Elton Sette* departed French Frigate shoal en route to Maro Reef to opportunistically conduct marine debris surveys and removals if weather conditions were ideal.
October 10	Arrived at Maro Reef and successfully completed the CTD cast at Maro Reef's permanent CTD cast station. The marine debris survey sites that were targeted on the outer edge of Maro Reef could not be surveyed unless weather conditions were ideal. Current weather conditions were evaluated by the *Oscar Elton Sette*'s CO and Chief Scientist and the decision to continue on to Laysan was made.

October 11 — The *Oscar Elton Sette* arrived at Laysan Island and launched at first light using their SAFEBOAT to successfully deliver vital communication gear to Laysan for U.S. Fish and Wildlife Service. Immediately following the safe recovery of the SAFEBOAT on board, the *Oscar Elton Sette* departed Laysan en route for Pearl and Hermes to conduct marine debris operations. In addition to the equipment delivery, the *Oscar Elton Sette* conducted the Laysan CTD cast at its permanent station. Upon the recovery of the CTD profiler, the survey technician noticed that one of the CTD bottles was missing. Further inspections showed cracks in the frame with whole support rods missing. The CTD did not take any impact on recovery. Closer inspections showed that the CTD bottle frame was bent outward like something had pulled the bottle off, not pushed in like damage from impact. The type of damage to the CTD profiler baffled everyone. There was no logical explanation for the damage that occurred. The remainders of the CTD casts on the cruise were cancelled due to the damage that was inflicted on the equipment.

October 12 — The *Oscar Elton Sette* arrived at Pearl and Hermes, and the small boat safety briefing was held at 0730 to discuss any safety concerns and last-minute operations. At 0745, we began launching the first small boat and entered Pearl and Hermes from the Big Boat Pass focusing our first days' cleanup effort on the area we surveyed on the last operational day of SE-09-08, Leg I. Four teams conducted freedive towed diver surveys and removed nets that were left behind from the last cruise because of lack of space. The marine debris teams surveyed 0.4975 km and removed 2399 kg from the southwest sand margin of Pearl and Hermes near Seal and Kittery. In addition to the marine debris surveys and removals, the *Oscar Elton Sette* also successfully deployed the second of the two HARPs that were scheduled for this cruise.

October 13 — The marine debris team continued to conduct their surveys on the southwest side of Pearl and Hermes and began getting back into their normal routine. An area of 0.7807 km was surveyed and 932 kg of derelict fishing gear were removed.

October 14 — The marine debris team shifted their survey and removal efforts to the central area in the maze entering through the small boat pass slightly west of Southeast Island. While operating within the maze, tow surveys are not as effective so swim surveys were conducted by the boat teams. An area of 0.2615 km was surveyed, and 2372 kg of derelict fishing gear was removed from Pearl and Hermes shallow coral reefs.

October 15 The marine debris teams continued swim surveys in the maze working north into areas that had not been surveyed for a few years. In addition to the 4 boat teams conducting swim surveys, the *Oscar Elton Sette*'s inflatable was also launched with the ship's crew and officers to remove land debris form North Island. An area of 0.2234 at the Pearl and Hermes' maze was surveyed, and 2686 kg of derelict fishing gear were removed. An additional 460 kg were also removed from North Island by the *Sette*'s crew of officers. The total amount of debris removed for the day equaled 3146 kg.

October 16 Swim surveys in the maze continued and 0.3984 km of area was covered. Derelict fishing gear comprised of 2798 kg was removed from the shallow coral reefs within the Pearl and Hermes' maze.

October 17 As the marine debris teams continued to push north working the northern areas of the maze, teams continued to locate and remove large sums of derelict fishing gear. Weather continued to cooperate creating ideal survey conditions. The ideal weather also allowed teams to cover a lot of area. The marine debris team surveyed 0.3695 km and removed 2599 kg of derelict fishing gear.

October 18 Priority sites in the maze were being covered quickly, and the teams conducted swim surveys for 4 days straight. To help reduce fatigue, 2 teams continued to conduct swim surveys in the northern maze and 2 marine debris teams conducted freedive tow surveys. One tow team focused on the northeast sand margin while another surveyed the interior fringing reef. The winds picked up and great weather conditions began to deteriorate. The swim team covered 0.1925 km, and the tow team covered 0.3978 km. The total area surveyed for the day equaled 0.5904 km. The marine debris teams also removed 1040 kg of derelict fishing gear.

October 19 The wind picked up and visibility in the maze deteriorated. All teams were assigned to focus survey and removal efforts in the northeast sand margins of Pearl and Hermes. Tow surveys by all teams covered 0.5864 km. Teams also removed 874 kg of derelict fishing gear and marked two large nets for lift bag operations.

October 20 The marine debris teams continued to survey the northwest sand margin of Pearl and Hermes. Freedive lift bag operations were also conducted on the two large nets that were left behind the previous day. One of the large nets was successfully removed; however the second one was left behind because it was too buried. Multiple attempts with lift bags and boat pulls failed. While conducting operations around 1300, the *Oscar Elton Sette* recalled

all small boats back to the ship for an early departure. The decisions was made to depart early to position closer to Laysan in case of evacuation due to Hurricane Neki. All small boats were recovered and the *Oscar Elton Sette* departed Pearl and Hermes en route to Laysan.

October 21 — En route to Laysan Island. While in transit, the decision was made by the Protected Species Division (PSD) and U.S. Fish and Wildlife Service to evacuate their personnel as a precaution because of the projected course of Hurricane Neki. Preparations were made to launch small boats first thing in the morning.

October 22 — A SAFEBOAT and Avon were launched and these boats successfully transported PSD and USFWS personnel from Laysan Island to the *Oscar Elton Sette*. Embarked Gretchen Johnson, Suzanne Conlon, Andrea Kristof, and Kirstie Yeager of the PSD and Malie Larish, Brette Souci, and Matt Stelmach of USFWS.

October 23 — In order to arrange for logistical air support for personnel departing from Midway and to wait for Hurricane Neki to move out of the region, the marine debris team conducted another day of survey and removal operations at Pearl and Hermes. The weather was not ideal, however, signs of Hurricane Neki were still light. In case of a weather recall or emergency, teams surveyed close to fringing reef to minimize transit time. Teams focused on the southwest region of Pearl and Hermes and surveyed 0.6693 km of shallow coral reef environments removing 464 kg of derelict fishing gear. An additional 220 kg were removed from Seal and Kittery Island. Following the recovery of all small boats, the *Oscar Elton Sette* departed for Midway Atoll to disembark personnel who were scheduled to fly to Honolulu.

October 24 — Arrived Midway Atoll to disembark Coral Reef Ecosystem Division personnel by way of small boat operations. Disembarked Tony Perry III, Andrew Grey, Mark Manuel, Louise Giuseffi, Brooke Hoffman, Kaylyn McCoy, Marie Ferguson, Malie Larish and Russell Van Dyke of the *Oscar Elton Sette*. All personnel departed Midway en route to Honolulu by United States Coast Guard C-130. USFWS personnel were transported from Midway to the *Oscar Elton Sette* by small boat. Embarked Ty Benaly, the Acting Tern Island Refuge Manager, Cindy Waddington, Adam Fox, and Elizabeth Koren, the Electronics and Communications Systems Specialist.

A shore party consisting of the *Oscar Elton Sette* CO and officers, USFWS and PSD camp personnel also went ashore to meet with

program leaders that flew in from Honolulu to go over Laysan Island camp reestablishment and to go over a Tern Island damage assessment priority list.

October 25 — In transit to Laysan. While in transit, last minute preparations were made for the next day's small boat and camp reestablishment operations.

October 26 — The *Oscar Elton Sette* arrived at Laysan in the morning and held its regular safety briefing at 0730. At 0745, the *Sette*'s SAFEBOAT and 1 Avon were launched to conduct an initial camp safety assessment. Once the safety assessment was complete and the green light was given by the *Sette*'s Commanding Officer, personnel, equipment and supplies were transported to Laysan Island. Disembarked Gretchen Johnson, Suzanne Conlon, Andrea Kristof, Matt Stelmach, Brette Souci, Cindy Waddington, and Adam Fox.

The ship's crew aided with the reestablishment of solar power systems and communications. Additional personnel aided with the refilling of camp water receptacles and camp reestablishment operations. Weather conditions were not ideal as exemplified by large swells and high winds. At 1200, the Avon was recovered because of poor sea state conditions but remained on standby until the Laysan camp reestablishment was completed and the SAFEBOAT was safely recovered at 1700.

October 27 — In transit to FFS. The *Oscar Elton Sette* CO conducted meetings for the assessment of Tern Island, French Frigate Shoals. Teams with primary and secondary goals were discussed and established. Maps of Tern Island with locations of structures and equipment were mapped out. Operational risks for the operation were discussed and addressed by those participating in the assessment operation. Last-minute preparations were made for the next day's operation.

October 28 — The *Sette* arrived at French Frigate Shoals at first light. The 0730 safety briefing was conducted with the opportunity to ask any last minute questions about the primary tasks and safety. Teams were limited to 4 hours on site to conduct their assessment. In addition to the assessment of Tern Island's infrastructure, the *Oscar Elton Sette* also transferred 300 gallons of unleaded fuel to the USFWS. Structural integrity of structures, seawall, runway, solar power/generators, septic and water systems were all assessed. Teams also cleaned out freezers and packed personal gear of USFWS personnel and volunteers. Around 1200, the *Oscar Elton*

Sette safely recovered the last small boat and was en route for Ford Island, Pearl Harbor. Following lunch, scientific equipment and small boats were cleaned and packed to prepare for off-load. The Wet lab and Hydro lab were also cleaned for winter in port.

October 29 — While in transit, scientific personnel cleaned staterooms, computer lab, the gym, and movie room. Last minute preparations and logistics were also completed for the in port off-load of marine debris and equipment.

October 30 — Arrived Pearl Harbor, Oahu, Ford Island piers. Disembarked scientists Kyle Koyanagi, Kevin O'Brien, Max Sudnovsky, Russell Reardon, Derek Levault, Guy Bennallack, Megan Cook, Jeffery Milisen, James Moriarty, Jessica Moye, Tony Perry III, Kris McElwee, Ty Benaly, and Elizabeth Koren.

MISSIONS AND RESULTS:

a. Conduct a maintenance level marine debris operation to remove derelict fishing gear from shallow water coral reef environments.

   Maintenance level marine debris in-water surveys and removals were conducted at French Frigate Shoals and Pearl and Hermes Atoll during SE-09-08, Leg II in shallow coral reef environments of 30 ft. or less. Marine debris operations during SE-09-08, Leg II were cut short and diverted to the emergency evacuation of Laysan Island personnel because of the threat of Hurricane Neki. As a result of unforeseen circumstances, marine debris operational days were reduced to 11. Despite the reduction of operational days, the marine debris removal team still managed to cover 4.8895 km² (Table 5) and removed a total of 18,320 kg of derelict fishing gear from the PMNM shallow-water coral reef environments (Table 4).

   During SE-09-08, Leg II (11 operational days)

b. Remove marine debris from Pearl and Hermes and French Frigate Shoals shorelines to reduce entanglement hazards for turtles and protect marine mammals.

   A total of 1754 kg of derelict fishing gear were removed from along French Frigate Shoals, Laysan, and Pearl and Hermes shorelines to reduce entanglement hazards for turtles and protected marine mammals (Table 4).

c. Conduct oceanographic equipment (ecological acoustic recorders, subsurface temperature recorders) deployment, removals, and inspections at location (listed in the cruise instructions attachment, Figure 1) in 60 ft or less.

Table 1.—Oceanographic instrument locations for SE-09-08, Leg II.

Oceanographic Instrumentation							
Action	**Location**	**Instrument Type**	**Latitude**	**Longitude**	**Depth_ft**	**Depth_m**	**Notes**
Check	FFS	EAR	23.76887	-166.26197	33	10.06	EAR Inspected
Deploy	FFS	STR	23.76887	-166.26197	33	10.06	STR successfully deployed
Restart	FFS	SST	23.85623	-166.2751	1	0.3	Restarted but buoy telemetry failed again
Swap	FFS	STR	23.85623	-166.2751	25	7.62	STR successfully swapped
Locate/ Recover	FFS	STR	23.85676	-166.27187	25	7.62	STR located and recovered
Swap	PHR	EAR	27.94057	-175.86171	54	16.46	Not conducted / North Swell
Swap	PHR	STR	27.94057	-175.86171	54	16.46	Not conducted / North Swell

d. Conduct 500-m CTD cast and water samples opportunistically at permanent CTD cast locations listed in cruise instructions.

Table 2.—Permanent CTD Station locations for SE-09-08, Leg II.

Permanent CTD Stations					
Deep Permanent Site ID	**Date**	**Latitude**	**Longitude**	**Description**	**Notes**
Nihoa	10/7/2009	22˚ 32.012 N	161˚ 59.092 'W	South of Nihoa Island	Successfully Completed
Necker	10/8/2009	23˚ 11.118 N	164˚ 42.468 'W	South of Necker Island	Successfully Completed
FFS	10/8/2009	23˚ 34.018 N	166˚ 14.933 'W	South of Tern Island	Successfully Completed
Gardner	10/8/2009	24˚ 08.045 N	167˚ 39.703 'W	SE of Gardner Pinnacles	Successfully Completed
Maro	10/10/2009	25˚ 00.020 N	170˚ 00.029 'W	SE of Maro Reef	Successfully Completed
Laysan	10/11/2009	25˚ 00.020 N	171˚ 32.047 'W	South of Laysan Island	Successfully Completed
Lisianski					Not Conducted Damage to CTD Frame
Pearl and Hermes					Not Conducted Damage to CTD Frame

e. Deploy 2 HARPS at the location listed in the cruise instructions.

Table 3.—HARP Buoy Deployment locations for SE-09-08, Leg II.

HARP Buoy Deployment						
Deep Permanent Site ID	**Date**	**Latitude**	**Longitude**	**Description**	**Depth (m)**	**Notes**
Oahu HARP Option 1	10/7/2009	21˚ 57.164'N	159˚ 53.238 'W	Kauai Channel	706	Successfully Deployed
PHReef HARP	10/12/2009	27˚ 43.517 N	175˚ 38.287 'W	40 Fathom Shoal	753	Successfully Deployed

f. Deliver communications equipment to Laysan Island and perishable supplies to French Frigate Shoals.

Delivery of perishable supplies to French Frigate Shoals (October 9) and communication equipment to Laysan (October 11) were successfully delivered.

SCIENTIFIC PERSONNEL:

Kyle Koyanagi, Chief Scientist, CRED Marine Debris Operations Manager, Joint Institute for Marine and Atmospheric Research (JIMAR), University of Hawaii (UH)
Kevin O'Brien, CRED Marine Ecosystem Specialist, JIMAR, UH
Max Sudnovsky, CRED Marine Ecosystem Specialist, JIMAR, UH
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Submitted by: _____
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Chief Scientist

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

Attachments

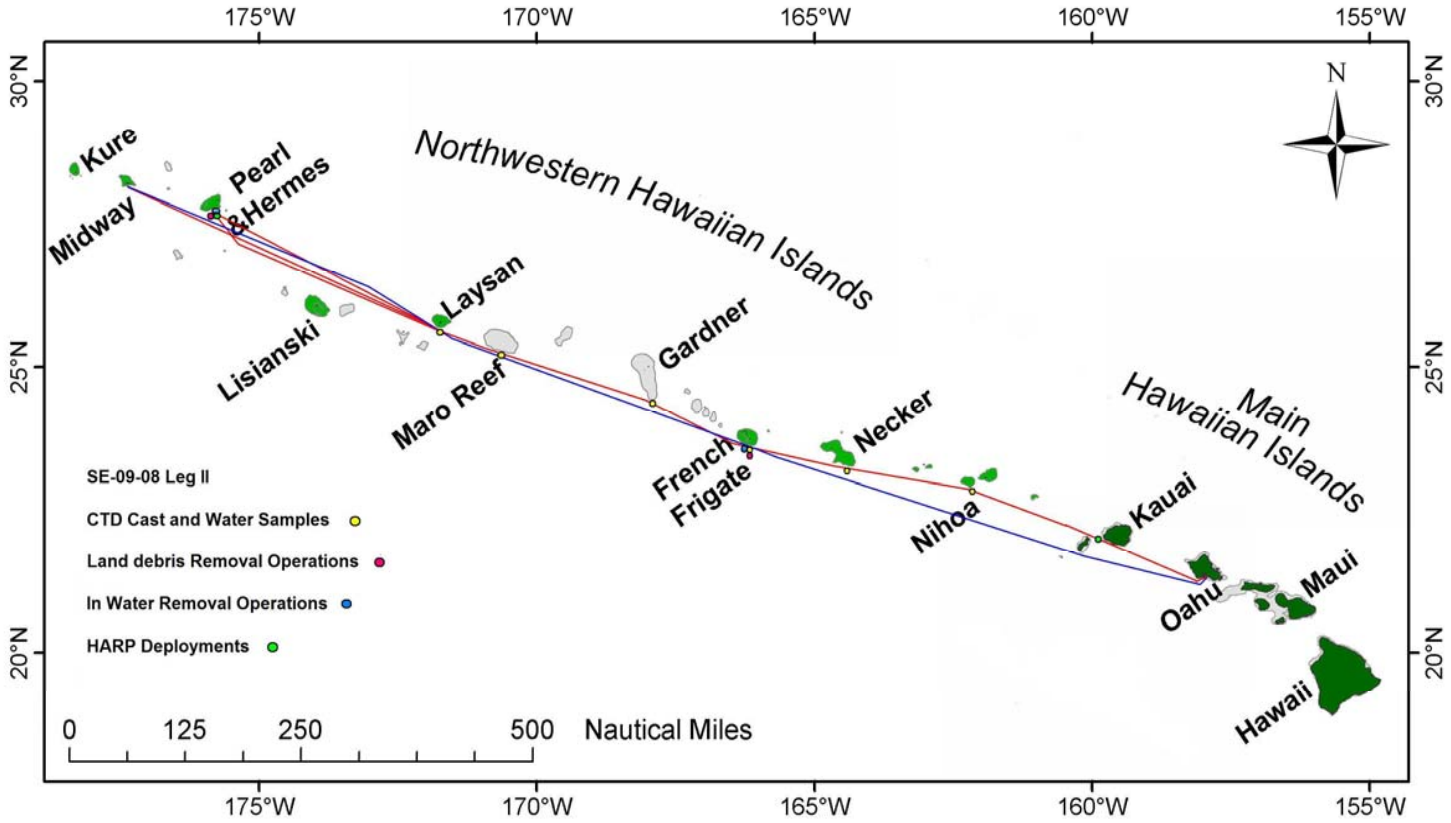

Figure 1.—Cruise Track for Oscar Elton Cruise SE-09-08, Leg II.

Table 4.—Marine Debris Weight in Kilograms for SE-09-08, Leg II.

Marine Debris Weight in Kilograms
ES 09 08 Leg II

Location	Date	Source		Daily Totals
		Land	Water	
French Frigate Shoals	10/9/2009	988	142	1130
French Frigate Shoals Total		988	142	1130
Laysan	10/26/2009	86		86
Laysan Total		86		86
Pearl & Hermes	10/12/2009		2399	2399
Pearl & Hermes	10/13/2009		932	932
Pearl & Hermes	10/14/2009		2372	2372
Pearl & Hermes	10/15/2009	460	2686	3146
Pearl & Hermes	10/16/2009		2798	2798
Pearl & Hermes	10/17/2009		2599	2599
Pearl & Hermes	10/18/2009		1040	1040
Pearl & Hermes	10/19/2009		874	874
Pearl & Hermes	10/20/2009		2014	2014
Pearl & Hermes	10/23/2009	220	464	684
Pearl & Hermes Total		680	18178	18858
Grand Total (kgs)		1754	18320	20074

Table 5.—Marine Debris Survey Area in km² for SE-09-08, Leg II.

Marine Debris Survey Area in km² ES 09 08 Leg II				
		Survey Type		
Location	Date	Swim	Tow	Daily Total
French Frigate Shoals	10/9/2009		0.185668447	0.185668447
French Frigate Shoals Total			0.185668447	0.185668447
Pearl & Hermes	10/12/2009		0.497520731	0.497520731
Pearl & Hermes	10/13/2009		0.78066769	0.78066769
Pearl & Hermes	10/14/2009	0.26157902		0.26157902
Pearl & Hermes	10/15/2009	0.223393872		0.223393872
Pearl & Hermes	10/16/2009	0.3984887		0.3984887
Pearl & Hermes	10/17/2009	0.369502249		0.369502249
Pearl & Hermes	10/18/2009	0.192511178	0.39784162	0.590352797
Pearl & Hermes	10/19/2009		0.58638166	0.58638166
Pearl & Hermes	10/20/2009	0.257220769	0.069404069	0.326624839
Pearl & Hermes	10/23/2009		0.669307442	0.669307442
Pearl & Hermes Total		1.702695788	3.001123213	4.703819001
Grand Total (km²)		1.702695788	3.18679166	4.889487448

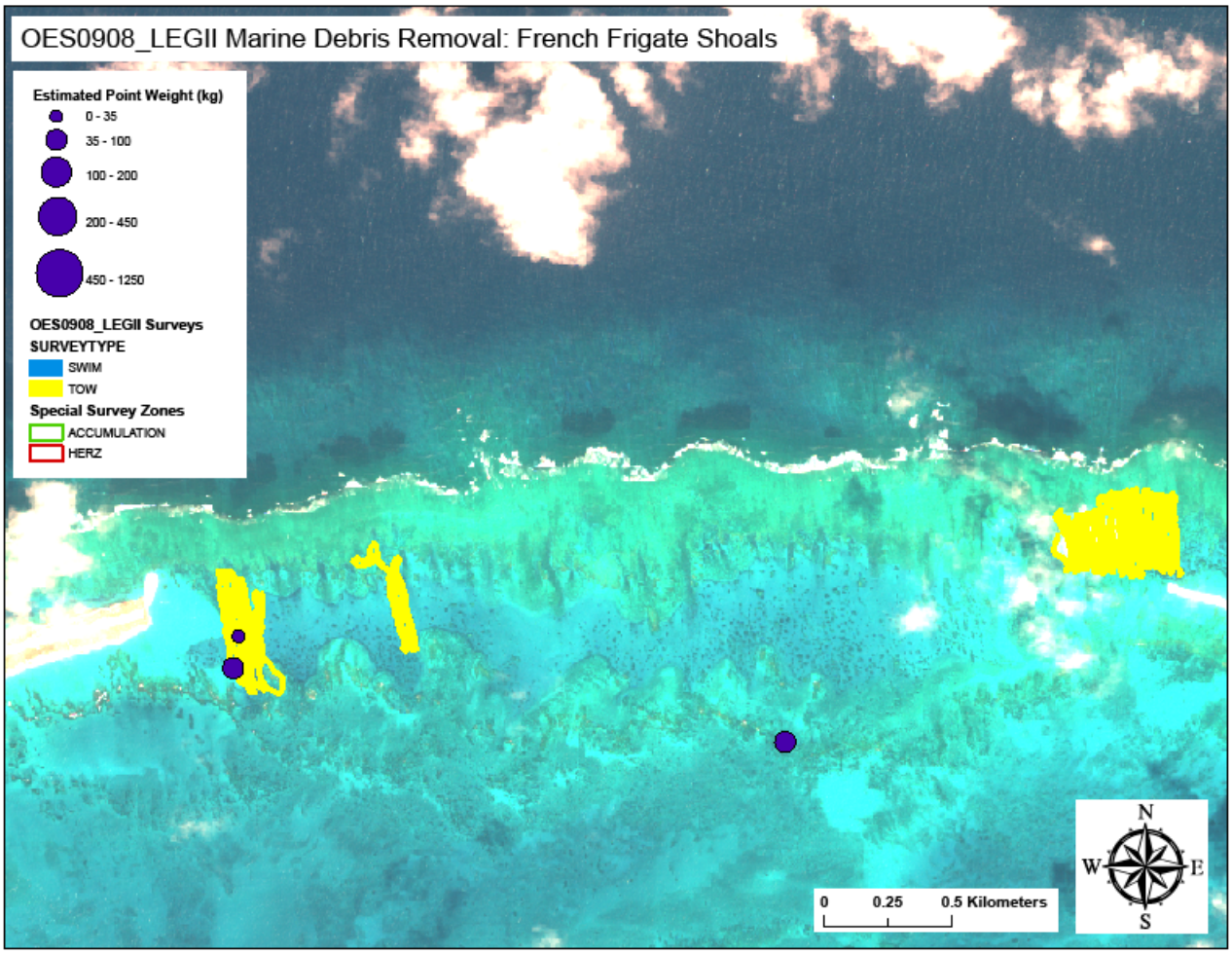

Figure 2.—French Frigate Shoals marine debris survey sites and waypoints for SE-09-08, Leg II.

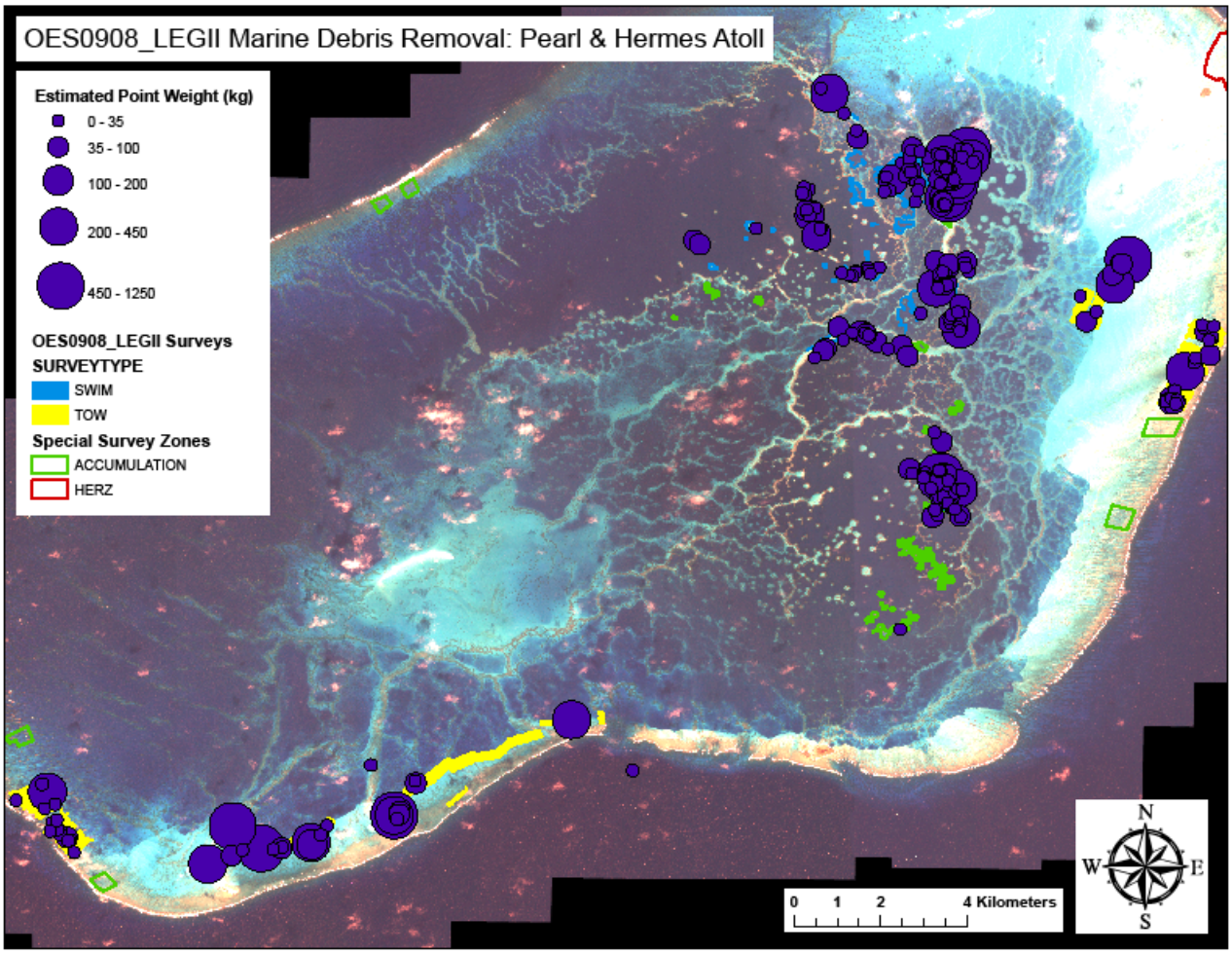

Figure 3.—Pearl and Hermes marine debris survey sites and waypoints for SE-09-08, Leg II.