

Northwestern Hawaiian Islands Coral Reef Ecosystem: A National Treasure

• With coral reefs in many places around the world in decline, it is extremely rare to be able to examine a coral reef ecosystem that is relatively free of human influence and consists of a wide range of healthy coral reef habitats. The remoteness and limited reef fishing activities that have occurred in the Northwestern Hawaiian Islands (NWHI) have resulted in minimal human impacts. The NWHI provide a unique opportunity to assess how a 'natural' coral reef ecosystem functions in the absence of major human intervention.

• Large apex (top level) predators such as ulua (jacks), reef sharks, and kahala (amberjacks) are some of the most striking and unique components of the NWHI ecosystem. These top carnivores, analogous to lions and wolves on land, are seldom encountered by divers nowadays in the inhabited Hawaiian Islands. More than 54% of the total fish biomass in the NWHI consists of apex predators, whereas this trophic level account for less than 3% of the fish biomass in the Main Hawaiian Island (MHI). Differences in fish biomass between the MHI and NWHI represent both near-extirpation of apex predators and heavy exploitation of other, primarily carnivorous, lower-trophic level fishes, on shallow reefs of the MHI.

• Despite their high latitude, more species of coral have been reported from

the NWHI (52) than from the MHI (48). Several species of the reef-building genus *Acropora* are locally abundant in the NWHI, but are not found in the MHI. The NWHI has a relatively high percentage of live coral cover (mean 20%) in coral-colonized areas of the island chain. Unlike the MHI, where alien and invasive algae have overgrown many coral reefs, the reefs in the NWHI are essentially free of alien algae and the high natural herbivory results in a natural algal assemblage.

• The fish fauna of the NWHI includes a large percentage of species that are endemic to (only found in) the Hawaiian Islands. On average, more than half the numerical abundance of all fishes in the NWHI is endemic. The faunas of isolated oceanic archipelagos like the Hawaiian Islands represent species conservation 'hot spots' that have become increasingly important due to the continual losses of biodiversity on coral reefs worldwide. That over one-half of the fishes on shallow NWHI reefs are endemic to the Hawaiian Islands is a noteworthy finding, given our contemporary appreciation of the nature and magnitude of species loss in the sea.

• The NWHI represent important habitat for a number of threatened and endangered species. The Hawaiian monk seal is one of the most critically endangered marine mammals in the U.S. (1,400 indi-



viduals) and depends almost entirely on the islands of the NWHI for breeding and the surrounding reefs for sustenance. More than 90% of Hawaiian Green Sea turtles nest in the NWHI. The islands are the largest tropical seabird rookery under U.S. jurisdiction as millions of resident seabirds nest and thousands of migratory shorebirds winter in the NWHI.

• Recent NOAA coral reef ecosystem mapping studies have mapped 2,356 km² of NWHI's shallow water (<30m) bottom habitats and quantified the spatial extent of the complex mosaic of habitat types that support living marine resources. Although this effort characterized most of the shallow water benthic habitats, much more effort is required to characterize the large areas of mid and deepwater habitats (>30m) in the NWHI using ship-board sonar-based technologies.

• The reefs in the NWHI are among the few remaining large-scale, intact, predator-dominated reef ecosystems left in the world and offer an opportunity to examine what could occur if larger, more effective no-take marine reserves are established elsewhere. The NWHI allows us to understand how relatively unaltered ecosystems are structured, how they function, and how they can most effectively be protected for the future.



For additional information contact:
Aulani Wilhelm,
Acting Reserve Coordinator
Northwestern Hawaiian Islands
Coral Reef Ecosystem Reserve
Phone: 808-397-2660 x223
Email: Aulani.Wilhelm@noaa.gov

