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ENDANGERED Species BULLETIN

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ENDANGERED Species BULLETIN

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Cover: Elkhorn coral (*Acropora palmata*), one of two coral species listed as endangered.
©Stephen Frink Collection/Alamy

Opposite page: A killer whale or orca leaps out of the water near San Juan Island, Washington.
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The Endangered Species Bulletin is an on-line publication. Three electronic editions are posted each year at www.fws.gov/endangered/bulletin.html, and one highlights edition is published each year. To be notified when a new on-line edition has been posted, sign up for our list-serv by clicking on "E-Mail List" on the Bulletin Web page.

The Bulletin welcomes manuscripts on a wide range of topics related to endangered species. We are particularly interested in news about recovery actions and conservation partnerships.

Please send us your comments and ideas! E-mail them to us at esb@fws.gov.

IN THIS ISSUE

A Shared Responsibility

by Angela Somma

The National Marine Fisheries Service (NMFS), an agency within the U.S. Department of Commerce, shares responsibility for implementing the Endangered Species Act (ESA) with the Fish and Wildlife Service, an agency of the U.S. Department of the Interior. Generally, the Fish and Wildlife Service manages terrestrial and freshwater species, while NMFS manages most marine and anadromous species. NMFS is responsible for conserving 68 species listed under the ESA, from large whales to sea turtles, corals, and fish, including Pacific salmon.

This issue of the *Endangered Species Bulletin* focuses on NMFS' efforts to conserve and protect these threatened and endangered species. Specifically, we describe innovative recovery efforts, such as the management of ship speeds on the Atlantic coast to protect highly endangered right whales, the progress in restoring Kemp's ridley sea turtles, and the need for urgent action to avoid the extinction of the Hawaiian monk seal. This edition also highlights conservation efforts for newly listed corals, habitat improvements for Pacific salmon, and the emerging issue of acoustics and the impacts of sound on marine mammals, sea turtles, and fish in the marine environment.

Finally, we illustrate two of our programs that address conservation for a wide variety of species: our Cooperation with States program to conserve listed and candidate species, and our Species of Concern program, which draws attention and resources to species that may be vulnerable but are not listed under the ESA. By focusing research and management attention on these species now, we may be able to avoid the need for future listings under the act.

In the years ahead, NMFS intends to continue these conservation and recovery efforts and work cooperatively with the Fish and Wildlife Service to implement the ESA.

A Kemp's ridley sea turtle hatchling begins its life with a crawl down the nesting beach to the ocean.

Wendy Teas/NOAA

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Endangered and Threatened Species under NMFS Jurisdiction

Species	Year Listed	Status
CETACEANS		
Blue whale (*Balaenoptera musculus*)	1970	E
Bowhead whale (*Balaena mysticetus*)	1970	E
Chinese River dolphin (*Lipotes vexillifer*)	1989	E
Fin whale (*Balaenoptera physalus*)	1970	E
Gray whale (*Eschrichtius robustus*),		
Western North Pacific	1970	E
Gulf of California harbor porpoise/vaquita		
(*Phocoena sinus*)	1985	E
Humpback whale (*Megaptera novaeangliae*)	1970	E
Indus River dolphin (*Platanista minor*)	1991	E
Killer whale (*Orcinus orca*)		
Southern Resident	2005	E
North Atlantic right whale (*Eubalaena glacialis*)	2008	E
North Pacific right whale (*Eubalaena japonica*)	2008	E
Sei whale (*Balaenoptera borealis*)	1970	E
Southern right whale (*Eubalaena australis*)	1970	E
Sperm whale (*Physeter macrocephalus*)	1970	E
PINNIPEDS		
Guadalupe fur seal (*Arctocephalus townsendi*)	1985	T
Hawaiian monk seal (*Monachus schauinslandi*)	1976	E
Mediterranean monk seal		
(*Monachus monachus*)	1970	E
Saimaa seal (*Phoca hispida saimensis*)	1993	E
Steller sea lion (*Eumetopias jubatus*)		
Western	1997	E
Eastern	1990	T
MARINE TURTLES		
Green turtle (*Chelonia mydas*)		
Florida & Mexico's Pacific Coast breeding		
colonies	1978	E
All other areas	1978	T
Hawksbill turtle (*Eretmochelys imbricata*)	1970	E
Kemp's ridley turtle (*Lepidochelys kempii*)	1970	E
Leatherback turtle (*Dermochelys coriacea*)	1970	E
Loggerhead turtle (*Caretta caretta*)	1978	T
Olive ridley turtle (*Lepidochelys olivacea*)		
Mexico's Pacific coast breeding colonies	1978	E
All other areas	1978	T
FISH		
Atlantic salmon (*Salmo salar*)		
Gulf of Maine	2009	E
Chinook salmon (*Onchorhynchus tshawytscha*)		
California coastal	1999	T
Central Valley spring-run	1999	T
Upper Columbia River spring-run	1999	E
Puget Sound	1999	T
Sacramento River winter-run	1994	E
Snake River fall-run	1992	T
Snake River spring/summer-run	1992	T
Upper Willamette River	1999	T
Chum salmon (*Oncorhynchus keta*)		
Columbia River	1999	T
Hood Canal summer-run	1999	T
Coho salmon (*Oncorhynchus kisutch*)		
Central California coast	2005	E
Lower Columbia River	2005	T
Oregon Coast	2008	T
Southern Oregon & Northern CA coasts	1997	T
Green sturgeon (*Acipenser medirostris*)		
Southern	2006	T
Gulf sturgeon (*Acipenser oxyrinchus desotoi*)	1991	T
Shortnose sturgeon (*Acipenser brevirostrum*)	1967	E
Smalltooth sawfish (*Pristis pectinata*)		
U.S. portion of range	2003	E
Sockeye salmon (*Oncorhynchus nerka*)		
Lake Ozette	1999	T
Snake River	1991	E
Steelhead trout (*Oncorhynchus mykiss*)		
Puget Sound	2007	T
Central California coast	1997	T
Snake River Basin	1997	T
Upper Columbia River	2006	T
Southern California	1997	E
Middle Columbia River	1999	T
Lower Columbia River	1998	T
Upper Willamette River	1999	T
Northern California	2000	T
South-central California coast	1997	T
California Central Valley	1998	T
Totoaba (*Totoaba macdonaldi*)	1979	E
MARINE INVERTEBRATES		
Elkhorn coral (*Acropora palmata*)	2006	T
Staghorn coral (*Acropora cervicornis*)	2006	T
White abalone (*Haliotis sorenseni*)	2001	E
Black abalone (*Haliotis cracherodii*)	2009	E
MARINE PLANTS		
Johnson's seagrass (*Halophila johnsonii*)	1999	T
DELISTED SPECIES		
Gray whale (*Eschrichtius robustus*)		
Eastern North Pacific	1970	R
Caribbean monk seal (*Monachus tropicalis*)	1967	Extinct

(E = Endangered; T = Threatened; R = Recovered)

Recovering West Coast Salmon and Steelhead

by Scott Rumsey

Pacific salmon (*Oncorhynchus* spp.) and steelhead (*O. mykiss*), treasured icons of the West Coast, are important to our ecosystems, economy, and culture. But many populations are seriously declining in numbers and range. Since 1991, NOAA's National Marine Fisheries Service (NMFS) has listed 28 distinctive groups of salmon and steelhead as threatened or endangered under the Endangered Species Act (ESA); 6 are listed as endangered and 22 are threatened. The spawning ranges of these protected species include the states of California, Oregon, Washington, and Idaho, spanning approximately 176,000 square miles (about 456,000 square kilometers) of habitat.

Numerous factors are responsible for the decline of Pacific salmon and steelhead. Habitat changes resulting from hydropower development, land development, resource extraction, logging, and other land use practices have damaged or eliminated some populations. Certain fish hatchery practices, natural variations in ocean-climate conditions, and other factors such as predation and the introduction of non-native species have also contributed to the decline. However,

Partnership with Pacific Coast Tribes to Conserve Native Steelhead in Washington

The Lower Elwha Klallam Tribe, in collaboration with the Washington Department of Fish and Wildlife, NMFS, and National Park Service, is developing a hatchery program to preserve the native winter-run steelhead population in the Elwha River on the Olympic Peninsula of northwestern Washington. Two hydroelectric dams constructed in the early 1900s have blocked fish passage and confined salmon and steelhead to the lower 5 miles (8 km) of the river. This year, work will begin on removing the dams to reestablish fish access to pristine upper-river habitat in Olympic National Park. To ensure the survival of the critically depleted native winter-run steelhead population in the Elwha River while its habitat is being restored, eggs from spawning fish are being collected and reared to maturity in the tribal hatchery. Captive stock will be maintained at the hatchery until habitat in the river has stabilized after the dams are removed. Progeny from the hatchery program may then be introduced into restored habitat to recover wild, native steelhead in the Elwha River Basin.

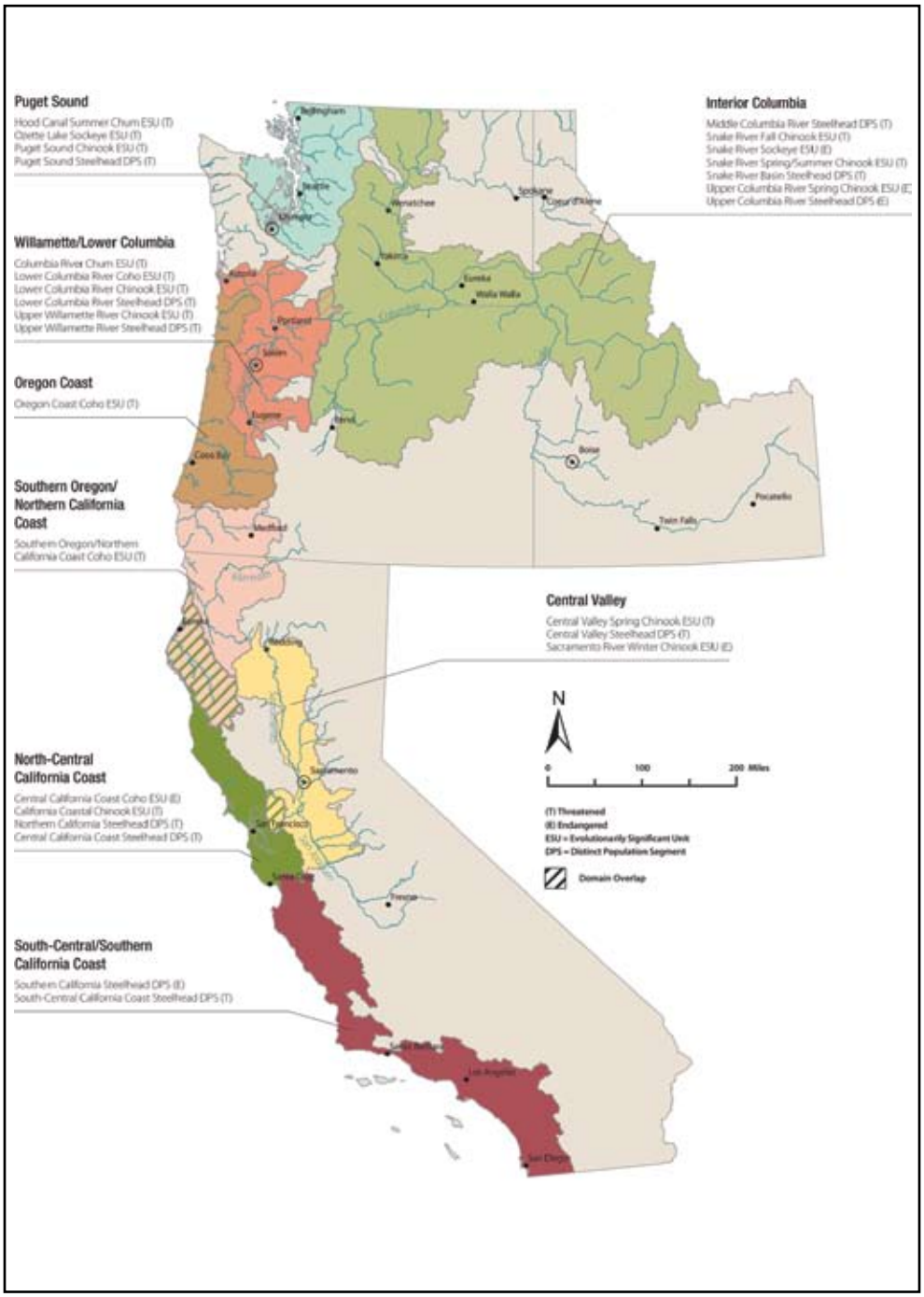
NOAA

Checking on fish produced by the captive brood program of the Lower Elwha Klallam Tribe.

these threats and limiting factors affect each listed species differently. No single factor is solely responsible for the declines, and it is difficult to quantify precisely the relative contribution of any one threat or factor to the decline of a given species. Adding to the complexity of threats facing salmon and steelhead are such new dangers as human-induced climate change.

Recovering imperiled Pacific salmon and steelhead is complicated by the patchwork of federal, tribal, state, county, city, and private land ownership and regulatory authorities across the salmon and steelhead landscape. Although the challenges are broad and complex, NMFS and its partners are working diligently to restore these iconic species for future generations, and we are making significant progress.

Recovery planning is progressing for every listed Pacific salmon and steelhead population. We believe that salmon and steelhead recovery will succeed only through conservation partnerships involving federal, state, regional, tribal, local, and private efforts. To that end,



NOAA

NMFS, the State of Idaho, and local landowners have worked collaboratively to restore flows and improve passage for threatened Snake River Chinook salmon and steelhead in the Pahsimeroi River, a tributary of the Salmon River.

NMFS has established a recovery planning process that encourages the participation of these diverse interests.

Through the Pacific Coastal Salmon Recovery Fund (PCSRF), which was established by Congress in 2000, NMFS is making significant contributions to actions that conserve and restore Pacific salmon and steelhead runs and their habitats. Since its inception, the PCSRF has allocated more than $724 million for habitat protection and restoration, watershed and sub-basin planning and assessments, public outreach and education, and research and monitoring. Many PCSRF projects are beginning to show direct benefits, such as salmon using newly accessible or improved habitat. Approximately 4,299 miles (6,919 kilometers) of stream habitat have been opened, and nearly 650,000 acres (263,050 hectares) of habitat have been restored or protected. (For more information, visit http://www.nwr.noaa.gov/Salmon-Recovery-Planning/PCSRF/).

Using a snorkle and mask, a biologist surveys a stream for juvenile salmon.

NOAA

Salmon Habitat Restoration in California

Prior to its restoration, Campbell Creek, located in northwestern California, ran through a ditch along a highway, became Gannon Slough, then ran through diked former tidelands turned into pasturelands, and finally crossed back under the highway before emptying into Humboldt Bay. Physical barriers and the lack of instream habitat prevented passage for steelhead, Chinook and coho salmon, and cutthroat trout.

Using Pacific Coastal Salmon Recovery Funds (PCSRF) provided by NOAA and administered through the California Department of Fish and Game's Fisheries Restoration Grants Program, the City of Arcata transformed Campbell Creek/ Gannon Slough. The project freed the creek from the ditch and realigned it, creating 910 feet (277 meters) of meandering stream and space for 10 log structures that provide habitat and protection for resident fish. A new tide gate facilitates the passage of salmon, steelhead, and cutthroat trout through the slough under the highway and preserves freshwater habitat. An upstream culvert providing passage under the highway was enhanced by installing a series of rock grade-control structures that created pools for the fish. Fencing was installed to keep cattle from the new 8 acres (3.2 hectares) of riparian habitat. Approximately 3,000 newly planted trees will provide shade, stream bank structure, future instream habitat, and organic material to jumpstart the aquatic food chain. The project was completed with help from almost 100 volunteers who planted trees during a series of community work parties.

NOAA

Community volunteers planting trees along Campbell Creek.

NMFS and its partners are making great strides toward steelhead and Pacific salmon recovery. Today, 17 out of the 20 species for which there are enough data to assess status are showing stable or increasing population trends. After a century of habitat degradation and population decline, there is still much work to be done to restore these fish to sustainable and harvestable levels. However, we are making progress toward our goal of preserving our natural legacy for future generations.

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Salmon Research and Climate Change

by Tom Hom
John Stein
John W. Ferguson

Concern about the expected impacts of long-term climate changes on natural climate variability is increasing. Ecosystems respond to, and are highly coupled with, climate variability. The effects are particularly acute in the Pacific Northwest, where ocean productivity, snow pack, and river hydrology respond quickly to changes in climate. This region supports a wide diversity of wildlife, including many valuable commercial and recreational fisheries, as well as endangered and threatened salmon populations.

In the Pacific Northwest, the effects of climate change will probably alter the timing of stream flows, reduce summer flows, increase stream temperatures, raise sea level, and change shorelines and ocean current patterns. Concurrently, human population growth in the Northwest will lead to increased demand in coastal communities for fresh water and erosion protection, which could cause additional changes in freshwater, terrestrial, and coastal ecosystems. A critical challenge for the National

A male coho salmon from the Russian River Coho Salmon Captive Broodstock Program.

NOAA

Marine Fisheries Service (NMFS) and other parts of the National Oceanic and Atmospheric Administration (NOAA) is to increase our understanding of how climate affects ecosystems that support salmon and to develop long-term strategies for maintaining ecological health.

In our watersheds, the effects of climate can alter rainfall patterns, thus increasing the risk of floods and reducing snowpack, which lowers summer stream flows. In the coastal ocean, climate affects the key process of coastal upwelling, a process that brings deep, nutrient-rich waters to the surface and fuels the growth of phytoplankton, which forms the base of the marine food web. Changes in this upwelling can propagate through the food web to such species as salmon by affecting the survival of juvenile fish when they swim from their natal stream into the ocean. Changes in marine water temperature can also affect salmon survival by influencing the distribution and abundance of predators. Thus, to conserve Pacific salmon, it is important to investigate climate effects from the "snowcaps to white caps" and provide scientific advice for mitigating and adapting to climate change.

For Pacific salmon, NMFS research priorities are to identify sensitive and resilient ecosystems and communities, then characterize the likely ecological effects of predicted changes in climate. The findings will provide NMFS, states, tribes, and local governments with a sound scientific basis for developing long-term management responses to climate change.

Climate-related Salmon Research

Climate-related research for the conservation of Pacific salmon takes place at NMFS' Northwest Fisheries Science Center (NWFSC) in Seattle, Washington. Scientists at the NWFSC are: 1) investigating how to predict changes in watershed processes (including, but not limited to, stream flows) at local-to-basin scales, 2) identifying physical and ecological characteristics that indicate the status of freshwater and coastal marine ecosystems, 3) combining field observations with models to predict the future response of salmon and other species to climate change, and 4) identifying and developing recovery strategies for listed salmon populations. Geographically, our research extends from headwater streams through the watershed to the estuary and into the ocean, and biologically from the base of the food web to top predators, such as killer whales. Some highlights of current research follow:

Ocean and Climate

Climate fluctuations can alter oceanic processes that affect the growth, survival, and abundance of marine and anadromous fish (species that become sexually mature in the ocean and migrate to freshwater rivers to spawn), along with their predators and prey. For example, changing water temperature influences the distribution and abundance of predators, and climate overall affects patterns of larval dispersal, growth and settlement, and survival to adulthood of prey species.

The NWFSC conducts ecological research to predict how human activities and management decisions may affect species abundance and status. This includes investigations of ocean habitats that juvenile salmon prefer; climate-driven physical forces that affect ocean conditions, plankton production, and fish community structure; and the interactions among freshwater, estuarine, and ocean ecosystems that affect salmon recruitment. The NWFSC maintains an online database on changing ocean conditions in the northern California Current (see www.nwfsc.noaa.gov) that provides information about key ecosystem indicators that forecast adult salmon returns. Other research topics include the effects of climate on salmon feeding and bioenergetics (in this case, increased food requirements for juvenile salmon in warmer waters) and the potential impacts of climate on salmon predators, such as killer whales (*Orcinus orca*). The southern resident killer whale, the term given to a group that visits the Puget Sound every summer, was listed in 2005 as endangered.

Estuary and Climate

In the Columbia River estuary, NWFSC scientists are investigating how juvenile salmon use a variety of habitats,

Chinook salmon.

NOAA

NOAA

Sockeye salmon.

which habitats are most important for their survival, and how the timing of juveniles moving through the estuary into the ocean is affected by river flow and ocean conditions, both of which are influenced by climate variability. In the Puget Sound, an integrated assessment is underway to identify ecosystem indicators, assess risks to key ecosystem components, and evaluate management strategies to maintain and restore ecosystem processes and productivity in the face of climate change. In addition, we are modeling climate, hydrology, and salmon population dynamics to support salmon recovery efforts.

Freshwater and Climate

Freshwater ecosystems are critical for salmon and other anadromous fishes. Climate directly affects the hydrologic cycle and stream temperatures, which can affect spawning, migration timing, and juvenile survival. Models have been developed to estimate the impact of flood strength on survival of salmon eggs and fry (newly hatched salmon), and there are ongoing studies on migration behavior in response to changing river conditions. An example of the latter is a study on the migration timing and survival of wild Snake River juvenile spring/summer Chinook salmon (*Oncorhynchus tshawytscha*) in response to changes in river flow and elevated water temperature. Research is also underway on whether, and how, restoration strategies could mitigate the effects of climate change and aid salmon recovery. In examining restoration strategies, models of climate, land cover, and hydrology are linked with the salmon population biology to identify the best strategies for salmon conservation in the face of climate change.

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Finding a New Future for Corals

by Sarah Heberling

Coral species around the world face numerous threats that vary from natural to human-induced, severe to slight, and global to local in scale. Unfortunately, few first-hand observers of the once biologically diverse "rainforests of the sea" remain. Most people today only know of such healthy coral reefs through photographs. Some of the threats to coral reefs are well understood, while others we are just beginning to comprehend.

In 2006, the once dominant Caribbean reef-building species of elkhorn (*Acropora palmata*) and staghorn (*A. cervicornis*) corals became the first to be listed under the Endangered Species Act (ESA). Both coral species are distributed throughout the Caribbean from the Bahamas to Venezuela, from Mexico to Florida, and in Puerto Rico and the U.S. Virgin Islands. These species were once so common that entire reef zones were named after them. Now, it is estimated that less than three percent of their populations remain.

The decline of these species, and their eventual listing as threatened, resulted mainly from disease, climate change (which increased bleaching[1] in response to elevated sea surface temperatures), and hurricane impacts. Other threats contributing to their decline include damage resulting from boating, fishing, diving, and snorkeling, as well as impacts of coastal development, including sewage and stormwater discharges. If these threats continue, so will the decline of elkhorn and staghorn corals.

Although we know the threats contributing to the decline of threatened elkhorn and staghorn corals, we do not yet know how these threats affect individual coral species or how individual threats acting together affect the overall physiology and health of these corals. The research conducted by scientists within and outside of the National Marine Fisheries Service (NMFS) will play an important role in managing threats and eventually recovering these species.

Michael Barnette/NOAA

Elkhorn coral.

At the 11th International Coral Reef Symposium, held this year in Ft. Lauderdale, Florida, elkhorn and staghorn corals were the subject of 46 oral and poster presentations. Much of the research on these species presented at the symposium focuses on reproduction and genetics. Other research centers on coral diseases, including physiological responses and environmental conditions associated with disease. The causes of disease in these coral species remain undetermined. Other investigations seek to identify coral restoration techniques in an on-going response to damage resulting from such disturbances such as vessel groundings and storms. Developing successful techniques may lead to the larger-scale reef restoration efforts needed to achieve recovery. In the meantime, we

[1]Bleaching is when a heat-stressed coral colony expels all of its symbiotic algae and only the white coral skeleton is left, giving the coral a "bleached" appearance.

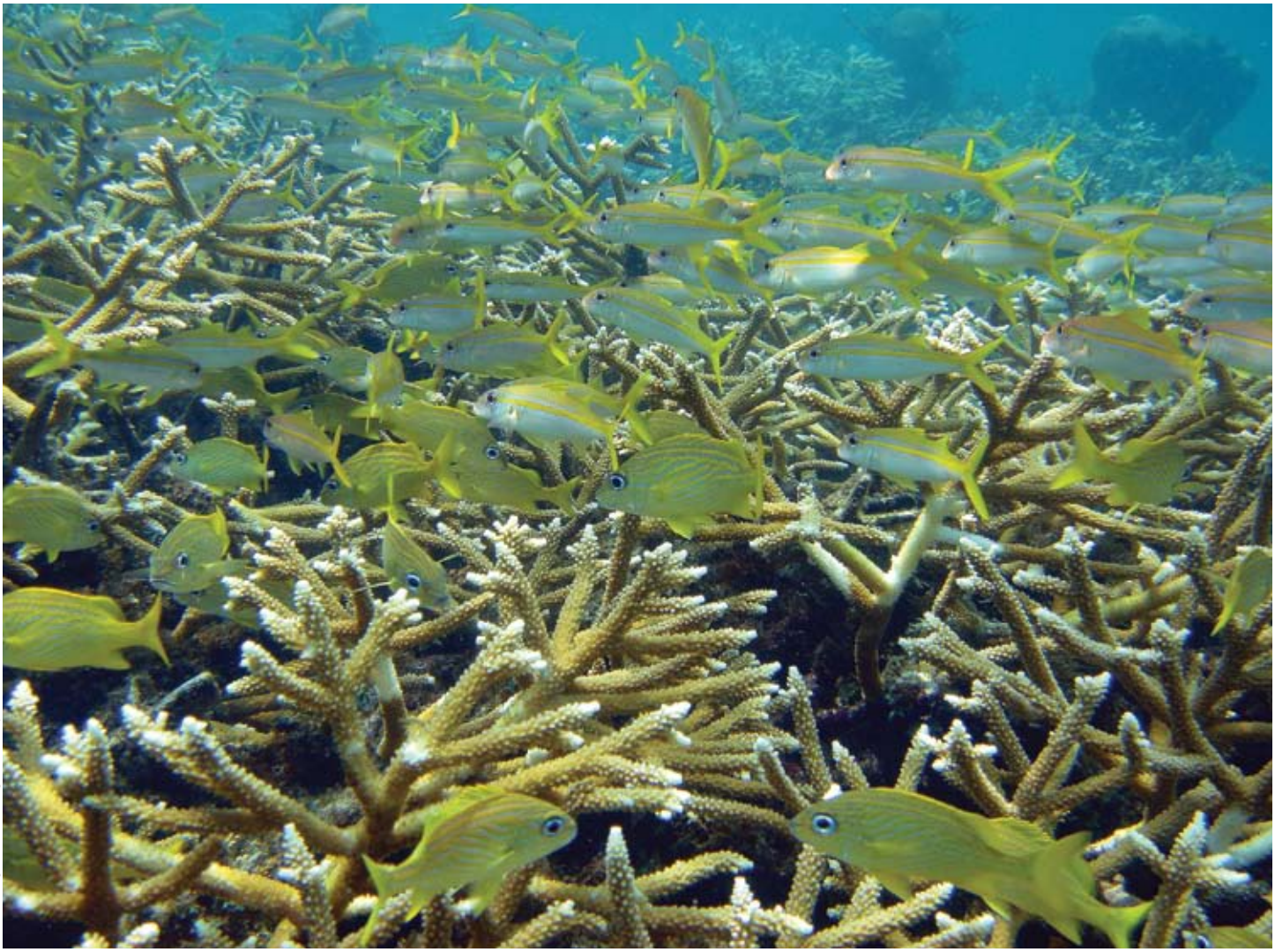
still need accurate estimates and maps of species numbers and distribution.

Gaps in knowledge and understanding can affect our ability to stem the decline of elkhorn and staghorn corals, but these uncertainties need not stop development of research and management strategies. For example, four years of data on elkhorn colonies in the Upper Florida Keys, collected by Dana Williams at the University of Miami Rosenstiel School of Marine and Atmospheric Science's Cooperative Institute of Marine and Atmospheric Studies and Margaret W. Miller at the NMFS Southeast Fisheries Science Center, is being used by Tali Vardi, a graduate student at Scripps Institution of Oceanography, to develop a population viability analysis model for this species. Different types of datasets can be incorporated into the model to show how those parameters change the long-term viability of elkhorn coral populations. These datasets may include annual bleaching, monitoring, or abundance data; climate change modeling data, such as long-term prediction data for future hurricane intensities, frequencies, and storm tracks; and changing ocean pH and calcium carbonate levels, which affects the rate at which corals form their outer skeletons. In turn, this may help the Acropora Recovery Team develop recovery objectives and compare recovery strategies.

Elkhorn and staghorn corals are unique in the world of ESA-listed species. These animals are immobile colonial invertebrates that also provide habitat for a multitude of species. These relatively fast-growing corals provide the branching framework for reef creatures in search of a safe place to live, eat, and grow. Therefore, conservation and recovery of threatened corals is inherently coupled with the conservation of an entire ecosystem. The unique nature of these threatened species means that existing examples of ESA-listed species management and recovery may not be appropriate. Thus, future research objectives and the data collected from past and on-going research initiatives will need to be formulated and applied in potentially new and creative ways to develop and implement practical recovery actions.

Sarah Heberling, a NMFS natural resource specialist/Acropora Implementation in St. Petersburg, Florida, can be reached at 727-824-5312.

Staghorn coral.



Caroline Rogers/US Geological Survey

CITES Gives Hope to the Queen Conch

by Nancy K. Daves

High international demand for marine species is producing increased fishing pressure and illegal, unregulated, and unreported fishing, resulting in significant population declines for many species. An important international trade and wildlife conservation treaty, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), regulates international trade to ensure sustainability of species listed on CITES appendices. An excellent example of the positive impact that CITES can have on a marine species is found in the case of the queen conch (*Strombus gigas*).

Bob Glazer/Florida Fish and Wildlife Conservation Commission

The queen conch is a marine mollusk that inhabits seagrass beds and sand flats in the greater Caribbean region from Bermuda and southern Florida to southern Mexico, Venezuela, and northern Brazil. A source of food harvested since ancient times, the queen conch is a commercially and culturally important species. Queen conch larvae disperse widely throughout the marine ecosystem; therefore, local fishery management plans can have far-reaching implications. Currently, there is no regional fishery management organization in the Caribbean region that prevents overexploitation of this species.

Landings of queen conch were stable at around 2,200 tons (2,000 metric tons) per year from the 1950s to the 1970s. Harvest increased rapidly in the following decades, leaving most queen conch populations significantly reduced. By the 1980s, conch over-harvest and population declines were widely considered by fisheries managers as an urgent regional problem, and fisheries were closed in many areas. Despite local closures, harvest continued to increase throughout the 1990s, with average annual landings of nearly 33,070 tons (30,000 metric tons). Much of the increase was driven by demand from Caribbean countries, as well as the United States, which imports

Andy Bruckner/NOAA

approximately 80 percent of the annual queen conch catch. In 1992, in response to concerns regarding high demand for the species and declining populations, the U.S. proposed to list the queen conch in Appendix II of CITES. Appendix II species are those species that are not necessarily threatened with extinction, but for which trade must be controlled in order to ensure their survival. This proposal was adopted during the CITES Eighth Conference of the Parties in Kyoto, Japan.

Although CITES provided the first legal conservation framework for regulating international trade in queen conch products, many countries continued to express concerns about over-exploitation, illegal trade, and subsequent enforcement problems. These concerns ultimately led to the inclusion of queen conch in the CITES Review of Significant Trade in 1995 and 2001. The review began with a thorough examination of the species' conservation and trade status, providing multiple opportunities for comment by the exporting and importing countries. The National Marine Fisheries Service (NMFS), in collaboration with the U.S. Fish and Wildlife Service (FWS), invested more than $100,000 and obtained a further $200,000 from other sources (U.S. Department of State, Darden Restaurants Foundation). This funding was used to convene regional workshops so that all affected countries understood: 1) the Significant Trade review process, 2) recommendations for training and fishery management capacity building, 3) how the range countries could participate in the Significant Trade Review, and 4) the implications of the findings of the Significant Trade Review process for exporting and importing countries.

Of the 28 queen conch range countries, the Dominican Republic and Honduras were the largest exporters of queen conch; the Significant Trade Review identified them as two of the three countries of "urgent concern" (the other was Haiti). There were 13 countries listed of "possible concern," and the remaining 12 countries included in the review were determined to be "not of concern." The Significant Trade review recommended against accepting imports from the three countries of "urgent concern" until they were found to be in full compliance with CITES. Honduras eventually set a quota for exports and was found to be in compliance with the CITES Significant Trade recommendations. The Dominican Republic decided to suspend international trade until research activities and an updated fisheries management plan are completed. Other countries in the region have taken considerable steps to ensure that harvest and export of queen conch are sustainable. The queen conch's Appendix-II listing has provided motivation and resources for local and regional efforts towards sustainable trade of the species.

Regardless of these accomplishments, illegal and perhaps unsustainable harvest continues to be a concern. FWS and NMFS enforcement agents, in cooperation with Environment Canada's Enforcement Branch, discovered that approximately 263,593 pounds (119,978 kilograms) of queen conch, valued at more than $2.6 million, were harvested from Colombia, the Dominican Republic, Haiti, and Jamaica and illegally transported into the U.S. and Canada between September 29, 2003, and December 31, 2006. An analysis prepared by Environment Canada and the Florida Fish and Wildlife Conservation Commission concluded that this harvest represented 798,000 to 1.05 million individual queen conch. The investigation into illegal trade continues.

Governments of the queen conch range countries and the U.S. continue to share concerns about the legality and sustainability of the queen conch fishery. In August 2008, the Archipelago of San Andres, Old Providence, and Santa Catalina (Colombia) hosted a Regional Workshop for Improving Queen Conch Collaborative Management and Enforcement in the Western Caribbean. This initiative called for increased attention to regulation and enforcement to ensure compliance with CITES requirements for queen conch.

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A Brighter Future for the Kemp's Ridley

by the Kemp's Ridley Recovery Team[1]

Once described as the most imperiled of all marine turtles, the Kemp's ridley sea turtle (*Lepidochelys kempii*) plunged to less than one percent of its historical population within a few decades. Intensive exploitation of turtle eggs and the drowning of adults in shrimp trawls were responsible for most of the decline. The Kemp's ridley has been protected by the United States since 1973 under the Endangered Species Act and by Mexico since 1994. The International Union for the Conservation of Nature lists the Kemp's ridley as critically endangered. Thanks to a bi-national conservation and recovery program, the future for this species now appears to be much brighter.

The Kemp's ridley ranges widely, swimming throughout the Gulf of Mexico, the northwestern Atlantic Ocean, and adjacent sounds, but most nesting occurs on the beaches of the western Gulf, primarily in the Mexican state of Tamaulipas. In the U.S., most Kemp's ridley nests are found in Texas, but they have been recorded infrequently elsewhere along the Gulf and Atlantic coasts. Based on a 1947 film by Andres Herrera, biologists estimate that approximately 40,000 Kemp's ridley females nested at Rancho Nuevo in Tamaulipas, Mexico, on a single day. By the late-1970s and mid-1980s, however, fewer than 400 females nested there in an entire season.

Due to an extensive international conservation partnership spanning decades, the situation has improved dramatically. The number of nests observed at Rancho Nuevo and nearby beaches has increased more than 10 percent per year since the mid-1980s. During the 2009 nesting season, approximately 21,000 Kemp's ridley nests were recorded in Mexico. In the U.S., 574 Kemp's ridley nests have been documented on the Texas coast from 2002 through 2008, as compared to the 81 nests recorded over the previous 54 years (although monitoring was less rigorous in earlier years, so some nests may have gone unreported). The number of nests detected in recent years indicates that at least 6,000 females (female turtles nest about 2.5 times on average during a season) are nesting each season in the western Gulf. We believe the Kemp's ridley is on its way to recovery as a result of protection on nesting beaches and in the marine environment.

After depositing her eggs in a hole dug in the beach sand, a Kemp's ridley covers the nest.

Wendy Teas/NOAA

Conservation on the Nesting Beaches

In the mid-1960s, Mexico sent a team of biologists to Rancho Nuevo to survey the Kemp's ridley sea turtle nesting population and to establish a conservation program to protect the remaining females, their eggs, and hatchlings from human and animal predators. By 1977, the U.S. Fish and Wildlife Service (FWS), National Park Service (NPS), National Marine Fisheries Service (NMFS), and Texas Parks and Wildlife Department joined Mexico's Instituto Nacional de Pesca (INP) in the conservation effort, eventually establishing conservation camps south and north of Rancho Nuevo. In the 1990s, the INP, Tamaulipas state

[1]For list of members, see www.fws.gov/kempsridley

Wendy Teas/NOAA

While a Kemp's ridley lays her eggs, researchers have a chance to gather data.

government, Administracion Portuaria Integral de Altamira, Universidad del Noreste, and Gladys Porter Zoo of Brownsville, Texas, expanded the project to include other beaches in the Mexican states of Tamaulipas and Veracruz. Since then, some eggs have been relocated to protected corrals and their hatchlings monitored as they crawled toward the sea. The hatching success of these eggs and emerging success of hatchlings from nests has been estimated at 62 to 79 percent, a rate that is believed to be greater than if the nests were left unprotected.

Since 1986, NPS staff and volunteers have patrolled North Padre Island (part of the Padre Island National Seashore) in southern Texas to protect nesting Kemp's ridley turtles and their eggs, and to gather biological data. The frequency and range of patrols has expanded over the years. Today, all Texas beaches are patrolled, to some extent, by the NPS and volunteers from the Sea Turtle Restoration Project, Texas A&M University at Galveston, and other organizations. Biologists and volunteers have also conducted extensive public education about sea turtles, which is vital since beach users report up to half the Kemp's ridley nests documented on the Texas coast each year. Eggs from the nests found along the Texas coast are transported to an incubation facility or relocated into a protected corral for their safety until threats in the wild can be addressed adequately.

In the late 1970s, Mexico and the U.S. also undertook a "headstart" program in which Kemp's ridleys hatchlings were maintained for a time in captivity to circumvent the normally high mortality of hatchlings. The turtles were released when they outgrew the threats posed by many of their predators. More than 10,000 turtles were obtained from Rancho Nuevo as hatchlings and released at various locations throughout the Gulf of Mexico after months of headstarting. From 1978 to 1988, more than 22,000 eggs from Rancho Nuevo were also sent to

Wendy Teas/NOAA

Burying relocated eggs in a protected beach corral.

North Padre Island in an attempt to reestablish a nesting colony in Texas. Over the 11 years, approximately 17,000 of these eggs hatched. The hatchlings were allowed to crawl down the beach at North Padre Island and swim up to 10 meters (33 feet) offshore, where most were recaptured; this was done in an attempt to imprint them on local beaches before taking them to the NMFS laboratory in Galveston for one year of headstarting. However, except on the upper Texas coast, most Kemp's ridleys found nesting on Texas beaches are from the wild stock and were not headstarted. It has been difficult to statistically demonstrate the success of experimental imprinting and headstarting, and additional headstart experiments have been discouraged.

Conservation in the Marine Environment

Mexico declared Rancho Nuevo a Reservation Area in 1986, which prohibited sailing and fishing within 6.44 kilometers (about 4 miles) of the beach. In 1990, commercial harvest of all species of sea turtles was banned in all waters of Mexico. Beginning in 2000, Mexico closed the nearshore waters off Tamaulipas and Veracruz to shrimp fishing during the Kemp's ridley nesting season. Since 2007, Mexico also has prohibited longline shark fishing in a 5-km (3.1-mile) buffer off Tamaulipas and Veracruz to protect Kemp's ridleys. Mexico also mandated the removal of fishhooks from turtles captured incidentally and prohibited longlines within the nearshore areas.

The development of turtle excluder devices (TEDs) to reduce sea turtle capture in the U.S. shrimp fishery began in the late 1970s. Used in conjunction with shrimping nets, TEDs have greatly reduced Kemp's ridley mortality due to shrimp fishing. Since 1987, U.S. law has required the use of TEDs by large shrimp vessels operating along the east coast of Florida. Because of delays in enacting the federal regulations, the state of Florida enacted regulations for its waters. In 1991, TEDs were required in all U.S. waters south of the North Carolina/Virginia border through Texas and in the summer flounder fishery operating in waters off North Carolina through southern Virginia. In addition, a U.S. law requires that nations exporting shrimp to the U.S. also conserve turtles. Consequently, TEDs have been used by the Mexican fleet since 1993.

In 1978, Texas established the "Texas closure," which generally occurs May through July, to enhance shrimp catch. Because the timing of the closure coincides with the peak Kemp's ridley nesting period, the turtle receives increased protection. In 2000, Texas also established a seasonal shrimp fishery closure from Corpus Christi Fish Pass to the Texas-Mexico border. It is in effect from December 1 to July 15 each year, and the zone extends 9.26 kilometers (about 5.8 miles) out from the beach. Historically, this area accounts for 68 percent of turtle strandings and less than 3 percent of the total Texas shrimp landings within this timeframe. These rules will give additional protection to adult Kemp's ridleys off Padre Island and could lead to the establishment of a secondary nesting beach.

Conclusion

The Kemp's ridley nesting population is increasing, and we are cautiously optimistic that the species is on its way to recovery. For the foreseeable future, however, continued protection for nesting beaches and turtles in their aquatic habitat is necessary. In 2002, the FWS, NMFS, and Mexico's Secretariat of Environment and Natural Resources convened a bi-national Kemp's Ridley Recovery Team to revise the Kemp's Ridley Recovery Plan of 1992. We expect that a draft revised plan will be available for public review in late 2009. This project demonstrates what collaborative conservation efforts can do for even critically endangered species, but it also underscores that such programs require a long-term commitment.

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Mixed News for the Hawaiian Monk Seal

by T. David Schofield

Question: What is the most critically endangered marine mammal whose entire range lies within the United States?

Answer: The Hawaiian monk seal (*Monachus schauinslandi*).

This "living fossil" is documented in the scientific literature as the most ancient of all pinniped (fin-footed animal) species. Originating 14 to 15 million years ago, this species is older than some of the Hawaiian Islands it now inhabits. The bad news is that only about 1,100 Hawaiian monk seals remain. Ninety percent of them live in the Refuge and Monument systems of the Northwestern Hawaiian Islands (NWHI) in the Midway Atoll and Hawaiian Islands National Wildlife Refuges, which are managed by the U.S. Fish and Wildlife Service, and at the very tip of the state's Kure Atoll Seabird Sanctuary. The NWHI population is declining by 4 percent per year. The somewhat good news is that the remaining 10 percent—estimated at 100 individuals found throughout the eight main Hawaiian Islands—are increasing.

Problems such as poor female juvenile survival, entanglement in fishing

Telemetry equipment is providing valuable information about the habitat needs of the Hawaiian monk seal.

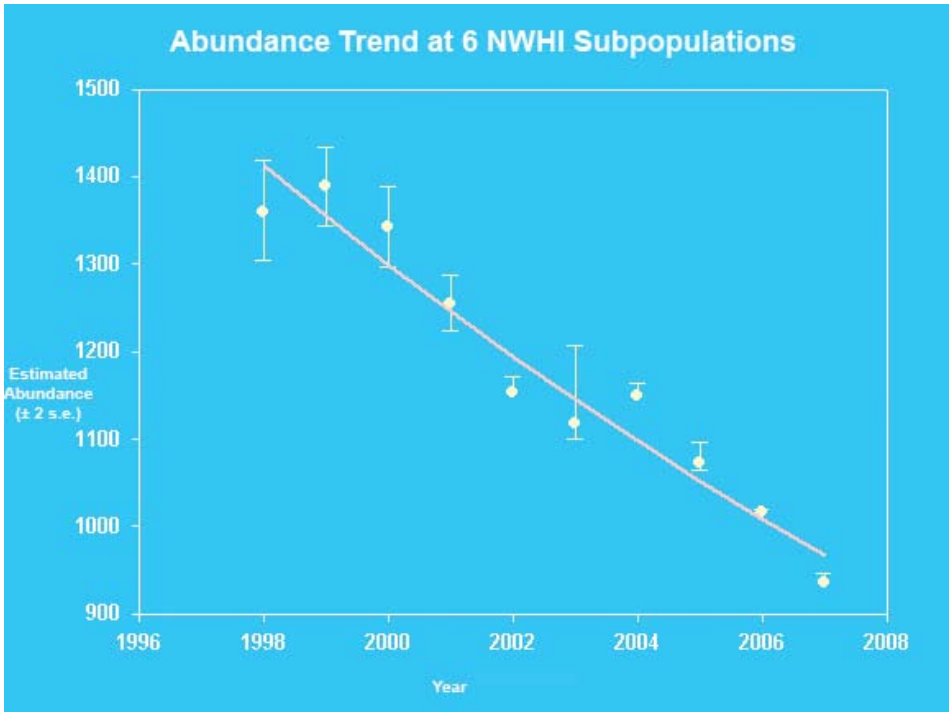
Justin Viezbicke

NOAA

gear and other marine debris, shark predation, diminishing beach habitat due to sea level rise, and reduced prey availability (which is due to people fishing and other top predator animals) are recognized as causes for the recent decline in the NWHI. Historical causes included pressure from military use of the islands and an intensive sealing and exploration expedition in the mid-1850s. However, the seal population in the main Hawaiian Islands appears to be on the rebound. Although the carrying capacity for monk seals in the main islands is unknown, 88 individuals are routinely sighted, a number that is based on such mark-recapture methods as identifying markings, flipper tags, and tracking by telemetry equipment.

The Recovery Plan for the Hawaiian Monk Seal established a range-wide population goal of maintaining 2,900 individuals for 20 years before the seal can be removed from Endangered Species Act protection. Projections suggest that the main Hawaiian Islands would have to sustain 500 of the seals. Currently, seals there appear to be thriving; the adults appear to be larger than those in the NWHI, mothers appear to be very healthy prior to giving birth, births are increasing, and pups are larger and healthier in comparison to the NWHI pups.

While the monk seal population growth in the main islands is encouraging, these animals face complex and unique impacts that were not previously observed in the larger NWHI population. Non-fatal hookings during recreational fishing, fatal entanglements, dog attacks, and conditioning to humans are among the threats that may be disastrous for the population in the main islands. For example, "R042," a female monk seal born on a popular beach on the Big Island of Hawai'i, quickly became desensitized to humans. As a result, she began to exhibit friendly behaviors and interactions with people that led to swimming together, tactile petting, and feeding. This seal was first adopted by the local community, but she was soon admonished after becoming too playful and occasionally aggressive. After she jumped onto kayaks and surfboards, it was clear that these behaviors could become a nuisance to people, and the seal had to be relocated to another island. This is the third monk seal that required removal from its island of origin due to negative interac-



Abundance trend at 6 NWHI subpopulations (source: Jason Baker, NOAA/NMFS/PIFSC).

tive behavior. In 2003, another monk seal from the Big Island was moved to the island of Kahoʻolawe and eventually moved farther away to Johnston Atoll. A second seal was removed from Kauaʻi and sent to Niʻihau. Moving seals away from their island of origin is not a preferred management practice. It demonstrates the need for increased public education about the problems caused by conditioning monk seals to interact with people.

With the decline of the NWHI population, the future of the Hawaiian monk seal may depend on the survival of the increasing population in the main islands. The National Marine Fisheries Service (NMFS) Pacific Islands Regional Office has developed a network of dedicated community members to foster public involvement in monk seal conservation. During the past three years, several island coordinators and a large cadre of volunteers throughout the state have enlisted in the effort. The volunteer network includes approximately 300 members from diverse backgrounds. On a daily basis, they respond to reports of seal haul-outs (literally, seals hauling themselves onto the beach), educate local citizens and tourists, record information, and provide the NMFS Pacific Islands Fisheries Science Center with images that are used to identify and monitor the seals. Outreach programs include a statewide Hawaiian Monk Seal Count every April and October, and school programs have been developed by volunteer teachers. These tools have proven useful in fostering the concept that recovering the monk seal will require efforts by all of us.

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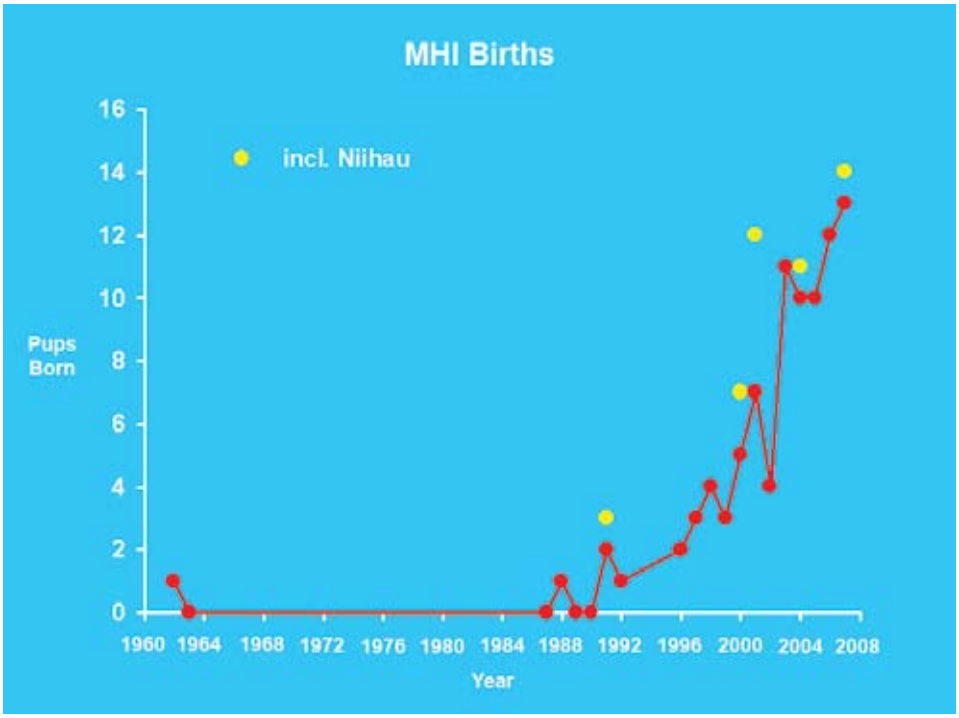
Learning from the growing public awareness of the humpback whale following its designation as the official Hawaii State Marine Mammal, monk seal response volunteers lobbied to appoint the seal as the official Hawaii State Mammal. This process helped to inform the Hawaii State Legislature on the critical status of the monk seal while elevating public awareness.

It is imperative that the public understand the plight of the Hawaiian monk seal and support efforts to prevent its continued decline. This year, one of the world's three species of monk seal was declared extinct (see the following article on the Caribbean monk seal). We all need to work to avoid such a fate for the Hawaiian monk seal—a unique natural treasure.



Births of Hawaiian monk seals in the main Hawaiian Islands are increasing (source: Tracy Wurth NOAA/ NMFS/PIFSC).

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Caribbean Monk Seal: Gone but Not Forgotten

by Kyle Baker

On October 28, 2008, the National Marine Fisheries Service (NMFS) confirmed the extinction of the Caribbean monk seal (*Monachus tropicalis*) and removed it from the federal list of endangered and threatened wildlife. This makes it the first species of seal to go extinct as a direct result of human activities.

It was the only seal native to the wider Caribbean region, including Florida and the Gulf of Mexico. Until recently, reports of seal sightings within the species' range led to hope that some monk seals may have persisted around remote reefs in the Caribbean. To resolve any lingering doubts, NMFS launched a formal status review. Completed in March 2008, the status review considered sighting reports, surveys, and marine mammal stranding data. Although some sightings from the late 1950s to the 1970s may have been solitary Caribbean monk seals, we have found that reported seal sightings in recent decades were all extra-limital (out of normal range) occurrences of hooded seals (*Cystophora cristata*), feral California sea lions (*Zalophus californianus*), misidentified manatees (*Trichechus manatus*), and other species.

It is remarkable how the Caribbean monk seal population, which likely numbered between 233,000 and 338,000 individuals among 13 major colonies, became extinct so rapidly following European colonization. Vulnerable due to their hauling-out behavior and abundant numbers, Caribbean monk seals were hunted as a readily available source of oil by European colonizers, and they were killed in lesser numbers for food. Intensive exploitation led to a rapid decline in seal numbers, extirpation of colonies, and population fragmentation. As the species became rare in the late 1800s and early 1900s, remaining seal colonies were targeted by expeditions to obtain dead specimens for scientific study and live animals for captive display. Expeditions of collectors to the Triangle Keys region of the Yucatan Peninsula in the early 1900s led to the extirpation of what may have been the last remaining large colony in the wild. Ironically, the hundreds of seals killed during this period due to scientific interest in the species may have sealed its fate.

We cannot be certain when the Caribbean monk seal vanished, but the

Caribbean monk seal.

Henry W. Elliott

New York Zoological Society.

A captive Caribbean monk seal at the New York Aquarium in 1910. Four specimens were purchased in 1909 from a dealer in Mexico who captured the animals from islands or reefs off the Yucatán Peninsula.

last confirmed sighting was of a small colony on an isolated reef at Serranilla Bank (a group of small uninhabited islands in the southern Caribbean) in 1952. Many efforts were made to locate remaining seals in the wild, but their occurrence was never again confirmed, and all captive specimens died long ago.

Hunting and collection of Caribbean monk seals was never regulated in time to save the species. The locations of any remaining seals were unknown by the time conservation actions were finally considered. Very little is known of the seal's life history, ecology, and behaviour. However, we believe that, as human settlement expanded in areas inhabited by this species, persistent hunting reinforced evasive seal behaviors, and avoidance of humans likely caused seals to abandon historic haul-out sites.

Lessons Learned

We hope the extinction of the Caribbean monk seal marks the end of the era when unbridled hunting and collection can endanger a species in the wild. The Caribbean monk seal is not the only seal species that was decimated by overhunting in the past. After only about 50 years of commercial hunting for their blubber in the 1800s, northern elephant seals (*Mirounga angustirostris*) nearly became extinct. Fortunately, the northern elephant seal population recovered remarkably well following an international hunting ban in 1911. In retrospect, we know that proper management and enforcement of sealing and whaling could have prevented the depletion of many marine mammals that are threatened and endangered today, and in the worst cases, the extinction of several species.

Currently, two species of monk seals remain—the Hawaiian monk seal (*Monachus schauinslandi*) and the Mediterranean monk seal (*Monachus monachus*). Both are listed under the Endangered Species Act (ESA) and are in serious decline. Other seals listed under the ESA are the Steller sea-lion (*Eumetopias jubatus*), Guadalupe fur seal (*Arctocephalus townsendi*), and Saimaa seal (*Phoca hispida saimensis*). NMFS completed a status review of ribbon seals (*Histriophoca fasciata*) in December 2008, and is currently reviewing the status of three other species: bearded seals (*Erignathus barbatus*), ringed seals (*Phoca fasciata*), and spotted seals (*Phoca largha*).

The scarcity of information and lack of management leading to the extinction of Caribbean monk seals spotlights the need for continued support of monitoring programs, research, and cooperation among stakeholders in the recovery of seal populations today. We know that conserving seals is no longer as simple as ending overharvesting. We face new conservation challenges associated with habitat loss, global climate change, overfishing, human interactions, and the cumulative effects of many factors affecting ecosystems. The overall health of ecosystems is crucial to the survival of these species, and monitoring and adaptive management strategies, as well as enhanced partnerships, are integral components of recovery plans.

The conspicuous absence of monk seals from tropical reef ecosystems in the wider Caribbean region is a permanent reminder of the tough research and management challenges we are certain to face in the future. Our ability and willingness to meet these challenges will determine if we are able to save our remaining species from the fate of the Caribbean monk seal.

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Hawaii Longliners Reduce Sea Turtle Bycatch

by Lance Smith

Longline fishing poses one of the greatest threats to threatened and endangered Pacific sea turtles. This fishing method typically consists of suspending a large number of baited hooks attached at regular intervals over a horizontal mainline more than a mile in length. Sea turtles are incidentally hooked or entangled in the gear, or in other words, become bycatch.

The National Marine Fisheries Service (NMFS) manages the limited-entry (maximum of 125 vessels) Hawaii longline fishery, which targets tuna and swordfish – species of high market value – across a large area in the central Pacific Ocean. Longlining for tuna is done during the day at 150 to 400 meters (about 500 to 1,300 feet) of depth, generally to the south of Hawaii, while longlining for swordfish is done at night in areas north of Hawaii less than 100 meters (about 330 feet) in depth. Because of the different gear and methods used, tuna and swordfish longlining are managed separately, although the same vessel may switch between the two species. The "Hawaii longline fishery" is a general term that refers to both the tuna and swordfish longline fisheries based in Hawaii.

All five sea turtle species living within United States Pacific waters are listed as threatened or endangered under the Endangered Species Act. The species caught most commonly in the tuna fishery is the olive ridley (*Lepidochelys olivacea*). The tuna fishery also results in bycatch of leatherback (*Dermochelys coriacea*) and green (*Chelonia mydas*) sea turtles. The sea turtle species caught most commonly in the Hawaiian swordfish fishery is the loggerhead (*Caretta caretta*), although incidental captures include leatherbacks from the Pacific's severely depleted population. Hawksbill sea turtles (*Eretmochelys imbricata*) occur in Hawaiian waters but are not known to be incidentally captured in either fishery.

Because of high bycatch rates of sea turtles, particularly loggerheads, the Hawaiian swordfish fishery was closed by court order in 2001. The Hawaiian tuna fishery was seasonally restricted by the same order due to high bycatch rates of olive ridley sea turtles. Both fisheries were also catching substantial numbers of leatherback sea turtles.

After longliners incorporated measures to reduce sea turtle bycatch, the Hawaiian swordfish fishery reopened in 2004. These measures included the use of large circle hooks (a hook designed to reduce mortality in non-target species) and mackerel-type bait (which reduces the likelihood of attracting turtles), the stationing of observers on every boat, and protocols for handling and releasing hooked or entangled turtles. Some turtle conservation measures were also adopted by the Hawaiian tuna fishery. As a result, bycatch of loggerhead and leatherback sea turtles was reduced by approximately 90 percent in the Hawaii longline fishery as a whole.

Sea turtle bycatch rates tend to be higher in swordfish longline fisheries than in tuna longline fisheries, especially for loggerheads. That's because juvenile

Green sea turtle.

NOAA

NOAA Fisheries Observer Program, Honolulu

A hooked loggerhead (left) being released (right).

loggerheads congregate in the same area of the ocean as swordfish, where prey for both species is abundant. In addition, loggerheads usually forage on the surface or in shallow water, whereas other sea turtle species, such as leatherbacks and olive ridleys, typically dive deeper in search of food. However, when the proper protocols are used to handle and release a hooked loggerhead, studies have shown that survival is approximately 80 percent.

Sea turtle bycatch rates in the Hawaii tuna and swordfish longline fisheries are lower than those in other longline fisheries operating in the Pacific. Bycatch rates of seabirds, such as several albatross species, have also been reduced in the Hawaii longline fishery in recent years as a result of several seabird conservation measures. These include dying bait blue and attaching weights to baited hooks to make them sink faster.

As part of a broad international program for the conservation of sea turtles and seabirds, NMFS is working with other countries that manage Pacific longline fleets to encourage the adoption of conservation measures in their waters. The Hawaii longline fishery provides an example of how sea turtle and seabird bycatch can be reduced as part of an economically viable fishery.

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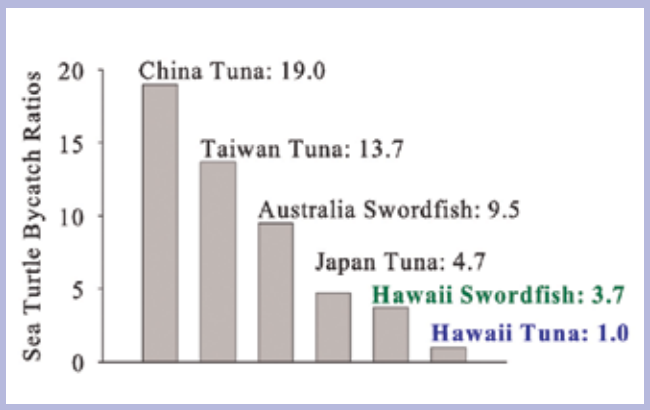
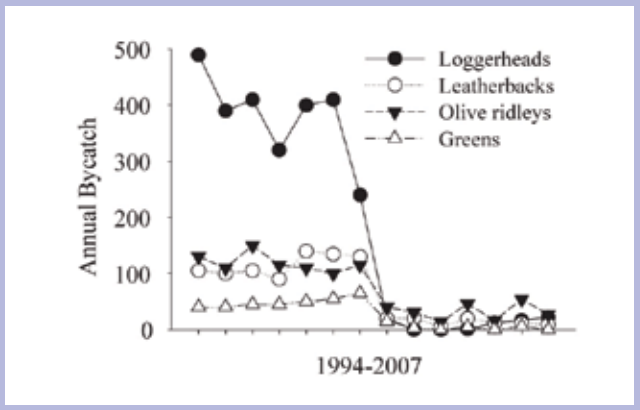
Lance Smith, the Endangered Species Team Leader in the Protected Resources Division of the NMFS Pacific Island Regional Office, can be reached at lance.smith@noaa.gov or 808-944-2258.



Relative bycatch ratios in Pacific longline fisheries (Kaneko & Bartram 2008).



Bycatch in the Hawaii longline fishery.

Southern Resident Killer Whale Recovery

by Lynne Barre

Killer whales (*Orcinus orca*), sometimes called orcas, are a focus of public interest, scientific curiosity, and awe. Many people in the Pacific Northwest feel a connection to these family-oriented mammals, and Indian tribes hold them in high regard. The cultural and spiritual importance of these whales to the people of the Pacific Northwest is an essential part of conserving these amazing animals for future generations.

In 2005, under the terms of the Endangered Species Act (ESA), the National Marine Fisheries Service (NMFS) listed a "distinct population segment" of the "southern resident killer whale" (a group that spends a fair amount of time each year in Washington's

Dawn Noren

Puget Sound) as endangered. Southern resident killer whales are found mostly in the inland waters of Washington State and British Columbia, Canada, in summer and in coastal waters in winter. They use a sophisticated sonar system called echolocation to search for food, primarily salmon and steelhead. The whales also exhibit a remarkable ability to communicate with each other by making a variety of sounds. They live in highly stable social groups called pods, led by matriarchal females.

From 1996 to 2001, the southern resident killer whale population fell by almost 20 percent, leaving only 79 whales at the beginning of this decade. Their listing under the ESA was due, in part, to the alarming decline of this already small population. The major threats to their survival are pollution and contaminants, disturbance from nearby vessels, and the scarcity of food. Scientists are also concerned that the whales' small population size makes it particularly vulnerable to a cataclysmic event, such as an oil spill. The census in 2008 counted 85 whales.

The NMFS released its recovery plan for these whales in January 2008. Although the population has been studied for more than 30 years, we are not certain which threat is the most important to address for recovery. The plan, therefore, addresses each of the threats based on the best available science. The recovery plan links its proposed management actions to a research and monitoring program to gather more information and assess how well the goals of the plan are being met. Some of the plan's main sections address:

Prey Availability: Support salmon restoration in the region, including habitat, harvest, and hatchery management improvements to ensure an adequate food supply for the whales.

Pollution: Clean up existing contaminated sites, minimize discharge of contaminants harmful to killer whales, and monitor emerging contaminants.

Vessel Effects: Continue with evaluation and improvement of guidelines for vessel activity near southern resident killer whales and evaluate the need for regulations or protected areas.

Candice Emmons/NOAA

Oil Spills: Prevent oil spills and improve response time to minimize effects on southern resident killer whales and their habitat in the event of a spill.

Transboundary and Interagency Coordination: Coordinate monitoring, research, enforcement, and complementary recovery planning with Canadian agencies and our federal and state partners.

Education and Outreach: Enhance public awareness and educate the public on what it can do to conserve killer whales. Improve reporting of southern resident killer whale sightings and strandings.

Long before the recovery plan was completed, many efforts were underway by local, state, federal, and regional groups to conserve southern resident killer whales and restore a range of habitats, species, and ecosystem processes in the region. Actions to restore listed salmon populations on the West Coast are increasing the availability of salmon for killer whales and restoring the degraded nearshore habitats they share. A collaborative and comprehensive effort in Washington, the Puget Sound Partnership (www.psp.wa.gov/), is also working to restore the area's ecological health.

Many efforts specific to southern resident killer whales are also underway or have been identified in the recovery plan. Working with the Coast Guard, Washington Department of Fish and Wildlife, and Canadian Department of Fisheries and Oceans, we are developing regulations to protect the whales from disturbance by vessels. A proposed vessel regulation was released for public comment in July 2009. In addition, a group of oil spill responders and killer whale researchers recently met to identify techniques to deter whales from an oil spill. A killer whale response plan has been submitted for inclusion in the region's contingency plan for oil spills.

We are working with museums and aquariums, non-profit groups, researchers, and schools to raise awareness and educate the public about recovery of killer whales, and how citizens can contribute. The following are a few examples of the education and outreach programs:

The Seattle Aquarium created an Orca Family Center to inspire conservation of our marine environment (www.seattleaquarium.org).

The Whale Museum features conservation messages in its educational programs, exhibits, and the Soundwatch Boater Education Program (www.whalemuseum.org).

Killer Whale Tales promotes classroom understanding and stewardship (www.killerwhaletales.org).

Orca Network connects whales and people in the Pacific Northwest and collects sighting information (www.orcanetwork.org).

For more information on killer whales, please visit our web site at www.nwr.noaa.gov/Marine-Mammals/Whales-Dolphins-Porpoise/Killer-Whales/Index.cfm.

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Underwater Noise and Endangered Species

by Amy R. Scholik-Schlomer

Humans and other terrestrial animals live in a world of colorful and varying landscapes, appreciated most commonly by the sense of sight. The marine environment is very different in many ways, and hearing has become the predominate means of sensing the underwater world. If one listens carefully, it is possible to grasp the complexity and diversity of the marine "soundscape" and its importance to the species that use sound to sense their environment. It also does not take long to comprehend the power of human-created (anthropogenic) noise to alter these soundscapes.

Since light does not travel far in water and sound does, the ability to accurately assess the underwater environment acoustically is essential to the survival of many marine species. A diverse array of oceanic species, especially marine mammals and fishes, have developed unique ways of relying on sound. Marine mammals in particular use sound in many ways. For example, humpback whales (*Megaptera novaeangliae*) produce intricate songs to communicate and attract mates, while sperm whales (*Physeter macrocephalus*) use powerful clicking sounds to locate deep-water prey via echolocation. Simple sounds produced by many fishes and invertebrates, even though they are not as impressive to our human ears, color and shape the marine soundscape, as well. For instance, scientists hypothesize that unique sounds produced from the normal hustle and bustle at coral reefs by its inhabitants help larval fishes find their way home to settle. Furthermore, being able to listen is often as important as producing sound. Many marine mammals and fishes are believed to listen to their surrounding soundscapes in order to perform critical life functions, such as detecting changes in their environment, evading predators, finding prey, and locating others of their species.

NOAA

The marine underwater soundscape is complex and inherently loud as a result of natural sounds (such as wind, rain, underwater volcanic activity). Anthropogenic sources of sound can also significantly contribute to the soundscape but are often considered noise (unwanted sound). Many human activities produce sound intentionally for a particular

purpose, such as to detect objects and aid in navigation (sonar) or find oil and gas deposits (seismic), or unintentionally as a by-product of normal operations (e.g., construction, pile driving, and shipping). These noise sources can be quite diverse in the frequency range (pitch) of sound they produce, their overall sound level (typically measured in decibels), and spatial (e.g., source can be mobile or stationary) and temporal (e.g., noise can be continuous or intermittent) extent. Most of these human activities are essential to our normal way of life in terms of national defense, commerce, transportation, energy, and recreation. As these activities continue to increase, so will noise levels.

Anthropogenic noise is an ever increasing dominant feature of the marine soundscape. Whether it is a North Atlantic right whale (*Eubalaena glacialis*) feeding outside Boston, Massachusetts, near one of the busiest shipping lanes in the world or a Chinook salmon (*Oncorhynchus tshawytscha*) migrating past pile-driving activity that helps to stabilize bridges in the face of earthquakes on the west coast, these already highly vulnerable organisms must adjust and adapt in order to survive. This adaptation can be something as simple as learning to "speak up" when a commercial ship goes by to having to alter migratory patterns to avoid extremely loud areas with the potential to cause hearing impairment. Impacts can range from minor annoyances and increases in stress to major adjustments in their natural patterns. For endangered and threatened species, anthropogenic noise places an additional burden on their already complicated world. The long-term impacts and ultimate fitness consequences of these adjustments are what terrestrial managers and scientists are struggling to better comprehend and appreciate from the point of view of our marine counterparts.

Scientific research on the impacts of noise, as well as the means to mitigate for these impacts, has been growing and becoming more sophisticated. Recent research has included examining the potential of underwater noise to cause physical injury, impact hearing, and elicit behavioral responses in numerous marine protected species, including marine mammals, fishes, and sea turtles. Through these studies, managers are better able to assess impacts, establish safety zones, and prescribe mitigation measures. As science and knowledge on this issue expands and becomes more complex, policy and management of underwater noise will also evolve.

The marine soundscape is colored with a broad range of natural and human-made sound sources and home to a diverse range of species, many of which are threatened and endangered as the result of other anthropogenic impacts. To understand better how noise affects protected marine species, in the short- and long-term, requires a better understanding of the diverse range of species and how they rely on and use sound, starting from the smallest shortnose sturgeon (*Acipenser brevirostrum*) fry to the largest blue whale (*Balaenoptera musculus*). It also calls for an appreciation for the diverse range of sound sources in the marine environment and an awareness of how these components interact to elicit a range of potential impacts. Only with this broad perspective can managers best provide protection for these endangered and threatened marine species.

To listen to some of the components of the marine soundscape and learn more about underwater noise, visit /www.pmel.noaa.gov/vents/acoustics.html and www.dosits.org/.

Louis Herman/NOAA Sanctuaries Collection

Humpback whales.

Amy R. Scholik-Schlomer, a fishery biologist with the National Marine Fisheries Service's Office of Protected Resources, can be reached at Amy.Scholik@noaa.gov

Reducing Threats to Right Whales

by Gregory K. Silber and Shannon Bettridge

The North Atlantic right whale (*Eubalaena glacialis*) is one of the most critically endangered large whale species in the world. Early whalers called them the "right whale" to hunt because they were often found near the shore and they floated when killed. Today, collisions with vessels are the primary threat to right whales because their migration route crosses major East Coast shipping lanes.

An average of about two known "ship strike" related deaths occur each year in a total population of only 300 to 400 whales. But on October 2008, NOAA's National Marine Fisheries Service (NMFS) announced landmark measures that will increase protection for North Atlantic right whales. For the first time, NMFS will require that ships 65 feet (20 meters) or greater in length reduce their speed to 10 knots (11.5 miles per hour) in areas where these whales feed, reproduce, or migrate.

Studies indicate that the likelihood and severity of ship strikes is related to ship speed. After analyzing cases where the ship speed and fate of the whale were known, researchers concluded that 85.5 percent of strikes occurred at vessel speeds of 10 knots or greater. They also

Northern right whales.

NOAA

found that the probability of a collision causing a whale's death increased from 45 percent to 75 percent as vessel speed increased from 10 to 14 knots (16 mph), and it exceeded 90 percent at 17 knots (19.5 mph). Therefore, NMFS has routinely issued vessel speed advisories recommending speeds of 10 knots or less in specific areas and at times where right whales occur. Advisories are distributed through a variety of media, including NOAA Weather Radio, the Mandatory Ship Reporting systems, broadcast notices to mariners, and e-mail distribution. The new speed restrictions, however, will be mandatory.

Modification of shipping routes, notification of whale sightings, and mariner education are additional key components of the North Atlantic right whale recovery program. The NMFS ship strike reduction effort includes:

- Conducting extensive aircraft surveys for right whales and alerting mariners via e-mail, facsimile, the internet, U.S. Coast Guard (USCG) Broadcast Notices to Mariners, NOAA Weather Radio, and other outlets.
- Operating Mandatory Ship Reporting systems, in which all ships 300 gross tons and greater in size are required to report to a shore-based station when entering the two most important right whale aggregation areas. Reporting ships receive an automated return message providing information about the vulnerability of right whales to ship strikes and recent right whale sighting locations.
- Developing and distributing, in collaboration with its partners, printed material and a multi-media CD on ship strikes and the Mandatory Ship Reporting systems. NMFS has also developed training modules for mariner training academies, and NOAA navigational charts and related publications are routinely updated to include right whale advisories.
- Consulting with other federal agencies that operate vessels in right whale habitat. NMFS asked that federal vessels proceed at 12 knots (subsequently lowered to 10 knots) or less (or at "safe speed") when in right whale habitat, and most agencies have voluntarily complied when vital missions are not compromised. One such consultation involved the transport of liquefied natural gas (LNG) in Massachusetts Bay. Licenses authorizing the use of pipelines in fin, humpback, and right whale habitat require use of hydrophone arrays to detect vocalizing whales. Locations of acoustically detected right whale calls are transmitted to LNG vessels, which are required to travel at 10 knots or less anywhere within 5 miles (8 kilometers) of the location. Use of the arrays is mandated for the life of both LNG facilities, estimated to be 25 to 40 years.
- Rerouting vessels, where feasible. Moving ships from customary routes has been done in key locations where the benefits of rerouting can be demonstrated. In November 2006, NOAA established recommended shipping routes within Cape Cod Bay and off three ports in Georgia and Florida that minimize transits of key right whale aggregation areas. In addition, the United States submitted a proposal to the International Maritime Organization to reconfigure the "Traffic Separation Scheme" (TSS) that services Boston. The realignment, enacted in July 2007, involved only a minor shift in the TSS and traffic lanes, but it is expected to reduce the risk of ship strikes by 58 percent for right whales and 81 percent for other large whale species in the area. A subsequent action to further reduce the threat of a ship strike by narrowing an adjoining leg of the TSS went into effect in June 2009.

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A struck whale on the bow of a container ship.

Efforts to recover a highly endangered migratory species often require an innovative, multi-faceted approach involving a variety of public and private interests. We have high hopes that our efforts to reduce the risk of ship strikes will aid in the eventual recovery of the North Atlantic right whale.

Additional information on this program can be found at www.nmfs.noaa.gov/pr/shipstrike/.

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Reducing Obstacles to Fish Migrations

by Rachel Brittin

Who hasn't heard of the monumental migrations of salmon, sturgeon, and shad? They return from the ocean to the river where they were born and swim up to hundreds of miles upstream for the single-minded purpose of breeding. As impressive as this feat may be, dams and other artificial barriers have blocked many fish from reaching their former spawning grounds. In these cases, an uphill swim becomes not just a challenge but a serious battle for survival of the species. This is particularly true for fish that are threatened or endangered.

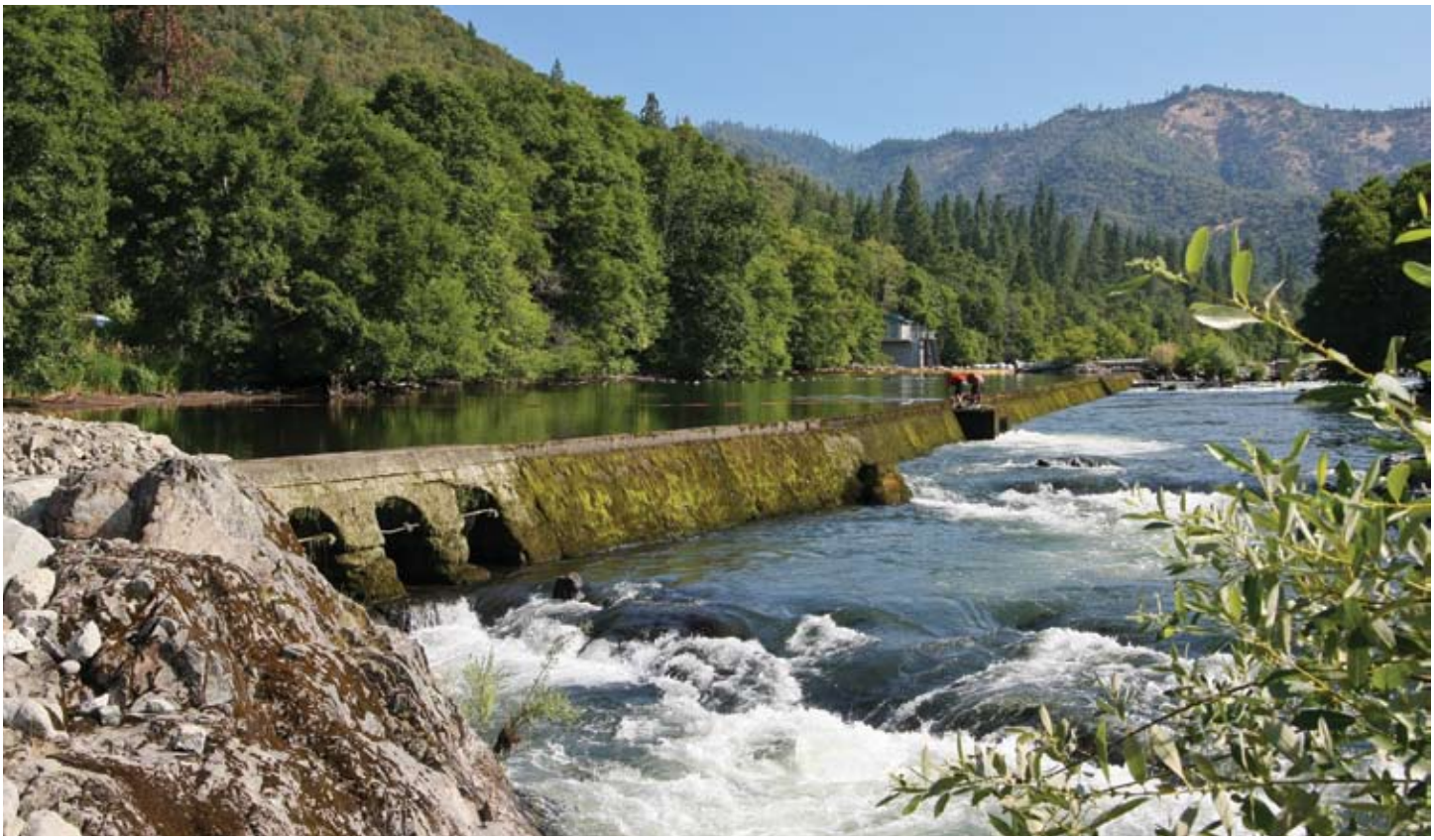
The National Marine Fisheries Service (NMFS), through its Open Rivers Initiative and its participation in the National Fish Habitat Action Plan (a public-private partnership), is working to protect and restore access to historic fish migration routes while engaging communities and the power industry to help in the restoration process.

Currently, an estimated two million dams and other barriers block countless miles of rivers and streams throughout the United States. Although large dams without proper fish ladders are obvious barriers to migrating fish, thousands of smaller, obsolete dams and culverts can pose problems that are just as serious.

"Many small, in-stream structures look innocent enough," says Tisa Shostik, coordinator of the Open Rivers Initiative. "But even small structures, if not properly designed, can have big consequences for fish populations."

Many dams provide clean energy benefits, while others sit abandoned and in disrepair long after they have outlived their intended use. These dams not only cause ecological problems but are safety concerns for local communities. Since its launch in 2006, NOAA's Open Rivers

For many years, the Gold Hill Dam blocked fish passage and limited recreation on the Rogue River.



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Initiative has received 150 requests from communities and organizations across the country to support the removal of small, obsolete dams and fish passage barriers. In 2008 alone, NOAA supported 35 such projects, which were prioritized by economic and ecological impacts, timing, feasibility, and level of safety concern. To date, NOAA has supported about 62 barrier removal projects.

"We have been flooded by requests," says Shostik. "In just the first year of the initiative, communities requested over $20 million to carry out barrier removal projects in their rivers and streams, far exceeding the available funding."

One such project is the Gold Hill Dam near Medford, Oregon. It was removed last summer after a century of diverting water, blocking fish passage, and limiting recreation on the Rogue River. Once stretching 900 feet (275 meters) across the river, the dam was constructed in the early 1900s to generate power for the city of Gold Hill. In recent years, the generators were no longer in operation, and the dam only presented a significant barrier to fish passage and safety concerns for the Gold Hill community.

The successful removal of this structure through the Open Rivers Initiative took place in concert with many local and regional partners. It resulted in access to 2 miles (3.2 kilometers) of spawning and rearing habitat for coho, Chinook, and steelhead salmon.

"At first, two miles may not sound like a lot of fish habitat," explains Shostik. "But it's actually part of a series of three dam removals on the Rogue that will open more than 150 miles of the river. The Savage Rapids Dam will be removed in 2009, and we're hoping that studies on the Gold Ray Dam, the third and final dam on the mainstem, will indicate that we can remove it within the next few years."

In addition to the Open Rivers Initiative, NMFS works with power companies to help them address passage for threatened and endangered fish at hydropower dams, the largest type of fish barriers. More than 2,000 hydropower

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Local supporters of the restoration watch as the Gold Hill Dam is removed.

dams block fish migrations to and from their spawning habitats. They provide clean energy for communities around the country, but many were constructed 50 years ago and do not incorporate modern fish passage technology. Since dam licenses have operation terms of 30 to 50 years, NOAA's involvement in relicensing provides a rare opportunity to open many miles of upstream habitat while maintaining valuable energy production.

For example, in 2006, the completion of the Columbia Fishway on the Broad River — the first for South Carolina — reopened 24 miles (39 kilometers) of habitat for the Santee Basin's shortnose sturgeon, shad, striped bass, and herring for the first time since the 1800s. The fishway has unique features intended to accommodate the distinctive swimming habits of the shortnose sturgeon. The fishway ladder is designed to allow fish to pass around the dam by swimming up a series of small pools or "steps" of water until they can continue on the other side. NOAA worked cooperatively with state, private, industry, and federal partners in planning and building the fishway.

Partnerships are a big part of NOAA's work to prevent fish populations from further decline. In the southeastern U.S., where more than 40,000 dams and failing culverts affect the passage of endangered fish like the Gulf sturgeon, NOAA hopes that the new Southeast Aquatic Restoration Partnership (SARP) will help.

The SARP was formed specifically to address aquatic resource issues in this region. It is a voluntary collaboration of natural resource managers and professionals, both inland and coastal, working together to protect, conserve, and restore aquatic resources throughout the Southeast.

SARP is also one of the first regional Fish Habitat Partnerships recognized under the National Fish Habitat Action Plan (for details, see fishhabitat.org). The Action Plan is an investment strategy to make dollars go farther in protecting, restoring, and enhancing our nation's waterways to sustainable health.

"It's a great example of how organizations can set aside what divides them and come together for a common cause," says Susan-Marie Stedman, a fishery biologist in NMFS' Office of Habitat Conservation and staff to the National Fish Habitat Board. "With healthy habitats and healthy watersheds, we can help prevent new species from reaching the endangered species list."

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Partnerships for Steelhead in Southern California

by Anthony P. Spina and
Mark H. Capelli

The Ventura River watershed in southern California is designated as critical habitat for an endangered population of steelhead (*Oncorhynchus mykiss*). Eliminating threats to steelhead in this watershed, which has unique physical and biological characteristics, is crucial to conserving the listed population (Boughton et al. 2006). Although few of the fish remain, the prognosis for Ventura River steelhead is not entirely gloomy. Thanks to conservation partnerships, work to restore the fish and its essential habitat has begun.

Now obsolete, the Matilija Dam will be removed and the riverine environment restored to pre-dam conditions, thereby allowing endangered steelhead access to historical spawning and rearing habitats in Matilija Creek.

Mark Capelli photograph

Through the Endangered Species Act (ESA), the National Marine Fisheries Service (NMFS) is collaborating with the Army Corps of Engineers (Corps) on the Matilija Dam Ecosystem Restoration Project. Constructed in 1946 on Matilija Creek, a tributary of the Ventura River, Matilija Dam caused extensive fragmentation and loss of steelhead habitat. The new project intends to reverse the environmental damage by removing the obsolete 200-foot- (about 67-meter-) tall dam in 2010 and restoring the riverine environment to pre-dam conditions. These actions should increase steelhead habitat and numbers (Capelli 2004), reducing the likelihood of extinction. The ESA section 7 interagency consultation between NMFS and the Corps identified project modifications that should improve the project results.

The Robles Diversion Dam was constructed in 1958 on the mainstem of the Ventura River as part of a local water-supply project. Because the structure was constructed without any provision for fish passage, steelhead could not reach prime upstream spawning and rearing habitats that the species accessed prior to the construction of the diversion dam. Through section 7 interagency consultation provisions of the ESA, NMFS worked with the Bureau of Reclamation from 1999 to 2003. This subsequently led to construction of a fish-passage facility in 2004 and implementation of an operational streamflow regime shortly thereafter to provide passage of adult

and juvenile steelhead around the diversion dam. Monitoring steelhead passage is a condition of the project and will provide valuable information about the status of this species in the Ventura River watershed.

The projects at Matilija Dam and Robles Diversion Dam restore steelhead access to a combined 40 miles (about 64 kilometers) of spawning and rearing habitats that have been unavailable to the species for over half a century. These projects will also begin addressing threats that have impaired the watershed-specific hydrologic and sediment regimes, which is critical to provide riverine habitat conditions and characteristics that are consistent with the life history and habitat requirements of steelhead and many other species on the river. Among other federally-listed species that would benefit from the projects are the California red-legged frog, southwestern willow fly catcher, least Bell's vireo, and tidewater goby.

Entities that are responsible for otherwise lawful activities, but which incidentally cause harm to steelhead, can benefit from partnering with NMFS on conservation actions for steelhead. For instance, activities causing incidental harm to steelhead can be brought into compliance with the ESA through either a section 10 permit (which must be accompanied by a conservation plan) or section 7 interagency consultation. Depending on the actual approach for undertaking a particular conservation effort, organizations or individuals may qualify to receive partial funding contributions from various sources, which can lessen financial commitments that may accompany planning and implementation of conservation actions. Perhaps more important is the satisfaction of undertaking conservation actions that contribute favorably to the survival and growth of endangered steelhead, potentially saving the species from extinction.

While the conservation partnerships undertaken in the Ventura River watershed are an important first step for restoring riverine habitat functions essential for steelhead survival and growth within southern California, additional conservation efforts are necessary to fully and effectively address the ongoing threats to this species. This is particularly true if the species is to be spared extinction. To this end, future NMFS priorities within the Ventura River mainstem and joining tributaries include partnering with entities to (1) balance water-management needs and properly functioning living space for juvenile steelhead, (2) return lost habitat to steelhead, and (3) remediate the effects of human-made structures on the migration of this endangered species.

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The Robles Diversion Dam and fish passage facilities on the mainstem Ventura River in early 2004.

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Anthony P. Spina, steelhead ecologist and the leader of the south coast steelhead team, and Mark H. Capelli, recovery coordinator for southern and south-central California steelhead, are located in the NMFS Southwest Regional Office. They can be reached at anthony.spina@noaa.gov and mark.capelli@noaa.gov.

Conserving Species Before They Need the ESA

by Dwayne Meadows

The National Marine Fisheries Service (NMFS) has two programs designed to conserve potentially at-risk species that are not listed under the Endangered Species Act (ESA): the Candidate Species program and the Species of Concern (SOC) program.

NMFS defines "candidate species" as: 1) species for which NMFS has initiated a status review but that are not the subject of a listing petition, and 2) species for which a "may be warranted" finding on a listing petition has been made, but for which a proposed listing rule has not yet been published. The U.S. Fish and Wildlife Service (FWS) defines candidate species somewhat differently as species for which it has determined a listing proposal is warranted but for which development of a proposed listing rule is precluded by higher priority listing actions ("warranted but precluded" findings). At present, NMFS considers only eight species as ESA listing candidates (see http://www.nmfs.noaa.gov/pr/species/esa/other.htm).

Due to the relatively small number of NMFS candidates, much of our effort to conserve organisms is focused on SOC. As defined by NMFS, these are species for which we have some concern regarding status and threats but for

The sand tiger shark (*Carcharias taurus*), a coastal species of the Atlantic, Caribbean, and Gulf of Mexico, is threatened by poor water quality in their nearshore habitat, direct fishing, and bycatch in other fisheries. The SOC program funded a project in 2008 to examine movements and essential nursery habitat and to assess the physiological effects of fishing capture stress on post-release survivorship. Enhanced conservation efforts for this species are to be implemented by the Coastal Sharks Interstate Fishery Management Plan that is under development by the Atlantic States Marine Fisheries Commission.

Paula Whitfield/NOAA

which insufficient information is available to indicate a need to list them under the ESA. Our SOC program, established in 2004, is designed to increase our knowledge of these species and, where possible, provide some protection for declining species before they need protection under the ESA. The specific goals of the SOC program are to: 1) identify species that are potentially at risk; 2) identify data deficiencies regarding status and threats; 3) stimulate cooperative research to evaluate status and threats; 4) increase public awareness; and 5) foster voluntary efforts to conserve these species before ESA listing is warranted. Thus, the goals of the NMFS SOC program are similar to those of the FWS Candidate Conservation program (see http://www.fws.gov/endangered/candidates/index.html).

Currently, NMFS recognizes 39 SOC. The program covers a diversity of species including four sharks, three salmonids, three abalone, three groupers, three herring, two rays, two corals, two rockfishes, two sturgeon, the largetooth sawfish (*Pristis perotteti*), and a variety of other species from many ocean and stream habitats (see fact sheets at http://www.nmfs.noaa.gov/pr/species/concern/).

To help us reach our goals, we fund conservation efforts for SOC through one of two mechanisms: 1) the Proactive Species Conservation Grant program, which funds conservation efforts by states and other non-federal management entities, and 2) an annual internal grant competition among NMFS regions and science centers for agency research and outreach projects. We also provide technical assistance and develop partnerships with states, non-governmental organizations, and others on various projects. These projects benefit species by addressing threats and researching key areas of uncertainty.

The Proactive Species Conservation Grant program provides funds to states or other non-federal entities with management authority over a SOC. It is a competitive grant program for projects lasting up to 5 years. An applicant submits a proposal that meets certain criteria (importance/relevance, technical merit, applicant qualifications, project costs, and outreach). Since its inception in Fiscal Year 2006, the program has provided $2.5 million in conservation projects for species ranging from the humphead wrasse (*Cheilinus undulates*) to the Alabama shad (*Alosa alabamae*) and the saltmarsh topminnow (*Fundulus jenkinsi*). From Fiscal Years 1999-2008, we funded an additional $3 million to NMFS regions and science centers for the internal grant competition. (See http://www.nmfs.noaa.gov/pr/species/concern/grant.htm for more details on the Proactive Species Conservation Grant program and funded projects).

Although still in its infancy, the SOC program has evolved from limited research and outreach efforts into a national initiative that engages external partners in conserving at-risk species. Funding for the program remains limited, but we expect it to become more effective over time, promoting healthy populations and reducing the number of declining species that require regulatory protection.

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The Atlantic wolffish (Anarhichas lupus) is designated by NMFS as a Species of Concern because of a decline due to direct commercial fishing, bycatch in other fisheries, and habitat degradation resulting from trawls and dredges.

Dr. Meadows, the NMFS Species of Concern Program Coordinator, can be reached at Dwayne.Meadows@noaa.gov or 301-713-1401.

Cooperative Conservation with the States

by Lisa Manning

The states play an essential role in conserving and recovering plants and animals listed under the Endangered Species Act (ESA). Congress recognized this fact in section 6 of the ESA, "Cooperation with the States." Section 6 authorizes federal agencies to engage in cooperative conservation agreements with state natural resource agencies and to provide financial assistance for state endangered species programs. Both the U.S. Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS) implement section 6 to conserve and recover species under their respective jurisdictions.

Although small in relation to the FWS program, which receives approximately $80 million in annual appropriations and includes agreements with all states, the NMFS section 6 program has grown significantly over the past five years in

Entanglement in fishing gear is one of the threats facing the endangered Hawaiian monk seal. The Hawaii Department of Land and Natural Resources has received a grant to address this growing concern.

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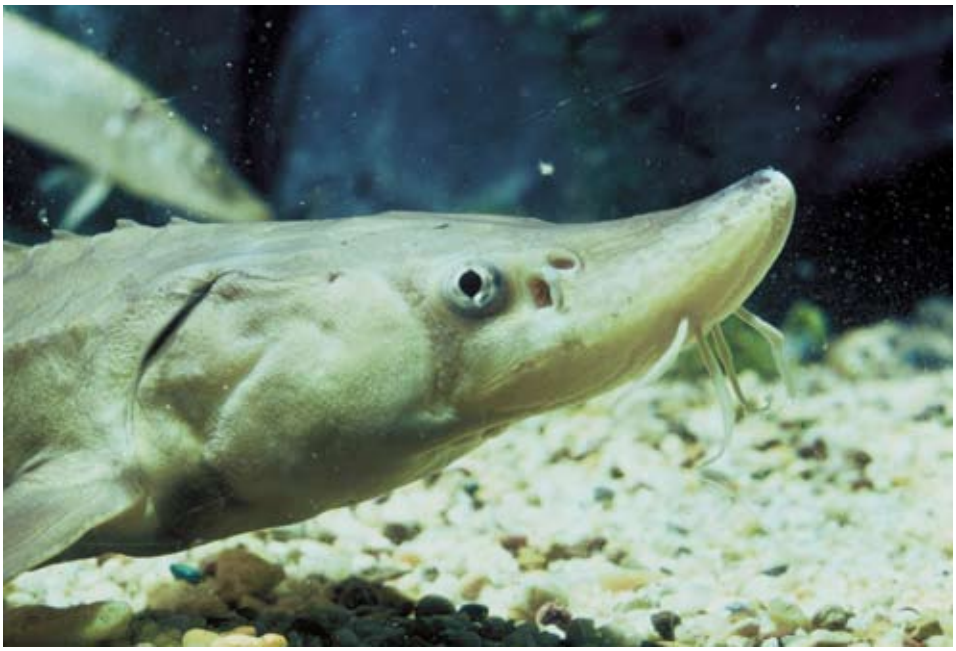

USFWS

Shortnose sturgeon.

terms of the number of states involved. NMFS first received dedicated funding (just under $1 million) for the section 6 program in Fiscal Year (FY) 2003 and has received an appropriation every year since. The original 6 NMFS cooperative agreements in 2003 have more than doubled to 14, including agreements with Delaware, Florida, Georgia, Hawaii, Massachusetts, Maryland, Maine, North Carolina, New Jersey, New York, Puerto Rico, South Carolina, the U.S. Virgin Islands, and Washington. NMFS is actively developing partnerships with other states, and as the number of state partners continues to increase, so too will the number of conservation actions for listed and candidate species.

Using section 6 funding, NMFS instituted and administers the Protected Species Cooperative Conservation (PSCC) Grant program, which has provided $4.7 million in federal funding to support research, management, and outreach. From FY 2003 to FY 2008, this grant program funded conservation actions for just over a dozen listed and candidate species, including the Hawaiian monk seal (*Monachus schauinslandi*), elkhorn coral (*Acropora palmate*), sea turtles, smalltooth sawfish (*Pristis pectinata*), and shortnose (*Acipenser brevirostrum*) and Atlantic sturgeons (*Acipenser oxyrinchus oxyrinchus*).

One successful effort funded through a PSCC grant is a project the Hawaii Department of Land and Natural Resources (HDLNR) is conducting to conserve and manage the Hawaiian monk seal, one of the world's most critically endangered marine species. Threats facing this species include reduced prey availability, interactions with fisheries (e.g., entanglement), human disturbance, disease, and marine pollution. In FY 2007, the HDLNR received a $153,000 PSSC grant for management of monk seals on the island of Kaua'i, where human interactions with monk seals is a continuing problem, and to further develop the agency's community-based response network. PSCC funding also supports state-wide education and outreach efforts to promote stewardship of marine wildlife and to minimize adverse interactions between people and protected marine species. As part of the project, HDLNR is also developing a conservation plan to minimize and mitigate the incidental take of monk seals and sea turtles in state-managed fisheries, a problem of growing concern in Hawaii.

A small-scale, cost-effective management project also achieving success is the effort conducted in the U.S. Virgin Islands (USVI) to reduce injury and mortality of endangered leatherback sea turtles (*Dermochelys coriacea*) resulting from boat collisions. The USVI Division of Fish and Wildlife (DFW) documented an increase in the number of injured and stranded leatherbacks during recent nesting seasons in the area of Sandy Point National Wildlife Refuge, the largest nesting beach for leatherbacks in the United States. Although there are already speed restrictions in this area, most boaters are unaware of these restrictions or the presence of leatherbacks so close to shore. To address this issue, the DFW has partnered with the West Indies Marine Animal Research and Conservation Service to install marker buoys around the Sandy Point Refuge, establish a "no-wake" zone, and promote the awareness of leatherback presence in this area to local fishermen and recreational boaters.

These projects and more than four dozen others funded through the PSCC Grant Program are a vital component of the NMFS species recovery program. As more state partnerships are formed through the ESA section 6 program, and as additional funding becomes available, more listed and candidate marine species will benefit. Ultimately, these efforts will help to restore imperiled species and make ESA protection unnecessary.

Dr. Manning, a biologist with the NMFS Office of Protected Resources in Silver Spring, Maryland, can be contacted at 301-713-1401.

In the first six months of 2009 (through June 30), the Fish and Wildlife Service (FWS) published the following proposed and final listing rules under the Endangered Species Act (ESA):

FINAL RULES

Atlantic Salmon *(Salmo salar)*

On June 19, 2009, the FWS and the National Marine Fisheries Service (NMFS) extended ESA protection to more Atlantic salmon by adding fish in the Penobscot, Kennebec, and Androscoggin rivers and their tributaries to the endangered Gulf of Maine population first listed in 2000 as endangered.

This imperiled salmon species, which once returned by the hundreds of thousands to most major rivers along the Northeastern United States, now returns in small numbers only to rivers in Maine. Legend has it that a person could once walk across these rivers on the backs of salmon, but in most recent years biologists were able to count barely 1,000 fish returning to the Penobscot and fewer than a hundred in the other two rivers.

Endangered status under the ESA will now apply to all anadromous (sea-run) Atlantic salmon whose freshwater range covers the watersheds from the Androscoggin River northward along the Maine coast to the Dennys River, an area that includes the Penobscot and Kennebec rivers. It also applies wherever these fish occur in these rivers' estuaries and marine environment. Hatchery fish used to supplement these natural populations are also included under this rule. However, landlocked salmon and salmon raised in hatcheries for aquaculture are not included.

In 2000, the NMFS and FWS listed as endangered all naturally reproducing wild Atlantic salmon as well as river-specific hatchery populations returning to small coastal Maine rivers and their tributaries. As a group, these fish were called the Gulf of Maine population. A team composed of federal and state agency biologists and a biologist from the Penobscot Indian Nation has showed that salmon in the Androscoggin, Penobscot, and Kennebec rivers are also part of the Gulf of Maine population.

Phyllostegia hispida

On March 17, the FWS listed *Phyllostegia hispida*, a rare Hawaiian plant with no common name, as an endangered species. This plant, a non-aromatic member of the mint family (Lamiaceae), is a loosely spreading, many-branched vine that forms large tangled masses. It is known only from wet forests on the island of Moloka'i and has rarely been seen in the wild.

From 1910 to 1996, a total of 10 individuals of this species were recorded, but they subsequently died for various reasons. Since 1997, surveys failed to locate additional individuals, and the species was thought to be extirpated until 2005, when two seedlings were discovered at The Nature Conservancy's Kamakou Preserve. After the discovery of a small number of other wild plants and the outplanting of more than 100 individuals produced from cuttings, a total of 238 plants are known today.

Due to its low numbers, *Phyllostegia hispida* is susceptible to extinction from random events such as hurricanes and disease outbreaks. Other major threats are predation and habitat degradation by feral pigs and competition with invasive, non-native plants. Feral pigs have been described as the most pervasive and disruptive non-native influence on the unique native forests of the Hawaiian Islands, and are widely recognized as one of the greatest threats to its forest ecosystems in today. Non-native plant species, which now comprise approximately half of the plant taxa in the islands, have come to dominate many Hawaiian ecosystems, and they frequently out-compete native plants.

A variety of organizations, such as the University of Hawaii's Lyon Arboretum on O'ahu, the National Tropical Botanical Garden on Kaua'i, and Kalaupapa National Historical Park on Moloka'i, are propagating *Phyllostegia hispida* for possible outplanting into suitable habitat. Land managers from the Hawai'i Department of Land and Natural Resources have fenced some plants for protection, and The Nature Conservancy continues to control feral pigs and alien plants on its land.

Two Southeastern Salamanders

On February 10, due to a recognized taxonomic reclassification, we revised the listing of the threatened flatwoods salamander (*Ambystoma cingulatum*)

Phyllostegia hispida.

Hank Oppenheimer/ Plant Extinction Prevention Program

into two distinct species: the frosted flatwoods salamander (*Ambystoma cingulatum*) and reticulated flatwoods salamander (*Ambystoma bishopi*). We listed the reticulated flatwoods salamander as endangered and retained the threatened status for the frosted flatwoods salamander.

These imperiled amphibians are endemic to the lower southeastern Coastal Plain of Florida, Georgia, and South Carolina. The extensive loss of their longleaf pine—slash pine flatwoods terrestrial habitat and isolated, seasonally ponded breeding habitats are responsible for the decline of both species. Habitat degradation and fragmentation remain threats to their survival.

PROPOSED RULES

Three Southeastern Mollusks

On June 29, the FWS proposed to list the Georgia pigtoe mussel (*Pleurobema hanleyianum*), interrupted rocksnail (*Leptoxis foremani*), and rough hornsnail (*Pleurocera foremani*) as endangered species. These aquatic mollusks are considered biological indicators of stable, high-quality stream and river habitats. Their presence reflects the quality of the watersheds where they occur for a wide variety of other wildlife species, as well as for people.

All three of these animals no longer exist in more than 90 percent of their historical ranges due to impoundments and water quality degradation. Surviving populations are small, localized, and highly vulnerable to water pollution and habitat deterioration.

The Georgia pigtoe mussel historically inhabited the Coosa River and several tributaries in Alabama, Georgia, and Tennessee. Currently, the species is known to survive on shoals in a 27-mile (43-kilometer) reach of the Conasauga River in Georgia and Tennessee.

The interrupted rocksnail historically occurred on shoals in the main stem of the Coosa River in Alabama and Georgia, and in the Oostanaula and Conasauga rivers of Georgia. Currently, the species is known to survive in a 7.5-mile (12-km) reach of the Oostanaula River. A population has been recently reintroduced into a short reach of the lower Coosa River in Alabama by the Alabama Department of Conservation and Natural Resources.

The rough hornsnail was found in the Coosa River and at the mouths of several tributaries in Alabama. It is currently known from two small populations in Alabama.

Oregon Chub

As a result of substantial recovery progress, the FWS proposed on May 15 to reclassify the Oregon chub (*Oregonichthys crameri*) from endangered to the less critical category of threatened. Findings from a recently completed five-year review indicate that the status of this fish has improved substantially and that existing threats are not likely to put it in danger of extinction in the foreseeable future.

The Oregon chub is a small minnow, less than 3.5 inches (8.9 centimeters) long, and is endemic to the Willamette River Basin in western Oregon. Oregon chub thrive in slackwater habitats such as beaver ponds, oxbows, side channels, backwater sloughs, low gradient tributaries and flooded marshes, which provide abundant aquatic vegetation for hiding and spawning cover. The Oregon chub is now abundant and well-distributed throughout most of its historical range, which spans the Willamette Valley. Populations are currently found from the North Santiam River in the north to the Middle Fork Willamette River in the south.

We listed the chub as endangered in 1993 after receiving conclusive data showing a 98 percent reduction from its historical range. The decline came at a time when the environment of the Willamette River was undergoing large-scale changes. Extensive alteration of the Willamette and its tributaries resulted in the loss of the sloughs and side channels that provide important chub habitat. Non-native fishes have become established throughout the Willamette basin and are considered to be the greatest threat to the chub's survival.

The recovery plan for the Oregon chub recommended specific recovery actions to protect existing sites, establish new populations, research the chub's ecology, and increase public involvement in conservation. The plan determined that the chub should be considered for reclassification when 10 large populations were distributed throughout the species' range, with a stable or increasing trend for at least five years.

Along with implementing the recovery actions, the Oregon Department of Fish and Wildlife and a team of federal agencies conducted extensive surveys for Oregon chub. The surveys led to the discovery of many new populations. In addition, successful reintroductions established nine new populations within the chub's historical range. (See feature story at http://www.fws.gov/endangered/bulletin/2009/bulletin_spring2009-all.pdf, page 48). These actions have contributed to a dramatic improvement in the status of the chub. Of these, 19 have more than 500 individuals.

Two Safe Harbor Agreements are already in place to guide management of Oregon chub populations on private lands, and we are preparing to extend the program to allow more private landowners to participate. Information on the Safe Harbor program is available at http://www.fws.gov/endangered/factsheets/harborqa.pdf.

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For details on listing actions, Critical Habitat designations, and petition findings, visit the FWS central library of *Federal Register* notices at http://www.fws.gov/policy/frsystem/default.cfm.

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Hawaii and other Pacific Islands, Idaho, Oregon, Washington,	Robyn Thorson, Regional Director	503-231-6118 http://www.fws.gov/pacific

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MIDWEST REGION—REGION THREE Federal Bldg., Ft. Snelling, Twin Cities MN 55111

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SOUTHEAST REGION—REGION FOUR 1875 Century Blvd., Suite 200, Atlanta, GA 30345

Alabama, Arkansas, Louisiana, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Florida, Tennessee, Puerto Rico, and the U.S. Virgin Islands	Cynthia Dohner, Acting Regional Director	404-679-7086 http://www.fws.gov/southeast

NORTHEAST REGION—REGION FIVE 300 Westgate Center Drive, Hadley, MA 01035

Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia, and West Virginia	Marvin Moriarty, Regional Director	413-253-8300 http://www.fws.gov/northeast

MOUNTAIN-PRAIRIE REGION—REGION SIX P.O. Box 25486, Denver Federal Center, Denver CO 80225

Colorado, Kansas, Montana, Nebraska, North Dakota, South Dakota, Utah, and Wyoming	Stephen Guertin, Regional Director	303-236-7920 http://www.fws.gov/mountain-prairie

ALASKA REGION—REGION SEVEN 1011 E. Tudor Rd., Anchorage, AK 99503

Alaska	Geoff Haskett, Regional Director	907-786-3542 http://www.fws.gov/alaska

PACIFIC SOUTHWEST—REGION EIGHT 2800 Cottage Way, Sacramento, CA 95825

California and Nevada	Renne Lohoefner, Regional Director	916-414-6464 http://www.fws.gov/cno

BOX SCORE

Listings and Recovery Plans as of August 25, 2009

	ENDANGERED		THREATENED			
GROUP	U.S.	FOREIGN	U.S.	FOREIGN	TOTAL LISTINGS	U.S. SPECIES W/ PLANS
MAMMALS	70	256	14	20	360	59
BIRDS	75	179	15	6	275	85
REPTILES	13	66	24	16	119	38
AMPHIBIANS	14	8	11	1	34	17
FISHES	74	11	65	1	151	102
SNAILS	24	1	11	0	36	30
CLAMS	62	2	8	0	72	70
CRUSTACEANS	19	0	3	0	22	18
INSECTS	47	4	10	0	61	40
ARACHNIDS	12	0	0	0	12	12
CORALS	0	0	2	0	2	0
ANIMAL SUBTOTAL	410	526	163	44	1,143	471
FLOWERING PLANTS	573	1	143	0	717	633
CONIFERS	2	0	1	2	5	3
FERNS AND OTHERS	26	0	2	0	28	28
PLANT SUBTOTAL	600	1	146	2	749	664
GRAND TOTAL	1,011	527	309	46	1,893*	1,135

TOTAL U.S. ENDANGERED: 1,011 (411 animals, 600 plants)
TOTAL U.S. THREATENED: 309 (163 animals, 146 plants)
TOTAL U.S. LISTED: 1,320 (574 animals**, 746 plants)

* Separate populations of a species listed both as Endangered and Threatened are tallied once, for the endangered population only. Those species are the argali, chimpanzee, leopard, Stellar sea-lion, gray wolf, piping plover, roseate tern, green sea turtle, saltwater crocodile, and olive ridley sea turtle. For the purposes of the Endangered Species Act, the term "species" can mean a species, subspecies, or distinct vertebrate population. Several entries also represent entire genera or even families.

** Eleven U.S. animal species and five foreign species have dual status.

ENDANGERED Species BULLETIN

U.S. Department of the Interior
Fish and Wildlife Service
Washington, D.C. 20240