



# PACIFIC REGIONAL MARINE DEBRIS

UH Sea Grant Extension Agent: Christine Woolaway

## The Issue

Approximately 50 years ago, most of the world's fishing industries largely replaced nets and gear made of natural fibers—such as cotton, jute and hemp—with those made of synthetic materials—such as nylon, polyethylene and polypropylene. Unlike natural fiber gear that degrades over time, synthetic fishing gear is functionally impervious to degradation in the water. Once discarded or lost, this gear remains in the marine environment, with negative economic and environmental impacts.

Because of the Hawaiian Archipelago's bathymetry and remote mid-Pacific location, these islands are the repository for an inordinate amount of marine debris originating from fisheries throughout the Pacific Rim. Derelict fishing gear has been identified by the National Oceanic and Atmospheric Administration (NOAA) as one of the greatest anthropogenic threats to the Northwestern Hawaiian Islands, home to 69 percent of the United States' coral reefs. Derelict fishing gear abrades and scours living coral reefs, destabilizes and breaks the reefs' calcium carbonate foundation, and entangles and kills marine mammals, sea turtles, and commercial and recreational fish species. Floating derelict fishing gear is also a costly threat to human safety, as debris tangles and clogs intake valves and propellers of commercial and recreational vessels. In addition, derelict fishing gear, also known as "ghostnets" continue to extract biomass from Pacific Ocean ecosystems with significant economic and environmental costs.

During the past five years, University of Hawai'i (UH) Sea Grant Extension Agent Christine Woolaway, has worked to raise awareness and facilitate mitigation of the problem of derelict fishing gear throughout the Pacific Rim by engaging and working with stakeholders on research, extension and education activities. Her goal is to seek solutions that will engender widespread acceptance and cooperation among the fishing community, resource managers, and the public.

## 1998 - 2002 Sea Grant Funding

\$389,646 SG; \$6,853,456 match.



*(l-r) UH Interim Chancellor Deane Neubauer, Hawai'i Governor Ben Cayetano, U.S. Coast Guard Captain Terry Rice, UH Sea Grant Extension Agent Christine Woolaway, UH Sea Grant Associate Director Mary Donohue, and UH Sea Grant Director Gordon Grau.*

## Extension Contributions

Directly resulting from UH Sea Grant's extension efforts, an unprecedented multi-agency Task Force was established in 1998 to address the problem of derelict fishing gear throughout the Pacific Rim. UH Sea Grant and the following diverse agencies continue to work together to address the complex and challenging issue of derelict fishing gear: the U.S. National Marine Fisheries Service (NMFS), U.S. National Ocean Service, U.S. Coast Guard, Alaska Sea Grant College Program, Hawai'i Coastal Zone Management Program,

the NOAA Corps, U.S. Fish & Wildlife Service, the City and County of Honolulu, U.S. Navy, Horizon Waste Systems Inc., Covanta Energy, Inc., and The Ocean Conservancy

In 1998, the Task Force conducted the first multi-agency marine debris removal expedition to the Northwestern Hawaiian Islands, using NOAA and U.S. Coast Guard ships. Each year since 1998, the NMFS has led ever more successful multiship, multi-agency expeditions resulting in the recovery of 287 tons of derelict fishing gear from the Northwestern Hawaiian Islands. The successful partnerships, and subsequent exposure and visibility from these efforts have generated significant support at federal, regional, and local levels, including a valuable partnership with the Northwest Straits Commission in Washington state.

In addition, the NMFS developed new field protocols based on a rigorous eight-week training course that marine debris clean up divers must complete. This enables the divers to more effectively and safely remove entangled ghostnets from coral reefs. Unlike mechanical recovery methods, human divers can remove ghostnets with minimal additional anthropogenic damage to fragile coral reef ecosystems.



*Courtesy NMFS*  
NOAA divers work to remove marine debris from the NWHI.

## Selected Extension Highlight: Marine Debris

A new process involving a number of project partners to dispose of recovered nets in an environmentally and socially responsible manner has also been developed. Instead of depositing debris in strained island landfills, recovered ghostnets are processed and incinerated to provide by-product electricity for Hawai'i's energy needs.

The U.S. Department of State employed results and images from this effort in the preparation of a briefing document, which the U.S. presented to the International Maritime Organization.

### Research Impacts:

The first quantitative diving surveys were conducted during the 1999 marine debris removal expedition and confirmed the threat of derelict fishing gear to coral reef ecosystems. Divers systematically surveyed and removed 14 tons of ghostnets from Lisianski Island and Pearl and Hermes Atoll. This research also provided the first quantitative estimates of submerged derelict fishing gear density on any coral reef, documenting debris density as high as 62.2 debris items/km squared; similar to densities in Alaskan areas of high fishing effort.

Research documented that a minimum of 80 percent of ghostnets recovered in the Northwestern Hawaiian Islands were of exogenous origin—not of the type of gear used by regional fishers—providing initial information on the origin of derelict fishing gear in the Northwestern Hawaiian Islands.

### Journal Articles:

Boland, R.C. and M.J. Donohue. In press. Marine debris accumulation in the nearshore habitat of the endangered Hawaiian monk seal, *Monachus schauinslandi*. *Marine Pollution Bulletin*.



Courtesy NMFS

NOAA Fisheries diver and UH Botany graduate student Kimberly Page frees a green sea turtle found entangled in a discarded fishing net at Pearl and Hermes Atoll National Wildlife Refuge.

Donohue, M.J., R. Boland, C.M. Sramek, and G.A. Antonelis. 2001. Derelict fishing gear in the Northwestern Hawaiian Islands: diving surveys and debris removal at two atolls confirms threat to coral reef ecosystems. *Marine Pollution Bulletin* 42(12): 1301-1312.

Donohue, M.J. 2003. How Multi-agency partnerships can successfully address large-scale pollution problems: a Hawai'i case study. *Marine Pollution Bulletin* 46:700-702.

In addition, more than 11 presentations were made on this project at local, state, regional and international conferences and symposia.

### Significant Partnerships:

U.S. National Marine Fisheries Service, U.S. Coast Guard District 14, Alaska, Washington and UH Sea Grant College Programs, the U.S. Navy, the Ocean Conservancy, the Western Pacific Regional Fishery Management Council, U.S. Fish and Wildlife Service, Hawai'i Coastal Zone Management Program, City and County of Honolulu, Hawai'i Department of Business, Economic Development and Tourism, Hawai'i Department of Land and Natural Resources, Northwest Straits Commission, Hawai'i Audubon Society, Horizon Waste Management, Inc., Covanta Energy, Inc.

### Awards:

2002—The U.S. Undersecretary of Commerce for Oceans and Atmosphere honored Extension Agent Christine Woolaway with a NOAA Environmental Hero Award for her tireless efforts to preserve and protect our Nation's environment.

1999—Vice President Al Gore's Hammer Award for Reinventing Government awarded to the UH Sea Grant College Program for partnering with private industry, agencies, federal, state and county civic organizations and academia while maximizing resources and reducing costs in the mitigation of derelict fishing gear in the Northwestern Hawaiian Islands.

1998—U.S. Department of Commerce, NOAA, NMFS Marine Environmental Stewardship Award presented to the UH Sea Grant College Program for its Marine Debris Removal Project, 1998 NW Hawaiian Archipelago.



Christine Woolaway has served as the University of Hawai'i Sea Grant College Program Coastal Recreation and Tourism Extension Agent for the past 21 years. Christine has been working on the problem of marine debris since she assisted in conducting *The Second International Conference on Marine Debris* held in Hawai'i in 1989. Woolaway serves as the Hawai'i State Coordinator for the International Coastal Cleanup and, together with the NMFS, co-coordinates the multi-agency derelict fishing gear cleanup in the Northwestern Hawaiian Islands.

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