

Marine Debris in the Northwestern Hawaiian Islands
Marine debris survey and removal efforts of the 2006 field season
National Marine Fisheries Service, Pacific Islands Fisheries Science Center
Coral Reef Ecosystem Division

Introduction

The Pacific Islands Fisheries Science Center (PIFSC), Coral Reef Ecosystem Division (CRED), Marine Debris Team and its partners removed nineteen metric tons of derelict fishing gear from the Northwestern Hawaiian Islands (NWHI) in 2006. With the support of NOAA's Coral Reef Conservation Program and Marine Debris Program, the Marine



Debris Team was able to lead one dedicated marine debris cruise to the NWHI aboard the NOAA ship *Oscar Elton Sette* (SETTE). The team also participated in two smaller scale efforts in the NWHI: one in conjunction with PIFSC's Protected Species Division (PSD) cruise, and the other in conjunction with the United States Coast Guard (USCG). On the PSD cruise, members of the debris team gathered and removed land-based derelict fishing gear from various islets throughout the NWHI. In partnership with the USCG staff,

debris team members led a survey and removal effort for derelict fishing gear caught on the near shore reefs of Midway Atoll National Wildlife Refuge.

Background

Recently designated as the Papahānaumokuākea Marine National Monument, the 1,200 nautical mile chain of atolls and islets known as the Northwestern Hawaiian Islands (NWHI) is geographically positioned as a repository for marine debris such as derelict fishing gear (DFG).

Accidentally lost or intentionally abandoned DFG circulates within the North Pacific Subtropical Gyre until it encounters the atolls of the NWHI. When the floating DFG reaches these islets and atolls, wave energy forces it across coral reefs, snagging the assorted nets and lines upon corals. Derelict fishing gear may impact coral reef ecosystems in a number of ways, including destroying coral reef habitat, acting as a vector for the introduction of non-native species, presenting a hazard to boat navigation, and entangling species of concern such as the endangered Hawaiian monk seal (*Monachus schauinslandi*) and the threatened green sea turtle (*Chelonia mydas*).



NWHI USCG Deployment

From May 26th through June 3rd, a joint operation consisting of USCG personnel and the Marine Debris Team was conducted to survey for and remove DFG from Midway Atoll National Wildlife Refuge. Marine debris operations focused primarily on areas in the atoll designated during previous marine debris surveys as having higher than average debris accumulation rates. The goal of these targeted survey and removal efforts was to maximize the quantity of DFG removed during the short deployment.

The trip to Midway Atoll replaced a planned ship-based marine debris removal operation scheduled for May 9th–29th. This operation originally planned to focus on completing baseline swim surveys of Maro Reef, a task initiated by the Marine Debris Team in 2004 and continued by a joint NOAA/USCG team in 2005. However, due to technical difficulties, the USCG vessel Kukui was unable to participate, forcing the development of a shore-based contingency plan for operations at Midway Atoll.

In five field days based on shore, the team successfully surveyed all of the planned target reef areas and removed 1.8 metric tons (MT) of debris from benthic habitats.

Additionally, the team removed 0.8 MT of derelict fishing gear from seventeen land debris sites identified by USFWS personnel. In total, 2.68 MT of derelict fishing gear were removed from Midway Atoll — a daily average of greater than 500 kg. The amount of debris removed this year demonstrates that marine debris accumulation is an ongoing problem for reef ecosystems. In 2003, the NOAA Marine Debris Team removed 18.70MT of debris from Midway Atoll, and 4.90MT of land debris was removed in 2005. This operation provides valuable data regarding future efforts necessary to keep up with debris accumulation at Midway Atoll.



Figure 1 NOAA/USCG divers with pile of debris removed from Midway Atoll, NWHI. Photo: Kyle Koyanagi

NWHI SETTE Land Debris

Selected staff of the Marine Debris Team accompanied the PSD monk seal research camps deployment cruise aboard the SETTE. The team was able to maximize limited time to gather land debris from the shores of Laysan Island (1549 kg) and from Lisianski Island (368 kg). While aiding the PSD, the team was also able to assemble and prepare debris for the following cruise to retrieve from several other islands within the atolls.



NWHI SETTE Marine Debris

One critical goal of the 2006 marine debris removal operations was to survey the accrual of DFG by examining the rate at which debris has accumulated. The Marine Debris Team traveled from Honolulu to the most remote atoll, Kure, in the NWHI Archipelago on August 10th 2005. Aboard the SETTE were crew members, 12 marine debris specialists, two PIFSC researchers and two State of Hawaii cooperative scientists

traveling to Green Island within Kure Atoll. After transferring passenger scientists to the island, marine debris field operations commenced on August 16th with three towed diver boat teams collecting 6,210 kg from the shallows waters of the inner reefs of Kure with a total coverage of 3.34 km. Despite a few days of severe weather, surveying of

accumulation rate sites and high density areas continued at Kure and Pearl & Hermes Atolls until August 31st as expected. Towed divers and free dive surveys allowed the team to collect 2,531 kg of debris from Pearl & Hermes covering an area of 1.98 km. On September 3rd, the Marine Debris Team was able to retrieve previously collected land debris from French Frigate Shoals on the return voyage to Honolulu. With the aid of PSD and USFWS workers staging debris from the terrestrial environment, 1,028 kg (French Frigate Shoals), 1,697 kg (Pearl & Hermes) and 2932 kg (Kure) was removed from shorelines of the NWHI. The total amount of debris collected on the brief maintenance mode marine debris cruise totaled at 14,360 kg.



Research during the cruise also included surveys to record the depth distribution of Black-lipped pearl oysters, *Pinctada margaritifera*, which were conducted during the six field days at Pearl & Hermes Atoll. During the cruise, 11 conductivity temperature-depth casts (CTD) were conducted throughout the archipelago. In addition, the cruise stopped at Laysan Island to pick up a USFWS volunteer who needed to be returned to Honolulu for medical attention.

MISSIONS AND RESULTS

The field season goals were to conduct marine debris tow and swim surveys and removal operations at Kure and Pearl & Hermes Atolls, collect land debris, and conduct joint operations with the USCG. During the 2006 field season, these marine debris removal objectives were met. All tow and swim accumulation rate areas and high density debris sites were surveyed and cleared of derelict fishing gear in waters less than 10 m. In addition, land debris removals from Kure Atoll, Pearl and Hermes Atoll, and French Frigate Shoals were conducted successfully. Finally, the USCG and the Marine Debris Team conducted one week of joint operations at Midway Atoll.

MARINE DEBRIS MULTI-AGENCY PARTNERS (the short list)

NOAA Coral Reef Conservation Program
NOAA Marine Debris Program
US Coast Guard
Papahānaumokuākea Marine National Monument
Hawaii Metals Recycling, Inc.
JIMAR (Joint Institute of Marine and Atmospheric Research), University of Hawaii
US Fish and Wildlife Service
State of Hawaii, Department of Land and Natural Resources
City and County of Honolulu
Western Pacific Regional Fishery Management Council
Convanta Energy
Hawaii Ocean Safety Team

Atoll Summaries

Kure Atoll

| | | |
|--------------|---------------------------|----------------|
| Area Covered | Standard Tow Sites | 2.35 km |
| | HERZ sites | 0.71 km |
| | <u>Accumulation Sites</u> | <u>0.28 km</u> |
| | Total | 3.34 km |

| | | |
|-----------|-------------------|----------|
| Waypoints | Standard Tow | 161 |
| | HERZ | 14 |
| | Accumulation rate | 12 |
| | <u>Non Survey</u> | <u>8</u> |
| | Total | 195 |

| | | |
|---------|--------------------|---------------|
| Weights | Standard Tow | 5,060 kg |
| | HERZ | 277 kg |
| | Accumulation Sites | 185 kg |
| | <u>Non Survey</u> | <u>688 kg</u> |
| | Total | 6,210 kg |

Pearl and Hermes Atoll

| | | |
|--------------|------------------------|----------------|
| Area Covered | Standard Tow Sites | 1.00 km |
| | Swim Accumulation Site | 0.79 km |
| | <u>Standard Swim</u> | <u>0.19 km</u> |
| | Total | 1.98 km |

| | | |
|-----------|------------------------|----------|
| Waypoints | Tow Accumulation Rate | 15 |
| | Swim Accumulation Rate | 24 |
| | Swim Standard | 22 |
| | <u>Non Survey</u> | <u>8</u> |
| | Total | 69 |

| | | |
|---------|------------------------|---------------|
| Weights | Tow Accumulation Rate | 195 kg |
| | Swim Accumulation Rate | 1,032 kg |
| | Swim Standard | 486 kg |
| | <u>Non Survey</u> | <u>818 kg</u> |
| | Total | 2,531 kg |

Land debris weights of derelict fishing gear removed from each atoll:

| | |
|------------------------------|-----------------|
| Kure Atoll | 2,932 kg |
| Pearl and Hermes Atoll | 1,697 kg |
| <u>French Frigate Shoals</u> | <u>1,028 kg</u> |
| Total | 5,657 kg |