The Seattle Aquarium Research Department is guided by a mission that emphasizes “pursuing knowledge to inspire conservation of our marine environment.”

Our Research Department has undertaken an ambitious program of 14 projects, involving sea otters, sixgill sharks, bottomfish, giant Pacific octopuses, leafy sea dragons, rockfish, and sea turtles. Results from these research efforts contribute to Aquarium exhibits, interpretation, educational programming, and add to the body of knowledge in the fields of marine biology and ecology.
Ongoing Projects

Washington State’s Annual Sea Otter Census
Aquarium staff participated in the annual Washington sea otter survey in 2010 and 2011, marking the tenth and eleventh consecutive years of participation. In 2010, 1,004 otters were counted. Overall, the long-term increase for Washington sea otters since 1989 has been 8.1%. Numbers for 2011 are not yet available.

Sea Otter Population Genetics
Aquarium biologists extracted and analyzed over 250 pre-fur trade sea otter bones collected before 1900 from the animal’s historical range: the waters off of Japan, Russia, Alaska and the Western United States. We discovered that while sea otters have lost significant genetic diversity (that may affect their ability to adapt to changing environments), they have maintained historical genetic structure despite a drastic population decrease from 150,000 animals prior to 1741, to only a few hundred in 1911, when they became protected by an international treaty.

Sea Otter Conservation Endocrinology
Aquarium biologists monitored the reproductive hormone levels in sea otters from Seattle Aquarium, Oregon Zoo and Georgia Aquarium. These animals are currently on Deslorelin implants for contraception. Our goals are to understand the complex physiology of sea otter reproduction and to document the long-term effects of the use of this contraceptive implant in sea otters to assist in the captive management of the species.

Sixgill Population Genetics
The aquarium has developed several variable microsatellite genetic markers for population studies in sixgill sharks. We found a high degree of genetic variability as well as a high degree of relatedness among sharks sampled at the same time and place suggesting that siblings remain in related groups when they are young. We also found multiple paternity in sixgills with at least 8 males contributing to the genetics of a single female’s brood of 71 pups.

Leafy Sea Dragon Population Genetics
Aquarium biologists have developed 12 microsatellite markers for use in the leafy sea dragon. These markers have been useful for population genetics of leafy sea dragons in the wild and to determine relatedness among the captive population.

Giant Pacific Octopus Genetics
Aquarium researchers are currently developing variable genetic markers for population analysis of giant Pacific octopuses to determine if unique and separate populations exist between Puget Sound, the outer Washington Coast and Oregon. These markers will also be used to determine the parentage of a single female octopus’s eggs to see if she fertilizes her brood with the sperm of more than one male.

New Projects

Sea Otter Ecology Study
The Seattle Aquarium is partnering in a multi-million dollar and multi-disciplinary federal project studying trends in sea otter populations called “coastal ecosystem responses to influences from land and sea”. Led by the United States Geological Survey (USGS) sea otter biologist, Dr. Jim Bodkin. The goal of the project is to understand factors currently affecting the health and productivity of six separate sea otter populations from California to Alaska. Next the team will analyze marine productivity, watershed inputs, diet, nutrition, disease exposure and genetics as primary factors potentially regulating sea otter population abundance and growth rates. The Aquarium’s contribution includes: gathering data on ocean productivity through local fish sampling; diet and activity budgets of sea otters through foraging data; and through population genetics analyses of sea otters sampled throughout their range.

Expansion of Rockfish Surveys
The Seattle Aquarium, Point Defiance Zoo and Aquarium and the Oregon Coast Aquarium are partnering in the expansion of underwater video surveys to document changes in rockfish diversity and distribution in Northwest marine ecosystems. Rockfish are long-lived fish listed as species of concern within both Oregon and Washington waters. The Seattle Aquarium has been conducting surveys in five sites in the Strait of Juan de Fuca since 2005. In 2010-2011 three new survey sites were activated. The new site data will be merged with data from the established sites off the Washington coast and central Puget Sound by the Seattle Aquarium. The combined results will be shared with all participating institutions, each state’s Department of Wildlife and the public through publication of results.

Research Publications

Research Summary

Research is an integral component of the Seattle Aquarium Strategic Plan in order to:

• increase our knowledge of the animals we exhibit;
• contribute to conservation efforts in the wild and restoration of the health of Puget Sound;
• contribute to the creation and expansion of our educational programs and exhibits;
• support the public interest in research and encourage young people to learn more about the world around them;
• reinforce the credibility and accreditation of the Seattle Aquarium.

For more information email:
Shawn Larson, PhD: s.larson@seattleaquarium.org or C.J. Casson: c.casson@seattleaquarium.org or visit our website at seattleaquarium.org.

The Seattle Aquarium thanks our Research supporters:
• Amgen
• Foley/Frischkorn Wildlife and Conservation Fund
• Enzo Life Sciences
• National Oceanic and Atmospheric Association
• Northwest Zoo and Aquarium Alliance

Seventh International Sea Otter Conservation Conference
March 2011
Since 1999 the aquarium has hosted the international sea otter workshop covering sea otter biology and ecology. This past workshop was attended by over 120 sea otter biologists from North America, Europe and Russia.