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Photo by Robert Todd

PLANKTON ECOSYSTEMS – THE FUTURE OF MARINE FOOD WEBS

How will ocean food webs respond to climate change and human interventions?
How do physics and biology interact to modify ocean communities?

Life in the open ocean follows different "rules" than on the seafloor or on land. The freely drifting plants and animals of the ocean known as plankton are in constant motion, influenced by ocean currents, changing dissolved oxygen, ocean acidity, marine debris, and other factors. Because of their close connection to the physical environment around them, many types of plankton are bellwethers of a changing climate, serving as early sentinels of changes to ocean ecosystems.

The laboratory of **Mark Ohman**, Scripps Oceanography professor of biological oceanography, is tackling these issues on several fronts. These studies are connected to the California Current Ecosystem Long Term Ecological Research site, and make use of the world-class Scripps Zooplankton Collection.

One graduate student in Ohman's lab is using ocean gliders to assess whether ocean fronts and eddies are "hotspots" of biological activity in the ocean where plankton production is elevated, or the plankton are able to aggregate. Such hotspots are thought to attract many fish, marine mammals, and seabirds.

Another graduate student is conducting experiments to figure out why jellyfish populations bloom and why jellyfish sometimes dominate in ocean conditions when other types of animals do poorly. Yet another graduate student is working to understand the accumulation of plastic debris in the North Pacific Ocean Gyre and the effects this plastic soup may have on zooplankton and other invertebrates of the open ocean.

In order to advance their ocean food web studies, Mark Ohman and his science team require funding for advanced technology and student support:

WISH LIST

Graduate student support **$50,000**
SEAPLEX leader Miriam Goldstein is seeking support for her next year's research, including graduate stipend and tuition.

ZooScan technician **$40,000**
A novel instrument (ZooScan) is used to image and measure thousands of particles of plastic debris, but qualified technical support is needed to carry out the analyses.

Dissolved oxygen controller **$66,000**
A dissolved gas measurement/controller device will make it possible to measure the consequences of low dissolved oxygen on jellyfish feeding and growth.

HPLC recording integrator **$10,000**
A functioning digital integrator and software for our High Performance liquid chromatography system is needed.

Spray ocean glider **$90,000**
This autonomous, robotic glider will enable new studies of the three-dimensional structure of ocean fronts and their effects on ocean plankton. Spray gliders are designed and built at Scripps.

FTIR analytical expenses **$10,000**
Analytical facility charges to characterize plastic particles by Fourier Transform Infrared Spectroscopy.

Securing donations to support Scripps students remains an ongoing priority.

GARBAGE PATCH KIDS

Miriam Goldstein, a Scripps graduate student working with Mark Ohman, is studying the impact of plastic debris on zooplankton and plastic-associated marine invertebrates in the North Pacific Ocean Gyre. Dubbed the "Great Pacific Garbage Patch," the debris at the center of the North Pacific Ocean has the potential to damage marine life and alter the biological environment. Miriam is seeking to understand whether plastic debris is harming the planktonic community or transporting potentially invasive species. In August 2009, Miriam served as chief scientist on the student-run Scripps Environmental Accumulation of Plastic Expedition (SEAPLEX), which explored the problem of plastic accumulation in the North Pacific.