



U.S. DEPARTMENT OF COMMERCE
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CRUISE REPORT¹

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

CRUISE PERIOD: September 1 – September 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:

September 1 After completing refueling operations at Pearl Harbor from 0900 to 1800, the NOAA Ship *Oscar Elton Sette* embarked on a 30-day mission to the Northwestern Hawaiian Islands to remove derelict fishing gear from the remote coral reef habitats of the Papahānaumokuākea Marine National Monument (PMNM). This cruise was the first of two such expeditions this calendar year directed towards removing derelict fishing gear by the NOAA Pacific Islands Fisheries Science Center's (PIFSC), Coral Reef Ecosystem Division (CRED). While the ship's fueling was underway, a power point marine debris operational briefing was given by the Chief Scientist, Kyle Koyanagi to discuss, with the *Sette* NOAA Corps Officers, the logistics for removing marine debris in the Monument. A crew of 17 scientists, with specialized dive training, from CRED conducted in-water surveys and debris removal operations at Maro Reef, Pearl and Hermes Atoll, and Kure Atoll, focusing on areas known to have high densities of derelict fishing gear. Debris removal operations were also conducted along the shorelines of Laysan, Lisianski, Pearl and Hermes Atoll, and Kure Atoll to reduce the risk of entanglement of protected marine mammals and other wildlife utilizing these beaches.

¹ PIFSC Cruise Report CR-10-001
Issued 24 February 2010



Embarked scientists Kyle Koyanagi, Kevin O'Brien, Max Sudnovsky, Russell Reardon, Edmund Coccagna, Frank Mancini, Derek Levault, Guy Bennallack, Megan Cook, Louise Giuseffi, Andrew Gray, Jeffrey Milisen, Mark Manuel, Brooke Hoffman, James Moriarty, Jessica Moye, and Tony Perry.

- September 2 During the first days of transit aboard the *Oscar Elton Sette*, the following activities occurred: the welcome aboard ship briefing, ship fire and abandon ship drills, prepping of our small boats and equipment, and going over last minute operational logistics with the *Sette* officers. At 1630, conductivity-temperature-depth (CTD) casts at Nihoa were successfully completed.
- September 3 Transited en-route to Maro Reef. Opportunistically completed the Necker CTD cast successfully at 0632 and successfully completed a second CTD cast at French Frigate Shoals at 1500.
- September 4 Continued transiting en-route to Maro Reef. Successfully completed the Gardner CTD cast at 2303 and prepared small boats and equipment for the first day, conducting marine debris operations. The planning team reviewed historical data for Maro Reef to plan the logistics for the next day's marine debris surveys and removals.
- September 5 Arrived at Maro Reef and conducted our first marine debris operation for the cruise. At 0730, the small boat safety briefing covered operational risk assessment, safety reminders, and the day's marine debris survey and removal logistics. At 0745, the first Avon (17-ft Inflatable) was launched and craned over the side. This operation was successfully completed three more times. The marine debris operations consisted of loading four small boats with 4-5 divers in each boat daily. Our focus at Maro Reef was to continue survey and removal efforts that the USCG left off on their removal efforts earlier in the year. We began our first day of operations surveying the interior of Maro Reef, launching out of the northwest. Ideal weather conditions made possible effective swim surveys, and the marine debris team removed 1494 kg and surveyed 0.2771 km². Successfully completed the Maro CTD cast.
- September 6 The marine debris team continued to conduct swim surveys in the northwestern interior of Maro Reef and began to fine tune operations. The marine debris teams surveyed 0.2770 km² of shallow coral reef environments at Maro Reef and removed 278 kg of derelict fishing gear.

- September 7 Ideal weather conditions continued, and after looking at the historical marine debris data, we found areas that had never been surveyed in the past because they were located on the outer reefs and were exposed to open ocean swell conditions. We made a decision to move operations to the southeast corner of Maro Reef. This proved to be a good decision as we removed another 2400 kg of derelict fishing gear and surveyed 0.2832 km².
- September 8 Our last scheduled day for Maro Reef began like the previous three days with the safety briefing at 0730 and small boat launching operations at 0745. Operations continued to get smoother as everyone fell into a routine, and our marine debris survey again focused our efforts on the unsurveyed areas in the southeast. The marine debris teams surveyed 0.1068 km² of shallow coral reef 30 ft deep or less and removed 2644 kg of derelict fishing gear. Due to the ideal weather condition, we discussed staying a few extra days at Maro Reef but then made the decision to move farther up the chain as planned. After completing the day's operation, the *Oscar Elton Sette* departed Maro Reef at 1730 en route to Laysan conducting a CTD cast opportunistically at the permanent CTD cast station.
- September 9 The *Oscar Elton Sette* arrived at Laysan and successfully conducted the CTD cast at its permanent station at 0535. After completing our morning safety briefing, the *Oscar Elton Sette* launched our Avons to conduct shoreline removal and transport operations. The marine debris teams were broken up into two groups forming the land-based cleanup team and the small boat teams. They transported the derelict fishing gear from the Laysan shore team to the *Oscar Elton Sette*, where it would be held until it could be off-loaded in Honolulu. A total of 720 kg of derelict fishing gear were removed from Laysan's shoreline, therefore, reducing the entanglement risk to the green sea turtle and Hawaiian monk seal. After completing Laysan's shoreline cleanup effort, the *Oscar Elton Sette* departed Laysan en-route to Lisianski.
- September 10 *The Oscar Elton Sette* arrived at Lisianski and successfully completed a CTD cast at Lisianski's CTD cast permanent station at 0105. After completing the morning briefing, the marine debris teams conducted shoreline removal and transport operations. Removal efforts for the day collected 2120 kg of derelict fishing gear from the Lisianski shoreline. In addition to the derelict fishing gear removal, a mixed team of scientifics and ship's divers successfully completed the oceanographic instrument swap which included a subsurface temperature recorder (STR) and a sea surface temperature (SST) buoy. After completing operations at

Lisianski, the *Oscar Elton Sette* departed en-route to Kure Atoll opportunistically conducting CTD casts at the permanent sites along the way.

- September 11 Transited en-route to Kure Atoll. Successfully completed Midway permanent station CTD cast at 1924.
- September 12 The *Oscar Elton Sette* arrived at Kure Atoll to conduct marine debris surveys and removals. Our first day of operations at Kure was focused on the area north of the small boat pass due to good weather conditions. Removal efforts for the day collected 362 kg of derelict fishing gear. Extensive cleanup efforts had been made at Kure in the past; however, we focused our cleanup effort for the cruise at areas that had not been surveyed in 2007. In addition to the day's removal effort at Kure Atoll, the Kure CTD cast was also successfully completed.
- September 13 The marine debris teams conducted in-water survey and removals at Kure and we continued to work our way north of the boat pass. Our removal effort for the day removed 354 kg of derelict fishing gear from Kure's shallow coral reef environments.
- September 14 The primary target areas on the north side of Kure were completed, and we began to shift our surveys to the southeastern side of Kure's interior fringing reefs. A total of 428 kg of derelict fishing gear were removed for the day. In addition to our in-water removal effort, 720 kg of derelict fishing gear were removed from Kure's shoreline with the aid from the Papahānaumokuākea Marine National Monument's State of Hawaii Department of Land and Natural Resources.
- September 15 The marine debris teams conducted their surveys and removals around Kure's Green Island and removed 462 kg of derelict fishing gear. Weather conditions continued to be ideal, so our focus shifted to the south of the boat pass which normally is exposed to swells making surveys challenging.
- September 16 Surveys conducted south of the boat pass along the fringing reef resulted in only scraps of debris. The large amounts of water movement in that area pushed the debris out farther into the atoll. Surveys were shifted farther away from the fringing reef into the atoll along the drop-off, and debris sighting significantly increased. The marine debris team removed 2464 kg of derelict fishing gear for the day.

- September 17 The marine debris team's success the previous day prompted us to continue our efforts in the area. Marine debris surveys and removals in the area produced another extraordinary day removing 2418 kg from Kure's shallow coral reefs. The areas of interest at Kure had been surveyed, so operations were moved to Pearl and Hermes Atoll. After recovering the last small boat, the *Oscar Elton Sette* departed Kure en route to Pearl and Hermes.
- September 18 The *Oscar Elton Sette* arrived at Pearl and Hermes to begin marine debris surveys and removals. Operations at Pearl and Hermes were split up into two groups. Two boat teams conducted swim surveys and the additional two boat teams conducted tow surveys, rotating every few days to give the swim survey teams a break. The tow team focused their efforts along the fringing reefs near the big boat pass on the south side of the atoll. The swim teams began their surveys in the southern part of the maze where the Protected Species camps reported seeing derelict fishing gear floating attached to the patch reefs in the area. The combined efforts of both groups removed 2776 kg of derelict fishing gear for the day. In addition to our debris removal effort, the Pearl and Hermes CTD cast was also successfully completed.
- September 19 Both swim and tow teams continued their efforts in the same area as the day before and removed an additional 2114 kg from the area.
- September 20 Swim tow teams slowly started moving north within the maze and we continued success in locating derelict fishing gear. Despite the fact that the area had been surveyed only a few years ago in 2007, marine debris densities seemed to be high. Marine debris tow teams surveyed around the small boat pass and covered a lot of area. In-water removal recovered 1793 kg of derelict fishing gear. In addition to in water removals, 3584 kg were removed from Pearl and Hermes, Southeast Island.
- September 21 The tow teams continued to cover a lot of area around the southeastern portions of Pearl and Hermes. The swim teams continued to push farther north into the maze increasing their transit distances; however, good weather conditions aided in reducing the projected commute times to our dive site. Combined removal efforts for the day removed 2593 kg of derelict fishing gear.
- September 22 Lack of high debris densities in the southern areas moved the tow teams operations to the eastern sand margins of Pearl and Hermes. The swim teams continued moving north through the maze in areas

- that had high historical debris densities and areas that had not been surveyed recently. The day's operations removed 1734 kg of derelict fishing gear.
- September 23 Both teams continued to work in the same area as the day before and removed 1388 kg of derelict fishing gear from Pearl and Hermes' shallow coral reefs.
- September 24 Due to lack of space onboard the *Oscar Elton Sette*, the marine debris teams surveyed the area near Seal Kittery to remove smaller pieces of derelict fishing gear and mark larger ones that could be removed on the second leg of the cruise. The ideal weather conditions deteriorated and squalls brought rain, higher winds and choppy sea conditions. Despite the change in weather conditions, teams managed to remove 932 kg of derelict fishing gear by conducting in-water surveys and removing an additional 554 kg from the shorelines of Seal and Kittery. Two large pieces of derelict fishing gear were recorded for the next leg of the marine debris cruise and were slated to be removed. The total cruise effort removed 36,394 kg of derelict fishing gear out of the Papahānaumokuākea Marine National Monument. The *Oscar Elton Sette* departed Pearl and Hermes en route to Ford Island, Honolulu.
- September 25 During the transit, the debris teams completed inputting the final data for the cruise and began double-checking the data base for discrepancies.
- September 26 While in transit, personnel washed and stored gear in preparation for our import and off-loading of debris.
- September 27 In Transit.
- September 28 While in transit staterooms, hydro lab, wet lab, and common areas were cleaned and a last minute inventory was completed for the resupplying of equipment before our next leg.
- September 29 Arrived at Ford Island, Oahu. Disembarked scientists Kyle Koyanagi, Kevin O'Brien, Max Sudnovsky, Russell Reardon, Edmund Coccagna, Frank Mancini, Derek Levault, Guy Bennallack, Megan Cook, Louise Giuseffi, Andrew Gray, Mark Manuel, Brooke Hoffman, James Moriarty, Jessica Moye, Jeffrey Milisen, and Tony Perry.

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 Maro Reef, Kure, and Pearl and Hermes Atoll during SE-09-08, Leg I in shallow coral reefs environments 30 ft. or less covering 7.4066 km² (Table 3). Ideal weather conditions allowed marine debris divers to survey areas that had been inaccessible or difficult to survey in the past. During SE-09-08, Leg I (19 operational days), all marine debris objectives were met or exceeded. A total of 28,634 kg of derelict fishing gear were removed from the PMNM shallow-water coral reef environments (Table 2).

- b. Remove marine debris from Laysan, Lisianski, and Pearl and Hermes shorelines to reduce entanglement hazards for turtles and protected marine mammals.

A total of 17,111 kg of derelict fishing gear were removed from along Laysan, Lisianski, and Pearl and Hermes shorelines to reduce entanglement hazards for turtles and protected marine mammals (Table 2)

- c. Conduct oceanographic equipment (ecological acoustic recorders (EARs), STRs, and SSTs) deployment, removals, and inspections in 60 ft or less.

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

Oceanographic Instrumentation

Action	Location	Instrument type	Latitude	Longitude	Depth_ft	Depth_m
Deploy	MAR	STR	25.41957	-170.66913	38	11.58
Check	MAR	EAR	25.41957	-170.66913	38	11.58
Swap	LIS	SST	25.96762	- 173.91583	1	0.3
Swap	LIS	STR	25.96762	- 173.91583	34	10.36
Swap	KUR	EAR	28.38172	-178.32572	41	12.50
Swap	KUR	STR	28.38172	-178.32572	41	12.50
Check	PHR	EAR	27.79097	-175.86298	35	10.67
Deploy	PHR	STR	27.79097	-175.86297	31	9.45
Swap	PHR	EAR	27.94057	-175.86171	54	16.46

Maro Reef

Deployed STR on existing EAR anchor.

Lisianski Island

Swapped telemetered SST buoy, inspected mooring hardware and line, swapped STR on SST anchor.

Kure Atoll

Swapped EAR and STR on existing anchor. Swapped SST buoy, inspected mooring hardware and line, swapped STR on SST anchor.

Pearl and Hermes Reef

Performed maintenance on south-side of EAR and deployed STR on same anchor. Performed maintenance on SST buoy, inspected mooring hardware and line, deployed additional STR on SST mooring line for redundancy, and swapped STR on SST anchor.

- d. Conduct 500-m CTD cast and water samples opportunistically at permanent CTD cast locations.

Shipboard CTD and Water Sampling

Performed 500-m CTD casts and collected water samples at all 10 permanent CTD stations in Monument. Fifty-six nutrient samples, 56 chlorophyll samples and 4 salinity samples were collected and sent out for further analysis (Table 4).

SCIENTIFIC PERSONNEL:

Kyle Koyanagi, Chief Scientist, CRED Marine Debris Operations Manager, Joint Institute for Marine and Atmospheric Research (JIMAR), University of Hawaii (UH)

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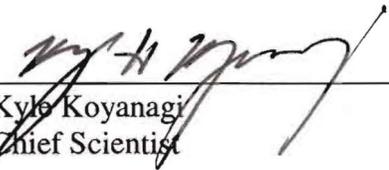
Jeffrey Milisen, Coral Reef Marine Debris Specialist, JIMAR, UH

Brooke Hoffman, Coral Reef Marine Debris Specialist, JIMAR, UH

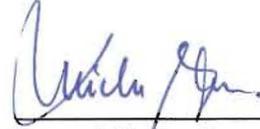
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Attachments

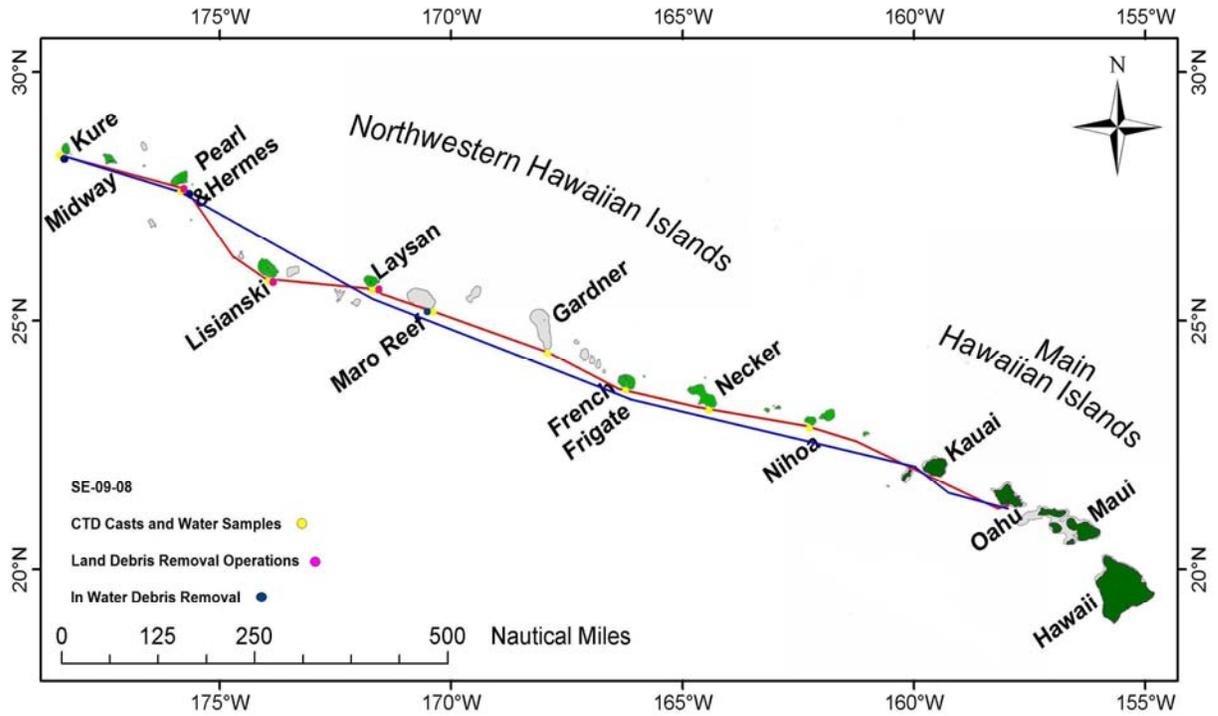


Figure 1.--Cruise track for the *Oscar Elton Sette* cruise SE-09-08 (SE-76), Leg I, September 1–30, 2009.

Table 2.--Marine debris removed during SE-09-08, Leg I.

Marine Debris Weight in Kilograms				
ES 09 08 Leg I				
Location	Date	Source		Daily Totals
		Land	Water	
Maro	9/5/2009		1494	1494
Maro	9/6/2009		2278	2278
Maro	9/7/2009		2400	2400
Maro	9/8/2009		2644	2644
Maro Total			8816	8816
Kure	9/12/2009		362	362
Kure	9/13/2009		354	354
Kure	9/14/2009	720	428	1148
Kure	9/15/2009		462	462
Kure	9/16/2009		2464	2464
Kure	9/17/2009		2418	2418
Kure Total		720	6488	7208
Laysan	9/9/2009	782		782
Laysan Total		782		782
Lisianski	9/10/2009	2120		2120
Lisianski Total		2120		2120
Pearl & Hermes	9/18/2009		2776	2776
Pearl & Hermes	9/19/2009		2114	2114
Pearl & Hermes	9/20/2009	3584	1793	5377
Pearl & Hermes	9/21/2009		2593	2593
Pearl & Hermes	9/22/2009		1734	1734
Pearl & Hermes	9/23/2009		1388	1388
Pearl & Hermes	9/24/2009	554	932	1486
Pearl & Hermes Total		4138	13330	17468
Grand Total (kgs)		7760	28634	36394

Table 3.--Area surveyed during SE-09-08, Leg I.

Marine Debris Survey Area in km²				
ES 09 08 Leg I				
Location	Date	Survey Type		Daily Total
		Swim	Tow	
Maro	9/5/2009	0.2771		0.2771
Maro	9/6/2009	0.277		0.277
Maro	9/7/2009	0.2832		0.2832
Maro	9/8/2009	0.1068		0.1068
Maro Total		0.9441		0.9441
Kure	9/12/2009		0.7252	0.7252
Kure	9/13/2009		0.7235	0.7235
Kure	9/14/2009		0.6356	0.6356
Kure	9/15/2009		0.5836	0.5836
Kure	9/16/2009		0.3856	0.3856
Kure	9/17/2009		0.5566	0.5566
Kure Total			3.6101	3.6101
Pearl & Hermes	9/18/2009	0.1204	0.3926	0.5129
Pearl & Hermes	9/19/2009	0.2381	0.2042	0.4423
Pearl & Hermes	9/20/2009	0.1305	0.1499	0.2805
Pearl & Hermes	9/21/2009	0.1257	0.2745	0.4002
Pearl & Hermes	9/22/2009	0.2194	0.2778	0.4972
Pearl & Hermes	9/23/2009	0.3151	0.1663	0.4814
Pearl & Hermes	9/24/2009		0.2378	0.2378
Pearl & Hermes Total		1.1492	1.7032	2.8523
Grand Total (km²)		2.0933	5.3133	7.4066

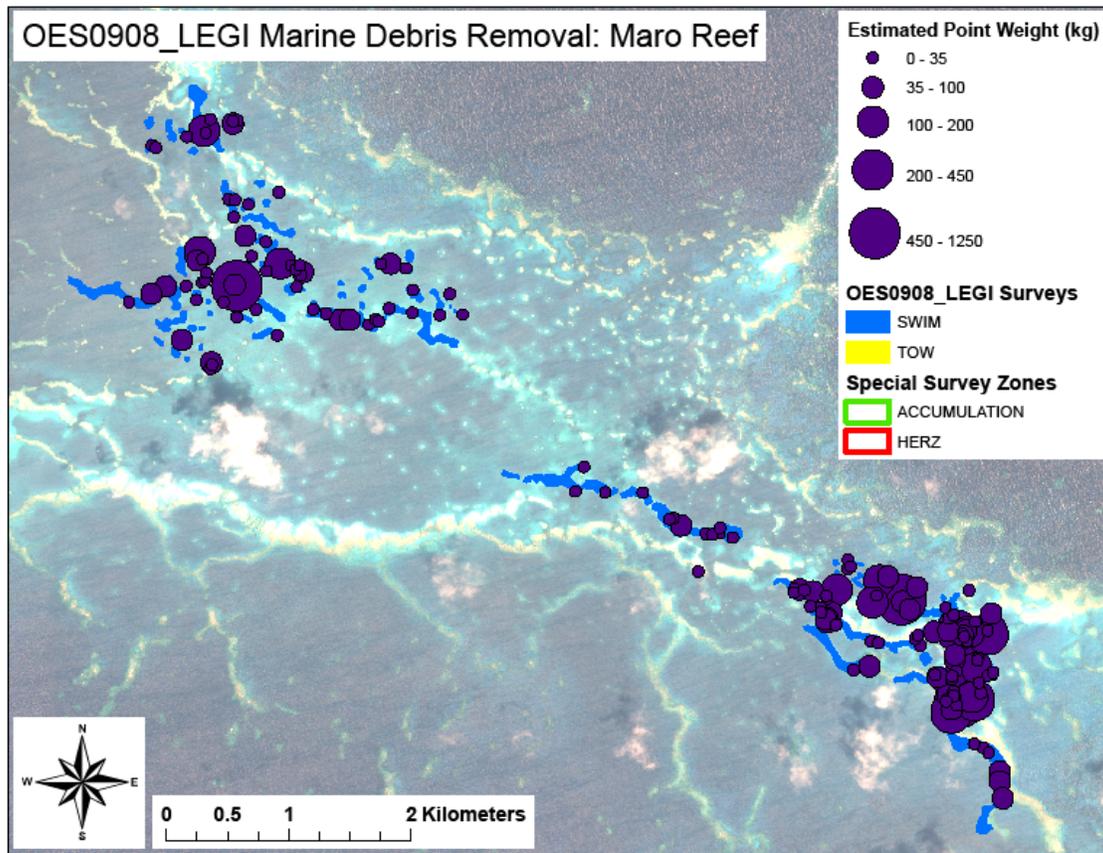


Figure 2. Maro Reef marine debris removal and survey sites for SE-09-08 Leg I.

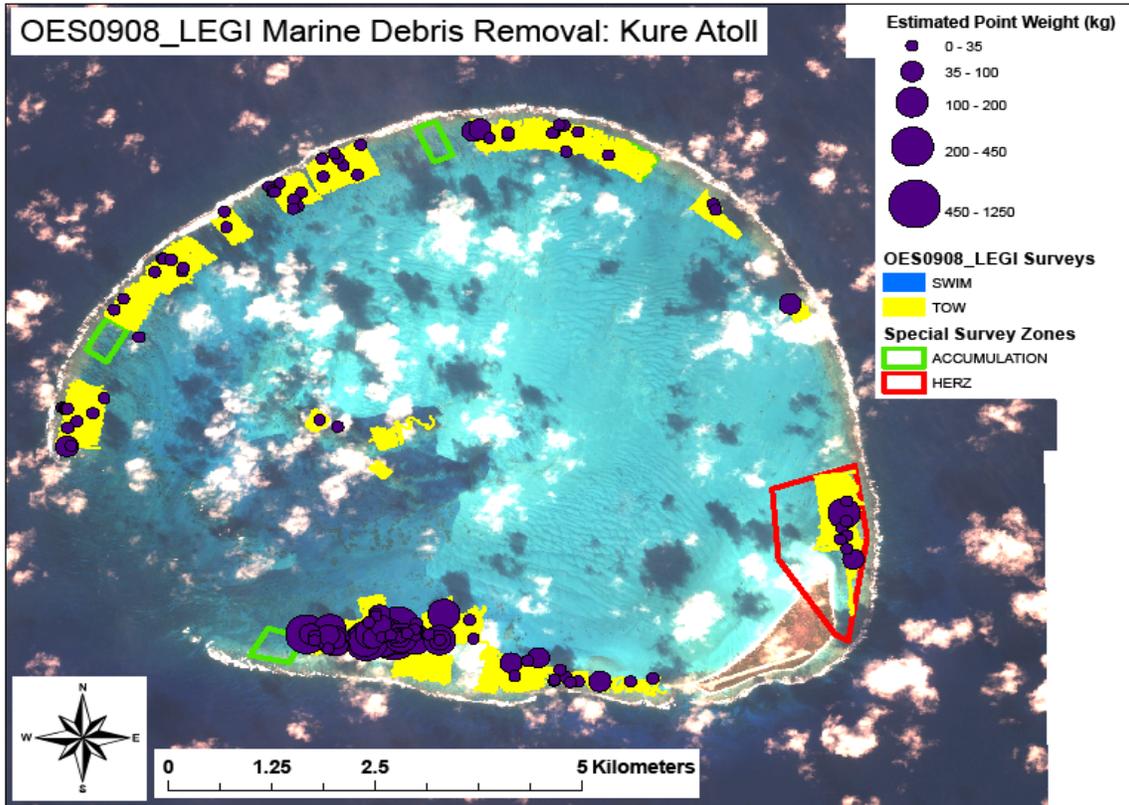


Figure 3.--Kure marine debris removal and survey sites for SE-09-08, Leg I.

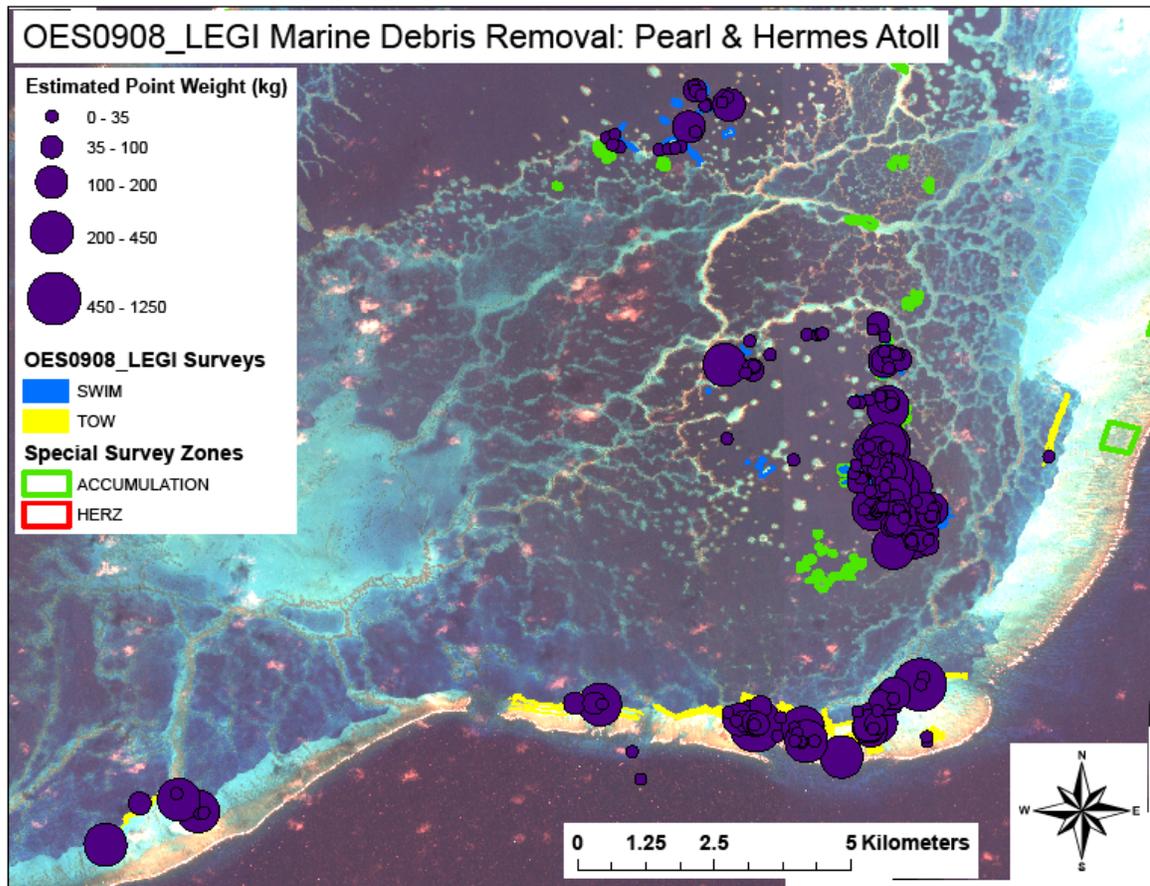


Figure 4.--Pearl and Hermes marine debris removal and survey sites for SE-09-08, Leg I.

Table 4.--Locations for CTD casts completed during SE-09-08, Leg I.

Permanent CTD Stations					
Deep Permanent Site ID	Date	Latitude	Longitude	Description	Notes
Nihoa	9/2/2009	22.53333	-162.00000	South of Nihoa Island	Successfully Completed
Necker	9/3/2009	23.18498	-164.70937	South of Necker Island	Successfully Completed
FFS	9/3/2009	23.56667	-166.30000	South of Tern Island	Successfully Completed
Gardner	9/3/2009	24.13333	-167.66667	SE of Gardner Pinnacles	Successfully Completed
Maro	9/4/2009	25.00000	-170.00000	SE of Maro Reef	Successfully Completed
Laysan	9/9/2009	25.56667	-171.53333	South of Laysan Island	Successfully Completed
Lisianski	9/10/2009	25.83333	-173.66667	South of Lisianski Island	Successfully Completed
Midway	9/11/2009	27.66667	-175.82833	S. of Pearl & Hermes Reef	Successfully Completed
Kure	9/12/2009	28.10002	-177.35500	South of Midway Islands	Successfully Completed
PHReef	9/18/2009	28.20002	-178.33335	South of Kure Atoll	Successfully Completed