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NOAA FISHERIES SERVICE

Biennial Report to Congress on the Recovery Program for Threatened and Endangered Species

October 1, 2008 – September 30, 2010

U.S. Department of Commerce | National Oceanic and Atmospheric Administration | National Marine Fisheries Service

Cover photo credit: Hawaiian monk seal (NMFS)

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BDCP	Bay-Delta Conservation Plan
BRT	Biological Review Team
CC	California Coastal
CCC	Central California Coast
CDFG	California Department of Fish and Game
CMP	Conservation and Management Plan
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
DPS	Distinct Population Segments
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
FCRPS	Federal Columbia River Power System
FERC	Federal Energy Regulatory Commission
FWS	U.S. Fish and Wildlife Service
GOM	Gulf of Maine
HCP	Habitat Conservation Plan
HSRG	Hatchery Scientific Review Group
IOSEA	Indian Ocean and Southeast Asia
IWC	International Whaling Commission
MHI	Main Hawaiian Islands
MMPA	Marine Mammal Protection Act
MOU	Memorandum of Understanding
mtDNA	Mitochondrial Deoxyribonucleic acid
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NWHI	Northwestern Hawaiian Islands
PCBs	polychlorinated biphenyls
PCSRF	Pacific Coastal Salmon Recovery Fund
RPA	Reasonable and Prudent Alternative
SNP	Single Nucleotide Polymorphisms
SONCC	Southern Oregon/Northern California Coast
STSSN	Sea Turtle Stranding and Salvage Network
SWP	State Water Project
TED	Turtle Excluder Device
TRT	Technical Recovery Teams
WCPFC	Western and Central Pacific Fishery Commission

BACKGROUND

The primary purpose of the Endangered Species Act (ESA) of 1973, as amended, is the conservation of endangered and threatened species and the ecosystems on which they depend. Conservation is defined as "…the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this Act are no longer necessary." As one means of achieving recovery, the ESA requires the development of recovery plans for listed endangered or threatened species (except those species for which it is determined that such a plan will not promote the conservation of the species). These plans organize and guide the recovery process. The ESA amendments of 1988 added a requirement that the Secretaries of Commerce and the Interior report to Congress every 2 years on the status of efforts to develop and implement recovery plans, and on the status of all species for which recovery plans have been developed (section 4(f)(3)). The Secretary of Commerce has delegated responsibility for endangered and threatened species recovery to the National Marine Fisheries Service (NMFS) of the National Oceanic and Atmospheric Administration (NOAA). This is the eleventh Report to Congress on the status of the recovery program for these species.

OVERVIEW

This report summarizes efforts to recover all domestic species under NMFS' jurisdiction from October 1, 2008, through September 30, 2010. It includes accounts of each species, its status, current threats, conservation actions undertaken during this timeframe, and priority actions needed in the next biennium. During the two years covered in this report, NMFS had jurisdiction over 64 domestic species[1] of salmon, sturgeon, sawfish, sea grass, mollusks, sea turtles, and marine mammals, and eight foreign species, for a total of 72 species. Sixty-four species are addressed in this report, including five newly listed species:

- Black abalone (*Haliotis cracherodii*), listed as endangered on January 14, 2009 (74 FR 1947);
- Puget Sound/Georgia Basin Distinct Population Segment (DPS) of bocaccio (*Sebastes paucispinis*), listed as endangered on April 28, 2010 (75 FR 22276);
- Puget Sound/Georgia Basin DPS of canary rockfish (*Sebastes pinniger*), listed as threatened on April 28, 2010 (75 FR 22276);
- Southern DPS of eulachon (*Thaleichthys pacificus*), listed as threatened on March 18, 2010 (75 FR 13012);
- Puget Sound/Georgia Basin DPS of yelloweye rockfish (*Sebastes ruberrimus*), listed as threatened on April 28, 2010 (75 FR 22276).

Of our 64 domestic listed species, 29 currently have final recovery plans, 8 currently have draft recovery plans, 24 plans are being developed, and 3 species have no plans:

- Final recovery plans were published for sperm whale, fin whale, and Middle Columbia River Steelhead DPS.
- Draft recovery plans were published for the Kemp's ridley sea turtle (revision), sei whale, Upper Willamette River Chinook Salmon Evolutionarily Significant Unit (ESU), Upper Willamette River Steelhead DPS, Central California Coast coho ESU, Central Valley spring-run Chinook ESU, Sacramento River winter-run Chinook ESU, Central Valley steelhead DPS, and Southern California steelhead DPS.
- A recovery plan is being revised for Johnson's seagrass.

[1] Species is defined in the ESA as including any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife that interbreeds when mature.

- Recovery plans are currently under development for elkhorn and staghorn corals, Cook Inlet beluga whale, green sturgeon, and 15 ESUs and DPSs of Pacific salmon and steelhead, respectively.
- Three listed species currently have no recovery plan in development—Guadalupe fur seal, bowhead whale, and North Pacific right whale.

In addition to these recovery plans, a Final Columbia River Estuary ESA Recovery Plan Module for Salmon and Steelhead was completed as an element of a larger regional planning effort to develop recovery plans for ESA-listed salmon and steelhead trout in the Columbia River basin. This module complements the other recovery plans being developed in the region by focusing on habitat conditions and processes in the Columbia River estuary and plume and outlines management actions intended to reduce the threats and increase the survival potential of salmon and steelhead during estuarine rearing and migration.

Recovery of threatened and endangered species is a tremendous, long-term challenge. Between October 1, 2008, and September 30, 2010, the status of the 64 domestic endangered or threatened species listed under the ESA was as follows:

- 26 (41%) were stabilized or improving;
- 17 (26%) were known to be declining;
- 7 (11%) were mixed; and
- 14 (22%) were unknown in their status.

These percentages reflect a minor variation from the previous 2006–2008 Biennial Report, and reflect five of the newly listed species with declining population trends. Two species with improving status are the eastern DPS of Steller sea lion and the Kemp's Ridley sea turtle. The eastern DPS of Steller sea lion increased at over 3 percent per year between 1982 and 2009, more than doubling in Southeast Alaska, British Columbia, and Oregon. In the 2008 Steller Sea Lion Recovery Plan, NMFS concluded that the most important protection for this population has likely been prohibitions on lethal takes. Due to the improved status, NMFS is conducting a status review to determine whether delisting of this species is warranted. The Kemp's ridley sea turtle may be in the early stages of recovery as a result of intensive bi-lateral conservation efforts, including full protection of nesting females and their eggs in Mexico, and implementation of turtle excluder device requirements in the U.S. shrimp trawl fishery. This species, once described as the most imperiled of all marine turtles, has seen a 10 percent increase in the number of nests observed at its primary nesting beach in Mexico since the mid-1980s.

Two species whose status continues to decline are the Central California Coast (CCC) coho salmon and the Hawaiian monk seal. The CCC coho salmon Evolutionarily Significant Unit is critically close to extinction. Only a few hundred adults have returned annually over the past several years. Many factors have led to the decline of CCC coho including historical logging, urbanization, overfishing, and climatic variability, to name a few. The continued decline of the endangered CCC Coho and increasing risk of extinction has raised awareness on the urgency of needed action and prompted a number of State, Federal, and local efforts to engage in projects that have immediate benefits in improving freshwater survival. The southern extent of the range (south of San Francisco Bay) is particularly imperiled and believed extirpated except for one small stream: San Vicente Creek in Santa Cruz County. Surveys and research have shown a small population of CCC coho salmon occupying small abandoned agricultural ponds adjacent to the creek; providing critical off channel habitat. Two restoration projects have been completed aimed at converting these ponds to higher quality salmon rearing habitat. Only a small handful of adult coho returned to the rivers south of San Francisco Bay—several were observed in San Vicente. These areas are also now being used by NOAA's captive broodstock program with captive broodstock being released into several areas on San Vicente. With focused efforts in key areas we just might be able to halt their trajectory to extinction.

The Hawaiian monk seal is declining at about 4 percent a year—the primary cause of the overall decline appears to be low juvenile survival in the Northwest Hawaiian Islands, where only about one of every five

seals survives to reproductive age. The best estimate of the current total Hawaiian monk seal population is 1,161 seals. A substantial funding increase in fiscal years 2009 and 2010 allowed NMFS to implement several new research and management activities designed to reduce juvenile seal mortality in the Northwestern Hawaiian Islands and improve community-based management in the main Hawaiian Islands. For example, juvenile mortality at a key breeding site in the Northwestern Hawaiian Islands (French Frigate Shoals) was reduced by mitigating shark predation and moving weaned pups away from high mortality areas. In the Main Hawaiian Islands, hundreds of new volunteers were recruited and trained to conduct public outreach and respond to seals hauled out on popular recreational beaches, in partnership with the State of Hawaii, the U.S. Coast Guard, and several other government and non-government partners.

A list of species for which NMFS is responsible is provided in the following section.

Recovery plans are available online at
http://www.nmfs.noaa.gov/pr/PR3/recovery.html

Recovery plans may also be requested by writing to the following address:
Endangered Species Division – Recovery Plans
Office of Protected Resources – F/PR3
National Marine Fisheries Service
1315 East-West Highway
Silver Spring, MD 20910-3226

This report is available online via the NMFS-Office of Protected Resources website at
http://www.nmfs.noaa.gov/pr/PR3/biennial.html

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Table 1. ESA-listed species under NMFS jurisdiction including listing status, trends, priority numbers, and recovery plan status.

Species/ESU/DPS	Date Listed / Reclassified	ESA Status	Population/ ESU Trend	Recovery Priority Number[1]	Status of Recovery Plan
SEA TURTLES					
Green sea turtle					
-Breeding colony populations in Florida, Pacific coast Mexico	7/28/1978	Endangered	Increasing (*FL*); Declining (*Mexico*)	5	Completed 01/1998
-Rangewide	7/28/1978	Threatened	Declining	5	Completed 01/1998 *(Pacific);* 10/1991 (*Atlantic*)
Hawksbill sea turtle	6/2/1970	Endangered	Declining	1	Completed 01/1998 *(Pacific);* 12/1993 (*Atlantic*)
Kemp's Ridley sea turtle	12/2/1970	Endangered	Increasing	5	Draft Completed 03/2010; Revision Under Development
Leatherback sea turtle	6/2/1970	Endangered	Declining (*Pacific*); Mixed (*Atlantic*)	1	Completed 01/1998 *(Pacific);* 04/1992 (*Atlantic*)
Loggerhead sea turtle	7/28/1978	Threatened	Mixed (*Pacific*); Declining (*Atlantic*)	5	Completed 01/1998 *(Pacific);* 12/1991; Revision Completed 01/2009 (*Atlantic*)
Olive Ridley sea turtle					
-Breeding colony populations of Pacific coast Mexico	7/28/1978	Endangered	Mixed	5	Completed 01/1998
-Rangewide	7/28/1978	Threatened	Mixed	5	Completed 01/1998
PACIFIC SALMON					
Northwest Region					
-Puget Sound Chinook ESU	3/24/1999; 6/28/2005[2]	Threatened	Stable or Increasing	1	Completed 01/2007
-Hood Canal Summer-run chum ESU	3/25/1999; 6/28/2005[2]	Threatened	Stable or Increasing	1	Completed 05/2007
-Ozette Lake sockeye ESU	3/25/1999; 6/28/2005[2]	Threatened	Stable or Increasing	1	Completed 05/2009
-Puget Sound steelhead DPS	5/11/2007	Threatened	Declining	1	Under Development
-Upper Willamette River Chinook ESU	3/24/1999; 6/28/2005[2]	Threatened	Stable or Increasing	1	Draft Completed 10/2010
-Lower Columbia River Chinook ESU	6/28/2005[2]	Threatened	Stable or Increasing	1	Partial Draft Completed 02/2006 (*Washington)*; Under Development (*Oregon)*
-Lower Columbia River steelhead DPS	3/19/1998; 1/5/2006[2]	Threatened	Stable or Increasing	1	Partial Draft Completed 02/2006 (*Washington*); Under Development (*Oregon*)

Species/ESU/DPS	Date Listed / Reclassified	ESA Status	Population/ ESU Trend	Recovery Priority Number[1]	Status of Recovery Plan
-Lower Columbia River Coho ESU	3/24/1999; 6/28/2005[2]	Threatened	Stable or Increasing	1	Under Development
-Columbia River chum ESU	3/25/1999; 6/28/2005[2]	Threatened	Stable or Increasing	1	Partial Draft Completed 02/2006 (*Washington*); Under Development (*Oregon*)
-Upper Willamette River steelhead DPS	3/25/1999; 1/5/2006[2]	Threatened	Stable or Increasing	1	Draft Completed 10/2010
-Upper Columbia River, Spring Run Chinook ESU	3/24/1999; 6/28/2005[2]	Endangered	Stable or Increasing	1	Completed 10/2007
-Snake River Spring/Summer-run Chinook ESU	4/22/1992; 6/28/2005[2]	Threatened	Stable or Increasing	1	Draft Completed 03/1995 (not adopted); Under Development
-Snake River Fall-run Chinook ESU	4/22/1992; 6/28/2005[2]	Threatened	Stable or Increasing	1	Draft Completed 03/1995 (not adopted); Under Development
-Upper Columbia River steelhead DPS	8/18/1997; 1/5/2006[2]	Threatened	Stable or Increasing	1	Completed 10/2007
-Middle Columbia River steelhead DPS	3/25/1999; 1/5/2006[2]	Threatened	Stable or Increasing	1	Completed 09/2009
-Snake River Basin steelhead DPS	8/18/1997; 1/5/2006[2]	Threatened	Stable or Increasing	1	Draft Completed 03/1995 (not adopted); Under Development
-Snake River sockeye ESU	11/20/1991; 6/28/2005[2]	Endangered	Unknown	3	Draft Completed 03/1995 (not adopted); Under Development
-Oregon Coast coho ESU	8/10/1998[2]; 2/11/2008	Threatened[3]	Stable or Increasing	1	Under Development
Northwest and Southwest Regions					
-Southern Oregon/Northern California Coast coho ESU	5/6/1997; 6/28/2005[2]	Threatened	Unknown	1	Under Development
Southwest Region					
-Central California Coast coho ESU	10/31/1996; 6/28/2005[2]	Endangered	Declining	1	Draft Completed 09/2009
-Northern California steelhead DPS	6/7/2000; 1/5/2006[2]	Threatened	Unknown	5	Under Development
-California Coastal Chinook ESU	9/16/1999 6/28/2005[2]	Threatened	Unknown	3	Under Development
-Central California Coast steelhead DPS	8/18/1997; 1/5/2006[2]	Threatened	Unknown	3	Under Development
-South-Central California Coast steelhead DPS	8/18/1997; 1/5/2006[2]	Threatened	Unknown	3	Under Development
-Southern California Coast steelhead DPS	8/18/1997; 05/01/2002[3]; 1/5/2006[2]	Endangered	Unknown	3	Draft Completed 07/2009

Species/ESU/DPS	Date Listed / Reclassified	ESA Status	Population/ ESU Trend	Recovery Priority Number[1]	Status of Recovery Plan
-Sacramento River Winter-run Chinook ESU	11/5/1990; 1/4/1994[4]; 6/28/2005[2]	Endangered	Stable or Increasing	3	Draft Completed 11/2009
-Central Valley Spring-run Chinook ESU	9/16/1999; 6/28/2005[2]	Threatened	Stable or Increasing	7	Draft Completed 11/2009
-California Central Valley steelhead DPS	3/19/1998; 1/5/2006[2]	Threatened	Unknown	7	Draft Completed 11/2009
ATLANTIC SALMON					
Gulf of Maine DPS	11/17/2000; 6/19/2009	Endangered	Declining	1	Completed 11/2005
NON-SALMONID FISH					
Bocaccio – *Puget Sound/Georgia Basin DPS*	4/28/2010	Endangered	Declining	3	Expected to Begin in 2011
Canary rockfish – *Puget Sound/Georgia Basin DPS*	4/28/2010	Threatened	Declining	7	Expected to Begin in 2011
Eulachon – *Southern DPS*	3/18/2010	Threatened	Declining	7	Expected to Begin in 2011
Green sturgeon – *Southern DPS*	4/7/2006	Threatened	Unknown; likely Declining	5	Under Development
Gulf sturgeon	9/30/1991	Threatened	Stable	8	Completed 09/1995
Shortnose sturgeon	3/11/1967	Endangered	Mixed	5	Completed 12/1998
Smalltooth sawfish – *U.S. DPS*	4/1/2003	Endangered	Stable	7	Completed 01/2009
Yelloweye rockfish – *Puget Sound/Georgia Basin DPS*	4/28/2010	Threatened	Declining	7	Expected to Begin in 2011
PLANTS					
Johnson's seagrass	9/14/1998	Threatened	Stable	7	Completed 09/2002; Revision Under Development
INVERTEBRATES					
Black abalone	1/14/2009	Endangered	Declining	3	Expected to Begin in 2011
Elkhorn coral	5/9/2006	Threatened	Declining	7	Under Development
Staghorn coral	5/9/2006	Threatened	Declining	7	Under Development
White abalone	5/29/2001	Endangered	Declining	2	Completed 10/2008

Species/ESU/DPS	Date Listed / Reclassified	ESA Status	Population/ ESU Trend	Recovery Priority Number[1]	Status of Recovery Plan
SEALS AND SEA LIONS					
Guadalupe fur seal	12/16/1985	Threatened	Increasing	10	None
Hawaiian monk seal	11/23/1976	Endangered	Declining	1	Completed 03/1983; Revision Completed 08/2007
Steller sea lion – *eastern DPS*	4/5/1990; 11/26/1990; 5/5/1997[5]	Threatened	Increasing	10	Completed 12/1992; Revision Completed 03/2008
Steller sea lion – *western DPS*	4/5/1990; 11/26/1990; 5/5/1997[5]	Endangered	Mixed	7	Completed 12/1992; Revision Completed 03/2008
WHALES					
Beluga Whale – *Cook Inlet DPS*	10/22/2008	Endangered	Declining	2	Under Development
Blue whale	6/2/1970	Endangered	Unknown	5	Completed 07/1998
Bowhead whale	6/2/1970	Endangered	Increasing	7	None
Fin whale	6/2/1970	Endangered	Unknown	9	Completed 07/2010
Humpback whale	6/2/1970	Endangered	Increasing	5	Completed 11/1991
Killer whale – *Southern Resident DPS*	11/18/2005	Endangered	Declining	3	Completed 01/2008
North Atlantic right whale	6/2/1970; 03/06/2008	Endangered	Increasing	1	Completed 05/2005
North Pacific right whale	6/2/1970; 03/06/2008	Endangered	Unknown	4	None
Sei whale	6/2/1970	Endangered	Unknown	11	Draft Completed 08/2011
Sperm whale	6/2/1970	Endangered	Unknown	5	Completed 12/2010

[1] Recovery Priority Numbers are designated according to guidelines published by NMFS on June 15, 1990 (55 FR 24296). Priorities are designated from 1 (high) to 12 (low) based on the following factors: degree of threat, recovery potential, and conflict with development projects or other economic activity. See Appendix A for further information on NMFS Recovery Priority Numbers, including criteria used to designate numbers.

[2] In *Alsea Valley Alliance* v. *Evans*, 161 F. Supp. 2d 1154 (D. Or. 2001) (*Alsea*), the U.S. District Court in Eugene, Oregon, ruled that NMFS could not exclude hatchery fish within the ESU when listing. Although the *Alsea* ruling affected only one ESU, subsequent to the ruling, NMFS initiated new status reviews for 27 ESUs and, in 2005, re-listed 15 ESUs of salmon with revised definitions of the populations to be included in the ESU, delisted one ESU (OR Coast coho) and listed one ESU (Lower Columbia River coho); and in 2006, re-listed 10 ESUs of steelhead (and called them DPSs).

[3] This ESU was first listed on 8/18/1997; the southern range extension to the U.S.-Mexico border was added to the listing for this ESU via a final rule on 5/1/2002.

[4] This ESU was first emergency-listed as threatened on 8/4/1989, then officially listed as threatened on 11/5/1990, then reclassified as endangered on 1/4/1994.

[5] This species was first listed as threatened via a 240-day emergency rule on 4/5/1990, then officially listed as threatened in a final rule on 11/26/1990. NMFS separated the species into western and eastern DPSs via a final rule on 5/5/1997, which maintained the eastern DPS as threatened and reclassified the western DPS as endangered.

SEA TURTLE RECOVERY

Overview

NMFS and the U.S. Fish and Wildlife Service (FWS) share responsibility for the conservation, management, and recovery of sea turtle species found in waters and lands under U.S. jurisdiction. Although both agencies work closely together on recovery activities, NMFS is primarily responsible for recovery actions in the marine environment and FWS is primarily responsible for recovery actions in the terrestrial environment (i.e., nesting beaches). Six species of sea turtles are listed under the ESA and targeted by NMFS recovery activities: green, leatherback, loggerhead, hawksbill, olive ridley, and Kemp's ridley. Two regionally important DPSs are listed separately: (1) the green turtle breeding populations in Florida and on the Pacific Coast of Mexico and (2) the olive ridley turtle breeding populations on the Pacific Coast of Mexico.

Threats

Major threats to sea turtles in the United States include, but are not limited to: destruction and alteration of nesting and foraging habitats, incidental capture in commercial and recreational fisheries, disease, climate change, and vessel strikes. To reduce the incidental capture of sea turtles in commercial fisheries, NMFS has enacted regulations to restrict certain segments of U.S. commercial fisheries using gears that have documented sea turtle bycatch (e.g., trawls, longlines, gillnets, and pound nets). To effectively address all threats to sea turtles, NMFS and the FWS have developed recovery plans to direct research and management efforts for each sea turtle species.

Sea Turtle Bycatch in the United States

Incidental take in fishing operations, or bycatch, is one of the most serious threats to the recovery and conservation of sea turtle populations. To evaluate this threat, NMFS has instituted fishery observer programs in some fisheries to document sea turtle bycatch and has promulgated regulations to reduce sea turtle bycatch in certain Pacific, Atlantic, and Gulf of Mexico fisheries.

In the Pacific, NMFS requires measures (e.g., gear modifications, changes to fishing practices, time/area closures, and allowable interaction limits) to reduce sea turtle bycatch in the Hawaii-based and U.S. west coast-based (deep set) longline fishery and the California drift gillnet fishery.

In the Atlantic, NMFS has issued measures (e.g., gear modifications, changes to fishing practices, and time/area closures) to reduce sea turtle bycatch, and injuries associated with such bycatch, in pelagic longline, mid-Atlantic gillnet, Chesapeake Bay pound net, Atlantic sea scallop dredge, and Southeast shrimp and flounder trawl fisheries. In the southeast U.S. Atlantic and Gulf of Mexico, NMFS has worked closely with the trawl fishing industry to develop turtle excluder devices (TEDs) to reduce the mortality of sea turtles incidentally captured in shrimp trawl gear. Large-opening TEDs are required in all shrimp trawl nets.

In 2003, NMFS launched the Strategy for Sea Turtle Conservation and Recovery in Relation to Atlantic and Gulf of Mexico Fisheries to evaluate and address sea turtle bycatch comprehensively across jurisdictional (i.e., state and federal) and fishing sector (i.e., commercial and recreational) boundaries on a per-gear basis. Initial efforts are focused on non-shrimp trawl fisheries and a proposed rule to expand TED regulations into certain of these fisheries is under development.

ESA Section 6 Funding

A number of projects were funded by Species Recovery Grants to states and tribes (section 6) during FY 2009–2010, including the coordination of Florida's sea turtle stranding and salvage network and research, the coordination of the Massachusetts's disentanglement network, research on sea turtles in Florida Bay and the eastern Gulf of Mexico, habitat and population assessments of marine turtle aggregations in Puerto Rican

waters, necropsy and tissue collection in South Carolina, and research on the reproductive behavior in female loggerhead turtles in Georgia.

International Sea Turtle Conservation

The conservation and recovery of sea turtles requires multi-lateral cooperation and agreements to ensure the survival of these highly migratory animals. NMFS has a broad national and international program for the conservation and recovery of sea turtles—the goals of the international component of the sea turtle program are to facilitate the global conservation and recovery of sea turtles by working closely with other nations through diplomatic channels, capacity building, and scientific exchange. To do this, NMFS participates in globally significant international binding and non-binding instruments designed to facilitate international sea turtle conservation, such as the Inter-American Convention for the Protection and Conservation of Sea Turtles, the Indian Ocean Southeast Asia Marine Turtle Memorandum of Understanding (MOU), and the Marine Turtle Action Plan of the Secretariat of the Pacific Regional Environmental Program. In addition NMFS works through other bi-lateral and multi-lateral channels and organizations, participates and facilitates the recommendations, resolutions, and actions of Regional Fishery Management Organizations, and implements project-specific grants and outreach initiatives as tools to advance global sea turtle conservation.

Green Sea Turtle (*Chelonia mydas*)

Date Listed: July 28, 1978 (43 FR 32800)

Legal Status:
Endangered (*breeding colony populations in Florida and Pacific coast of Mexico*)
Threatened (*rangewide except where listed as endangered*)

Recovery Plan Status:
Pacific: Two final recovery plans were approved on January 12, 1998; one for the East Pacific green turtle population and one for all other Pacific populations.
Atlantic: A final recovery plan was approved on October 29, 1991.


Photo credit: NOAA

Species Status: An assessment of the annual number of nesting females from major nesting areas (and other beaches in the Pacific Ocean, Asian Seas, Indian Ocean, Mediterranean Sea, and Atlantic Ocean where quantitative data are available) indicates a decline by 48 to 67 percent over the past three generations. Currently there are four sites in the Pacific (Hawaii, Japan, and two sites in Australia—Raine and Heron Islands) and two sites in the Atlantic (Florida and Tortuguero, Costa Rica) with consistent long-term datasets whereby reliable conclusions can be generated about annual nesting trends. In the United States, the nesting populations in Hawaii (Figure 1) and Florida (Figure 2) have been documented as increasing over the past 20–30 years. Age at sexual maturity is estimated at between 30 and 50 years, and nesting females comprise only a small fraction of overall population size and status. Thus, caution is warranted when interpreting nesting data.

Threats and Impacts: Threats and impacts in the marine environment affecting both the threatened rangewide populations and the endangered breeding populations of green turtles include the following:

- Harvest of immature turtles and adults: Direct harvest of East Pacific green turtles has been documented from as far north as Mexico, south through Peru. In the West and Central Pacific, direct harvest of immature turtles and adults occurs throughout the green turtle's range, including (although unauthorized) in Hawaii and the U.S. flagged areas of Guam, the Commonwealth of the Northern Mariana Islands, and American Samoa. A legal fishery for green turtles also occurs in the Caribbean and Nicaragua's

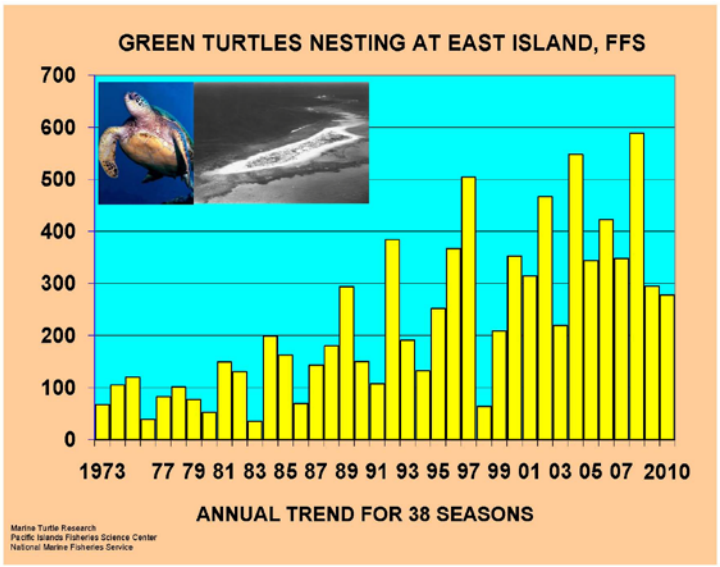


Figure 1. Estimated number of female green turtles nesting at East Island, French Frigate Shoals, Hawaiian Archipelago, 1973–2010.

commercial turtle fishery is estimated to kill thousands of large juvenile and adult green turtles each year.

- *Incidental capture in domestic and international commercial, artisanal, and recreational fisheries*: Fisheries known to interact with green turtles include gillnet, longline, hook and line, purse seine, pound net, trap/pot gear, dredge, set-net (or pound net), and trawl fisheries.
- *Marine debris and entanglement*: Green turtles can ingest a wide variety of marine debris and effects include interference with digestion and metabolism, as well as absorption of toxic by-products. They can also become entangled in marine debris, such as "ghost" fishing gear.
- *Pollution*: Point and non-point source pollution (e.g., pesticides, heavy metals, and polychlorinated biphenyls (PCBs)) in the marine environment have been detected in turtles and their eggs.
- *Disease*: In Hawaii, the occurrence of fibropapilloma tumors is elevated in locations with chronic eutrophication and nuisance blooms of invasive macroalgae.
- *Vessel strikes*: Especially in areas where recreational and/or commercial vessel traffic (small, medium, and/or large vessels) is intense, propeller and collision injuries are common. Vessel activities may also destroy or degrade habitat through anchoring, propeller scarring, and groundings.
- Power plant entrainment and entrapment, along both the U.S. Atlantic and Pacific coasts.
- *Dredging and beach nourishment activities*: These activities can result in marine habitat destruction via both direct and indirect effects, and hopper dredges can entrain and kill turtles.

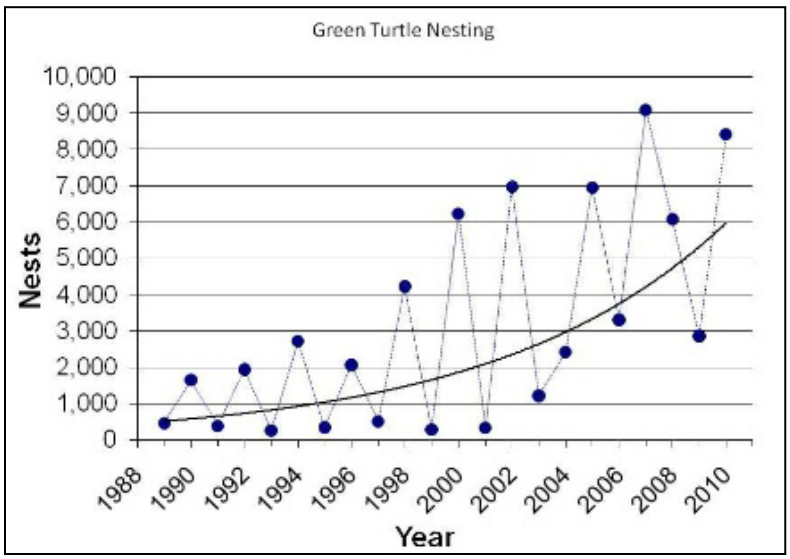


Figure 2. Number of green turtle nests documented on Florida core index beaches, 1989–2010.

- *Oil and gas exploration, development, and transportation*: Underwater explosions (e.g., gas and oil structure removal and seismic exploration activities) can kill or injure turtles, and destroy or damage habitat. Sea turtles are also at risk when encountering oil or other petroleum products in the marine environment, as respiration, skin, blood chemistry, and salt gland functions may be affected.
- *Military activities*: Military exercises in the marine environment may impact the migratory and foraging behavior of turtles and their habitats.
- Global climate change and sea level rise may result in changes to nesting and foraging habitat (e.g., shoreline erosion, beach temperature changes), and hatching success rates.

Conservation Actions: Major conservation actions conducted in 2008–2010 to advance recovery of the green turtle include the following:

Pacific/Indian Ocean:

- Continued to conduct population identification of bycaught, nesting, foraging, and stranded turtles through genetic analysis, flipper tagging, and satellite telemetry.
- Identified habitat requirements using stable isotope analysis.

- Continued U.S. fishery observer programs within the Exclusive Economic Zone as well as on the high seas to monitor, report, and estimate bycatch.
- Continued vital population assessment work including genetic sampling and analysis of age classes.
- Completed research to determine satellite transmitter drag for biotelemetry studies on turtles.
- Continued to collaborate with foreign partners to export longline fishery technologies through education and outreach, a circle hook exchange program, and fishing gear experiments. Projects to date have occurred in Ecuador, Mexico, Guatemala, Costa Rica, Peru, Brazil, Columbia, Chile, Korea, Thailand, Japan, Philippines, Spain, Vietnam, Indonesia, and the Mediterranean.
- Continued TED outreach, training, and capacity building efforts with various foreign governments.
- Supported the development, completion, and dissemination of a Turtle Research Database System in collaboration with six international Pacific Ocean-based agencies.
- Participated in the Indian Ocean MOU on the Conservation and Management of Marine Turtles of the Indian Ocean and Southeast Asia (IOSEA), and its associated Conservation and Management Plan (CMP), to provide a framework for the conservation of sea turtles and their habitats in the Indo-Pacific region. Led the development and negotiations to obtain agreement and passage of a [non-binding] international resolution dedicated to reducing bycatch of sea turtles.
- Convened the fifth International Fishers Forum to review and promote the transfer of commercial longline bycatch reduction technology, and discuss coastal and marine spatial planning.
- Completed an Options Paper and associated Analysis Matrix for members of the Secretariat of the Pacific Regional Environment Program (SPREP) to facilitate discussion, understanding, and final determination regarding a proposed Pacific-wide arrangement under the auspices of the Convention on the Conservation of Migratory Species of Wild Animals (CMS).
- Archived over 2,200 green turtle tissue samples in the Southwest Fisheries Science Center Molecular Research Sample Collection for use in a variety of population and trophic ecology studies.
- Analyzed genetic samples from nesting and foraging animals with molecular markers (mtDNA and SNPs) to determine Pacific wide population stock structure, elucidate stock boundaries, and DPS structure.
- Developed new molecular techniques (mitogenomics and SNPs) to determine green turtle population stock structure.
- Supported development of quantitative methods for sea turtle management.
- Established a state-of-the-art Stable Isotope Laboratory at the Southwest Fisheries Science Center, La Jolla, California.
- Convened a workshop to develop ecosystem-based stock assessment approaches for sea turtles.

Western and Central Pacific:

- Assisted national observer programs and supported capacity building through in-country fishery observer training to improve sea turtle species identification, reporting, handling, and education. Projects to date have occurred in Papua New Guinea, Marshall Islands, Palau, Indonesia, Vietnam, New Caledonia, Fiji, and Cook Islands.
- Continued long-term monitoring, research, and publication of results of the Hawaiian green turtle to identify potential causes and threats posed by fibropapillomatosis.
- Continued to conduct long-term nesting beach monitoring in the Northwest Hawaiian Islands to evaluate population trends, and continued to collect and publish information on the biology and ecology of the Hawaiian green turtle population.
- Continued to conduct long-term, spatially extensive, capture-mark-recapture programs at six coastal sites throughout the Hawaiian archipelago.
- Continued to support the State of Hawaii to build programmatic capacity to assess the impact of nearshore recreational fisheries on sea turtle populations and work toward future development of a State's CMP.
- Continued to educate Hawaii-based longline fishery participants about sea turtle mitigation requirements including safe handling, gear removal, and release of turtles caught incidental to the fishery.

- Convened a workshop in Hawaii to assess needs and develop an education and outreach program as a platform to address: human disturbance from recreational activities, boating impacts (vessel strikes), nearshore recreational fishery interactions, misleading public perceptions, illegal harvest, and the dissemination of information.
- Continued to support capacity building (including education and outreach initiatives) in American Samoa, Guam, and Commonwealth of Northern Mariana Islands for nesting beach and in-water monitoring to assess population trends and threats to sea turtles and their habitats.
- Continued to support turtle nesting beach monitoring program and capacity building in the Federated States of Micronesia.
- Continued to support in-water population assessment, genetic stock identification, and threat assessment of sea turtles at Palmyra Atoll.
- Supported education and outreach initiatives and development of relevant school curriculum to promote conservation and management of sea turtles in the Marshall Islands.
- Supported efforts to develop and test mitigation measures (escape mechanism) to reduce sea turtle bycatch in pound net fisheries in Japan.
- Convened a "Historical Ecology and Biogeography" Workshop in Honolulu to interpret and analyze over 2,500 historical accounts (1700–1950) of green and hawksbill turtles in the Pacific Ocean.
- Continued to facilitate the collection of genetic samples to assess the composition and stock structure of green turtles.
- Continued to work within the context of the Western and Central Pacific Fisheries Commission (WCPFC) to modify and improve international bycatch mitigation requirements.
- Evaluated relatedness among green turtle nests found on the main Hawaiian Islands using nuclear DNA analysis.
- Estimated carrying capacity of green turtles nesting in French Frigate Shoals.

Eastern Pacific:
- Continued trophic ecology identification of green turtles in the eastern Pacific.
- Continued long-term monitoring and tracking of resident green turtles in south San Diego Bay, California to collect life history data and determine population abundance, habitat use, population structure, and trophic ecology.
- Initiated long-term monitoring study of resident green turtles in the San Gabriel River, Long Beach, California to collect life history data and determine population abundance, population structure, trophic ecology, and habitat use.
- Supported a longline fishery observer program and sea turtle handling and resuscitation workshops in Peru.
- Supported an observer program to collect sea turtle-fisheries information and sea turtle tissue samples from coastal artisanal driftnet fisheries and commercial longline fisheries interactions in Chile.
- Supported education and community outreach efforts to reduce illegal harvest, fisheries bycatch, and mortality of sea turtles along the Baja California peninsula of Mexico.
- Supported research into methods to reduce sea turtle bycatch in the Mexican halibut gillnet fishery in Baja California, including a series of tests with illuminated fishing gear.
- Conducted skipper workshops to educate commercial fishermen on sea turtle identification and biology, and handling and resuscitation requirements.
- Supported education program in San Diego Bay, California geared towards educating elementary school students about sea turtle conservation.

Atlantic Ocean and Gulf of Mexico:
- Identified population structure of nesting turtles using DNA analysis, flipper tagging, and satellite telemetry and habitat requirements using stable isotope analysis.
- Conducted population identification of bycaught, foraging, and stranded turtles using DNA analysis, flipper tagging, and satellite telemetry.

- Supported in-water population studies in the Atlantic and Caribbean to provide indices of turtle abundance and to gather life history data.
- Continued coordination and support of the Sea Turtle Stranding and Salvage Network (STSSN) in the Atlantic and Gulf of Mexico, including cold stun response. NMFS worked with Florida state partners and the STSSN to respond to a massive cold stunning event in January 2010, in FL, which impacted over 4,600 turtles, the majority were green turtles.
- Convened workshop to discuss watercraft related injuries in sea turtles, including standardizations of data collection and identification of priorities and management needs.
- Continued coordination and support for the operation and training for the Sea Turtle Disentanglement Network in the Atlantic Northeast Region to address sea turtle entanglement in pot and other fishing gear.
- Developed and tested gear technologies to reduce sea turtle bycatch, including modifications to scallop dredges.
- Conducted an inspection program for modified pound net leaders in the Chesapeake Bay to ensure gear is consistent with sea turtle requirements. Coordinated with the Commonwealth of Virginia and Bottlenose Dolphin Take Reduction Team to expand modified pound net leader regulations.
- Continued and expanded fishery observer programs, including the U.S. longline fishery, to monitor, report, and estimate green turtle bycatch.
- Continued gear research to develop TEDs suitable for use in non-shrimp trawl fisheries such as the flynet, whelk, summer flounder, scallop, and sciaenid bottom trawl fisheries, as well as testing modifications for shrimp trawl TEDs.
- Continued TED outreach and training efforts with various foreign governments.
- Conducted observations on Core Sounds, NC gillnet fisheries and determined need for protective measures for sea turtles from those fisheries.
- Convened a workshop to review progress on TED gear research and discuss direction for future research in mid-Atlantic trawl fisheries.
- Convened a workshop to discuss sea turtle injuries in northeast fisheries and develop guidance to evaluate post-release mortality from such injuries. Identified a list of commercial fisheries in state and Federal waters that will be required to take observers upon NMFS' request.
- Conduct observer training workshops in West Africa to determine sea turtle bycatch in local fisheries.
- Provide scientific and technical advice on sea turtle nesting beach and bycatch projects in West Africa.
- Develop a sea turtle research and conservation strategy for the South Atlantic.

Priority Recovery Actions Needed: Priority recovery actions needed for the green sea turtle include the following:

- Maintain current U.S. monitoring and support education and outreach programs to reduce the direct take of eggs and nesting turtles, and the direct take of juvenile and adult green turtles in their foraging habitats.
- Support and encourage nations to develop and implement management measures to reduce and eliminate sea turtle interactions with commercial, artisanal, and recreational fisheries.
    - Support the use of large circle hooks in global longline fisheries and continue to identify other gear modifications and fishing practices to reduce turtle bycatch in longline fisheries.
    - Implement regulations in the United States requiring the use of TEDs, and encourage international uptake and use of TEDs, or other measures that provide comparable or greater protection, in trawl fisheries known to incidentally capture sea turtles.
- Support and encourage nations in monitoring efforts to assess sea turtle interactions in pelagic and coastal fisheries.
- Build capacity in foreign nations to establish and maintain conservation, research, and monitoring programs, and encourage efforts to strengthen legislation through enforcement and education.

- Further identify population structure of green turtle nesting populations in the South Pacific region including in-water mixed stock analysis of foraging populations.

Recovery Priority Number: 5 (*Breeding Colony Populations in Florida and Pacific coast of Mexico*); 5 (*Rangewide*)
The recovery priority number for the green sea turtle is 5. This represents a moderate magnitude of threat, a high recovery potential, and the presence of conflict with economic activities.

Hawksbill Sea Turtle (*Eretmochelys imbricata*)

Date Listed: June 2, 1970 (35 FR 8491)

Legal Status: Endangered

Recovery Plan Status:
Pacific: A final recovery plan was approved on January 12, 1998.
Atlantic: A final recovery plan was approved on December 15, 1993.


Photo credit: NOAA

Species Status: The hawksbill sea turtle is severely depleted throughout its range as a result of decades of intensive harvest. Today, most nesting populations continue to decline, a few appear stable (Buck Island Reef National Monument, U.S. Virgin Islands), and a few appear to be increasing (Mona Island, Puerto Rico) as a result of years of intensive conservation efforts. Major causes of the continued decline include commercial exploitation driven by the continuing demand for hawksbill shell (bekko), directed harvest of eggs, poaching of adult and immature turtles for meat and carapace, and destruction and degradation of nesting habitat and coral reef habitats that provide critically important foraging and resting areas. Baseline nesting demography, population status, trends, and genetic information is lacking throughout the species' range in the Western and South Pacific.

Threats and Impacts: Threats and impacts in the marine environment affecting hawksbill turtles include the following:

- Direct take of all life stages.
- *Destruction and degradation of habitat*: Hawksbills depend heavily on coral reefs for shelter and food.
- *Dredging*: Dredging can result in marine habitat destruction via both direct and indirect effects.
- *Marine debris and entanglement*: Hawksbill turtles ingest a wide variety of marine debris, and effects include interference with metabolism as well as absorption of toxic by-products. Turtles can also become entangled in marine debris, such as "ghost" fishing gear.
- Incidental capture in domestic and international, commercial and recreational fishing gear, including driftnets, seines, trawls, longlines, trap/pots, hook and line, and gillnets.
- *Vessel strikes*: Especially in areas where recreational and/or commercial vessel traffic (small, medium, and/or large vessels) is intense, propeller and collision injuries are not uncommon. Vessel activities may also destroy or degrade habitat through anchoring, propeller scarring, and groundings.
- *Oil and gas exploration, development, and transportation*: Underwater explosions (e.g., gas and oil structure removal and seismic exploration activities) can kill or injure turtles, and may destroy or damage habitat. Sea turtles are also at risk when encountering oil or other petroleum products in the marine environment, as respiration, skin, blood chemistry, and salt gland functions may be affected.
- *Pollution*: Point and non-point source pollution (e.g., pesticides, heavy metals, and PCBs) in the marine environment have been detected in turtles and their eggs.
- Global climate change and sea level rise may result in changes to nesting and foraging habitat (e.g., shoreline erosion, beach temperature changes), and hatching success rates.

Conservation Actions: Conservation actions conducted in 2008–2010 for recovery of the hawksbill turtle include the following:

Pacific/Indian Ocean:

- Supported the development, completion, and dissemination of a Turtle Research Database System in collaboration with six international agencies.
  - — Convened the fifth International Fishers Forum to review and promote the transfer of commercial longline bycatch reduction technology, and discuss coastal and marine spatial planning.
- Continued TED outreach and training efforts with various foreign governments.
- Collaborated with foreign partners to export longline fishery technologies through education and outreach, circle hook exchange program, and fishing gear experiments. Projects to date have occurred in Ecuador, Mexico, Guatemala, Costa Rica, Peru, Brazil, Columbia, Chile, Korea, Thailand, Japan, Philippines, Spain, Vietnam, and Indonesia.
- Archived over 550 hawksbill turtle tissue samples in the Southwest Fisheries Science Center Molecular Research Sample Collection for use in a variety of eastern and western Pacific population structure and trophic ecology studies.
- Analyzed genetic samples from nesting animals with molecular markers (mtDNA) to establish baseline for Pacific wide population stock structure.
- Convened a workshop to develop ecosystem-based stock assessment approaches for sea turtles.
- Identified a list of commercial fisheries in state and Federal waters that will be required to take observers upon NMFS' request.

Western and Central Pacific:

- Participated in the Indian Ocean MOU on the Conservation and Management of Marine Turtles of the IOSEA, and its associated CMP, to provide a similar comprehensive framework for the conservation and protection of sea turtles and their habitats in the Indo-Pacific region. Led the development and negotiations to obtain agreement and passage of a resolution dedicated to reducing bycatch of sea turtles.
- Assisted national observer programs and supported capacity building through in-country fishery observer training to improve sea turtle species identification, reporting, handling, and education. Projects to date have occurred in Papua New Guinea, Indonesia, Vietnam, Marshall Islands, Palau, New Caledonia, Fiji, and Cook Islands.
- Continued to convene an Annual Hawaii Hawksbill Turtle Recovery Implementation meeting amongst all federal, state, and non-governmental organization stakeholders.
- Continued to support nesting beach monitoring, genetic sampling and analysis, and mitigation activities to remove non-native predators of eggs and hatchlings and invasive plants impacting nesting habitats.
- Published satellite and radio telemetry studies of post-nesting females in the main Hawaiian Islands.
- Supported efforts in Maui to disseminate educational information and organize existing data since 1991 of foraging hawksbill turtles for population assessment, identification of habitats and anthropogenic impacts, and recovery planning.
- Continued to support capacity building in American Samoa, Guam, and the Commonwealth of the Northern Marianas Islands for nesting beach and in-water monitoring to assess population trends and threats to sea turtles and their habitats.
- Continued to support turtle monitoring program and capacity building in the Federated States of Micronesia.
- Continued to support in-water population assessment, genetic stock identification, and threat assessment of sea turtles at Palmyra Atoll.
- Supported education and outreach initiatives and development of relevant school curriculum to promote conservation and management capacity in the Marshall Islands.

- Convened a "Historical Ecology and Biogeography" Workshop in Honolulu to interpret and analyze over 2,500 historical accounts (dating 1700-1950) of greens and hawksbills in the Pacific Ocean.
- Continued to facilitate the collection of genetic samples to assess the composition and stock structure of hawksbill turtles.
- Continued to work within the context of the WCPFC to modify and improve international bycatch mitigation requirements.

Eastern Pacific:

- Convened the 2nd Data Gathering Workshop for Eastern Pacific Hawksbill Turtles in Padre Ramos, Nicaragua with sea turtle specialists from Mexico, Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Ecuador, Colombia, Panama, Peru, and the United States to compile current scientific knowledge on this endangered species, identify priority sites and principal threats, consolidate multinational alliances and projects for conservation, and establish conservation goals.
- Conducted educational outreach and capacity building efforts in Mexico, Costa Rica, El Salvador, and Ecuador to promote local and regional sea turtle conservation.
- Liaised with Subsecretary of Fisheries in Ecuador (one of the most important countries for hawksbill nesting in the Eastern Pacific) to discuss sea turtle bycatch reduction, national conservation legislation and enforcement of existing laws and regulations regarding the protection of marine turtles.
- Supported and collaborated with Ecuador to deploy transmitters on adult female hawksbills in the eastern Pacific to determine habitat use, migratory movements, and stock boundaries.

Atlantic Ocean and Gulf of Mexico:

- Supported satellite telemetry studies to investigate migration patterns and habitat use of hawksbills in the Caribbean Sea and Gulf of Mexico.
- Supported standardized index in-water surveys to monitor hawksbill populations in the wider Caribbean (e.g., Pearl Cays, Nicaragua).
- Re-examined population structure of nesting turtles in the U.S. Virgin Islands, Costa Rica, Mexico, Barbados, Antigua, Nicaragua, Puerto Rico, Cuba, and Guadeloupe using improved DNA analysis techniques. Continued gear research to develop TEDs suitable for use in non-shrimp trawl fisheries such as the flynet, whelk, summer flounder, scallop, and sciaenid bottom trawl fisheries, as well as testing modifications for shrimp trawl TEDs.
- Continued TED outreach and training efforts with various foreign governments.
- Identified a list of commercial fisheries in state and Federal waters that will be required to take observers upon NMFS' request.
- Convened a workshop to review progress on TED gear research and discuss direction for future research in mid-Atlantic trawl fisheries.
- Convened a workshop to discuss sea turtle injuries in northeast fisheries and develop guidance to evaluate post-release mortality from such injuries.
- Conduct observer training workshops in West Africa to determine sea turtle bycatch in local fisheries.
- Provide scientific and technical advice on sea turtle nesting beach and bycatch projects in West Africa.
- Develop a sea turtle research and conservation strategy for the South Atlantic.
- Continued coordination and support of the STSSN in the Atlantic and Gulf of Mexico.
- Continued and expanded fishery observer programs to monitor, report, and estimate hawksbill turtle bycatch.

Priority Recovery Actions Needed: Priority recovery actions needed for the hawksbill sea turtle include the following:

- Maintain current U.S. monitoring and educational outreach programs.
- Encourage foreign nations to reduce and eliminate the direct harvest of hawksbill turtles and eggs through capacity building, education, strengthening of in-country legislation, and law enforcement efforts.
- Support conservation and biologically viable management of hawksbill populations in countries that share U.S. hawksbill stocks.
- Determine population size, status, and trends through long-term regular nesting beach and in-water censuses.
- Identify stock home ranges and foraging/stranding population contributions using DNA analysis.
- Identify and protect primary nesting and foraging areas.
- Eliminate adverse effects of development on hawksbill nesting and foraging habitats.
- Control non-native predators of eggs and hatchlings (e.g., mongoose, feral cats, and pigs) and restore nesting habitats (e.g., remove invasive plant species) in Hawaii.
- Reduce incidental mortalities of hawksbill turtles by commercial, artisanal, and recreational fisheries.

Recovery Priority Number: 1

The recovery priority number for the hawksbill sea turtle is 1. This represents a high magnitude of threat, a high recovery potential, and the presence of conflict with economic activities.

Kemp's Ridley Sea Turtle (*Lepidochelys kempii*)

Date Listed: December 2, 1970 (35 FR 18319)

Legal Status: Endangered

Recovery Plan Status: A final recovery plan for the Kemp's ridley turtle was approved on August 21, 1992. A revised plan is currently under development.

Photo credit: Wendy Teas, NOAA

Species Status: The only major nesting sites for Kemp's ridley are in Mexico in the state of Tamaulipas, with the majority of nesting occurring along the coast at Rancho Nuevo. Although still significantly decreased in number from the mid-20th century, the trend in the number of nests documented at the Mexican nesting beaches has been increasing over the past decade, with 17,882 nests documented in 2008 (Figure 3). A small nesting assemblage is also found in the United States, primarily in Texas—6 nests were documented in 1996 and a record 195 nests were documented in 2008. As a result of intensive bi-lateral conservation efforts, including full protection of nesting females and their eggs in Mexico, and implementation of turtle excluder device requirements in the U.S. shrimp trawl fishery, there is cautious optimism that the Kemp's ridley population is in the early stages of recovery.

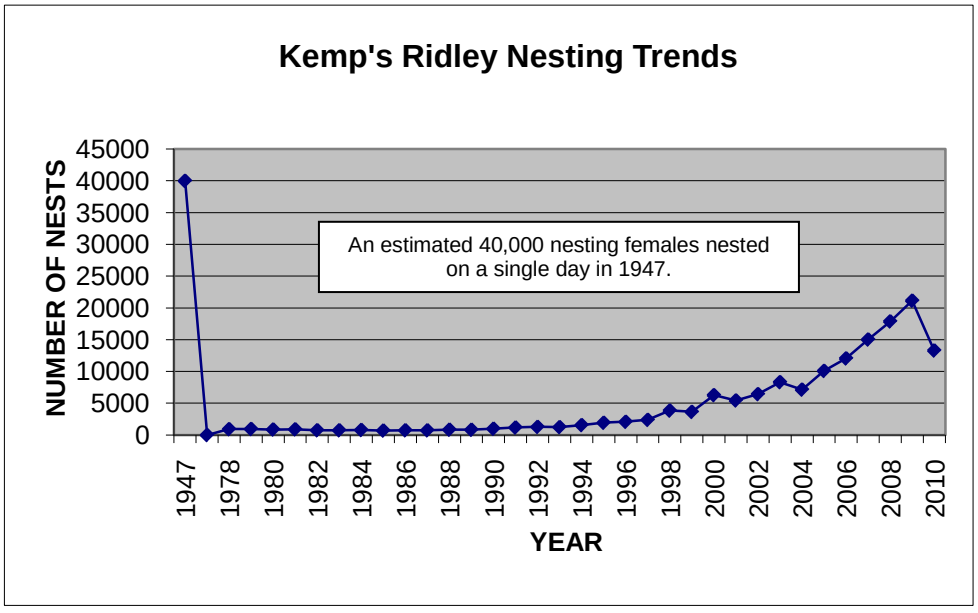


Figure 3. Kemp's ridley nesting trends in Mexico, 1978–2010. The 1947 point is a single reference point representing nesting females on a single day, the total nests over the entire 1947 season is believed to be much higher.

Threats and Impacts in the Marine Environment: Threats and impacts found in the marine environment affecting Kemp's ridley turtles include the following:

- Interactions with domestic and international, commercial and recreational fishing gear, including trawls, longline, purse seines, pound nets, traps and pots, hook and line, dredges, and gillnets.
- *Marine debris and entanglement*: Kemp's ridley turtles can ingest a wide variety of marine debris, and effects include interference with metabolism as well as absorption of toxic by-products. They can also become entangled in marine debris, such as "ghost" fishing gear.
- *Vessel strikes*: Especially in areas where recreational and/or commercial vessel traffic (small, medium, and/or large vessels) is intense, propeller and collision injuries are not uncommon.
- *Power plant entrainment and entrapment*: Kemp's ridleys can become entrained and entrapped primarily along the U.S. Atlantic coast.
- *Prey limitation*: Overfishing may lead to a reduction of key prey species preferred by Kemp's ridleys.
- *Dredging*: Dredging can result in marine habitat destruction via both direct and indirect effects and hopper dredges can entrain and kill turtles.
- *Oil production*: Sea turtles are at risk when encountering an oil spill, as respiration, skin, blood chemistry, and salt gland functions are affected.
- *Pesticides, heavy metals, and PCBs*: These materials and substances have been detected in turtles and eggs, but their effect is unknown.
- *Oil and gas exploration, development, and transportation*: Underwater explosions (e.g., gas and oil structure removal and use of explosives during exploration activities) can kill or injure turtles, and may destroy or damage habitat. Sea turtles are also at risk when encountering oil or other petroleum products in the marine environment, as respiration, skin, blood chemistry, and salt gland functions may be affected.
- *Marina and dock development*: Marina and dock development can destroy or degrade foraging habitat as well as lead to increased boat traffic, thus increasing the risk of collisions.
- Global climate change and sea level rise may result in changes to nesting and foraging habitat (e.g., shoreline erosion, beach temperature changes), and hatching success rates.

Conservation Actions: Conservation actions conducted in 2008–2010 for recovery of the Kemp's ridley turtle include the following:

- Identified population structure of nesting females and hatchlings at Padre Island, Texas using DNA analysis.
- Continued coordination and support of the STSSN in the Atlantic and Gulf of Mexico.
- Continued collection of samples for analysis at the National Sea Turtle Aging Laboratory.
- Supported infrastructure maintenance, stranding surveys, and provided monitoring equipment for the Mexican component of the Kemp's ridley conservation program.
- Supported research on in situ versus relocated nests to guide future conservation efforts.
- Archived over 650 Kemp's ridley turtle tissue samples in the Southwest Fisheries Science Center Molecular Research Sample Collection for use in population structure and demographic studies.
- Continued and expanded fishery observer programs to monitor, report, and estimate Kemp's ridley bycatch.
- Conducted an inspection program for modified pound net leaders in the Chesapeake Bay to ensure gear is consistent with sea turtle requirements. Coordinated with the Commonwealth of Virginia and Bottlenose Dolphin Take Reduction Team to expand modified pound net leader regulations.
- Supported in-water population studies in the Atlantic and Gulf of Mexico.
- Identified a list of commercial fisheries in state and Federal waters that will be required to take observers upon NMFS' request.
- Convened workshop to discuss watercraft related injuries in sea turtles, including standardizations of data collection and identification of priorities and management needs.
- Convened a workshop to review progress on TED gear research and discuss direction for future research in mid-Atlantic trawl fisheries.

- Convened a workshop to discuss sea turtle injuries in northeast fisheries and develop guidance to evaluate post-release mortality from such injuries.
- Developed and tested gear technologies to reduce sea turtle bycatch including modifications to scallop dredges and conducted research on TEDs suitable for use in non-shrimp trawl fisheries.
- Participated in in-water sea turtle recovery efforts during the Deep Water Horizon oil spill.

Priority Recovery Actions Needed: Priority recovery actions needed for the Kemp's ridley sea turtle include the following:

- Minimize commercial fishery bycatch and mortality of Kemp's ridley.
- Support Mexico in its conservation efforts on primary nesting beaches and build capacity for expansion of in-water conservation and research efforts.
- Improve and refine estimation techniques for the takes of sea turtles to ensure that criteria for recovery are being met.
- Continue and improve population assessments, including in-water studies of population size and structure.
- Determine distributional and seasonal movements for all life stages in the marine environment.
- Identify important marine habitats.
- Improve understanding of the effects of commercial fishery harvest on key prey species.

Recovery Priority Number: 5

The recovery priority number for the Kemp's ridley sea turtle is 5. This represents a moderate magnitude of threat, a high recovery potential, and the presence of conflict with economic activities.

Leatherback Sea Turtle (*Dermochelys coriacea*)

Date Listed: June 2, 1970 (35 FR 8491)

Legal Status: Endangered

Recovery Plan Status:
Pacific: A final recovery plan was approved on January 12, 1998.
Atlantic: A final recovery plan was approved on April 6, 1992.


Photo credit: NOAA

Species Status: Leatherback turtles are endangered throughout their global range. There are two populations in the Pacific, a Western Pacific population that nests in Indonesia (Papua Barat), Papua New Guinea, Solomon Islands and Vanuatu, and an Eastern Pacific population that nests in Mexico and Costa Rica. The Western Pacific population harbors the last remaining nesting aggregations of significant size in the Pacific with an estimated 2700–4500 breeding females. This population has been monitored sporadically over time; however, the past decade demarcates an era of discovery and implementation of both research and conservation initiatives with increasing involvement by stakeholders. While there has been overall long-term population decline, the Indonesian nesting aggregation at Jamursba-Medi is currently stable (since 1999), although there is growing evidence to suggest a significant and continued decline in leatherback turtle nesting abundance in Papua New Guinea and Solomon Islands over the past 30 years. Predation by pigs and dogs as well as continued direct harvest of eggs and turtles, beach erosion, and low hatch success remain significant impacts to the Western Pacific population. Leatherbacks were extirpated from Malaysia within the past decade or more. Research conducted by NMFS has indicated that leatherbacks from the Western Pacific population use areas off of the U.S. West Coast as key foraging sites. The Eastern Pacific population used to host the worlds' largest leatherback nesting population, which has now been reduced to less than 250 females nesting annually. The population has been regularly monitored over the past decade through nesting beach surveys and a hatchling relocation program at 4 major sites in Mexico that support 50 percent of all nesting in the Eastern Pacific. The potential for Pacific-basin wide leatherback extirpation remains significant. Conversely, in the Atlantic, leatherback nesting populations are increasing on U.S. beaches and are generally increasing elsewhere in the western north Atlantic, with the exception of Atlantic coastal sites of Costa Rica.

Threats and Impacts: Threats and impacts found in the marine environment affecting leatherback turtles include the following:

- *Incidental capture in both domestic and international commercial and artisanal fisheries*: Including drift and fixed gillnet, longline, purse seine, trap and pot, pound net, and trawl fisheries.
- *Vessel strikes*: Especially in areas where recreational and/or commercial vessel traffic (small, medium, and/or large vessels) is intense—propeller and collision injuries are not uncommon.
- *Marine debris and entanglement*: Leatherbacks can ingest a wide variety of marine debris (such as plastic bags) and effects include direct effects as well as secondary effects such as interference with digestion and metabolism, as well as absorption of toxic by-products. Turtles can become entangled in marine debris, such as "ghost" fishing gear and discarded shipping and packing materials.
- *Oil and gas exploration, development, and transportation*: Underwater explosions (e.g., gas and oil structure removal and seismic exploration activities) can kill or injure turtles, and may destroy or damage habitat. Sea turtles are also at risk when encountering oil or other petroleum products in the marine environment, as respiration, skin, blood chemistry, and salt gland functions may be affected.

- *Military activities*: Various short-term and long-term military exercises in the marine environment may impact the migratory and foraging behavior of turtles and their habitats.
- Illegal harvest of juveniles and adults.
- Habitat destruction and degradation due to development and tourism.
- Global climate change and sea level rise may result in changes to nesting and foraging habitat (e.g., shoreline erosion, beach temperature changes), and hatching success rates.

Conservation Actions: Conservation actions conducted in 2008–2010 for recovery of the leatherback turtle include the following:

Pacific/Indian Ocean:

- Identified population home ranges and conducted population identification of nesting, foraging, stranded, and bycaught turtles using DNA analysis and other tools.
- Conducted stable isotope analyses of leatherback soft tissues to determine habitat use and foraging strategies of leatherbacks in the Eastern and Western Pacific.
- Evaluated leatherback turtle population trends and designed and evaluated conservation strategies via stochastic simulation models.
- Continued to provide technical, scientific, and management support to Pacific-wide leatherback turtle projects.
- Supported the development, completion, and dissemination of a Turtle Research Database System in collaboration with six international agencies.
- Continued to promote and investigate options to encourage sustainable financing mechanisms for long-term maintenance of leatherback turtle monitoring and conservation programs.
- Completed research to determine satellite transmitter drag for biotelemetry studies on turtles.
- Conducted a pilot aerial survey study to assess marine habitat use, migratory corridors, and threats of leatherback turtles in the Sulu Sulawesis Sea based on the results of post-nesting migrations of satellite tracked turtles from Indonesia.
- Continued to promote "best practices" in the major longline fleets operating in the Pacific.
- Continued to manage leatherback interaction and mortality rates in U.S. Pacific longline fleets by requiring large circle hooks combined with non-squid bait; requiring proper handling techniques of hooked and entangled leatherbacks; and use of disentangling and de-hooking equipment such as dip nets, line cutters, and de-hookers.
- Continued to collaborate with foreign partners to export longline fishery technologies through education and outreach, circle hook exchange program, and fishing gear experiments to test longline fishing gear modifications to reduce bycatch and mortality.
- Convened the fifth International Fishers Forum to review and promote the transfer of commercial longline bycatch reduction technology, and discuss coastal and marine spatial planning.
- Identified a list of commercial fisheries in state and Federal waters that will be required to take observers upon NMFS' request.
- Convened a workshop to develop ecosystem-based stock assessment approaches for sea turtles.
- Archived over 12,500 leatherback turtle tissue samples in the Southwest Fisheries Science Center Molecular Research Sample Collection for use in a variety of population structure, demographic, and trophic ecology studies.
- Analyzed genetic samples from nesting and foraging animals with molecular markers (to determine Pacific wide population stock structure).
- Continued development of new molecular techniques (mitogenomics and SNPs) to determine leatherback turtle population stock structure.
- Supported development of quantitative methods for sea turtle management.
- Established a state-of-the-art Stable Isotope Laboratory at the Southwest Fisheries Science Center, La Jolla, California.
- Continued TED outreach and training efforts with various foreign governments.

Western and Central Pacific:

- Participated in the Indian Ocean MOU on the Conservation and Management of Marine Turtles of the IOSEA, and its associated CMP, to provide a similar comprehensive framework for the conservation and protection of sea turtles and their habitats in the Indo-Pacific region. Led the development and negotiations to obtain [non-binding] agreement and passage of a resolution dedicated to reducing bycatch of sea turtles.
- Continued to educate the Hawaii- and U.S west coast-based longline, ETP purse seine and California drift gillnet fishery participants about sea turtle mitigation requirements including safe handling, gear removal, resuscitation, and release of turtles caught incidental to the fisheries.
- Continued to assist national observer programs and supported capacity building through in-country fishery observer training to improve sea turtle species identification, reporting, handling, and education regarding fishery mitigation techniques. Projects to date have occurred in Palau, Indonesia, Vietnam, PNG, Solomon Islands, Marshal Islands, Federated States of Micronesia, Fiji, Cook Islands, and New Caledonia.
- Continued to draft a NMFS Western Pacific Leatherback Action Plan.
- Continued to support monitoring and protection of leatherback nesting beaches in the western Pacific, including education of local villagers on the importance of conservation of leatherbacks in Papua New Guinea, Indonesia, Solomon Islands, and Vanuatu.
- Provided scientific and technical oversight to projects, collaborated with local academics, and implemented nesting beach management measures to bolster hatchling production.
- Convened Western Pacific Leatherback Working Group Meetings.
- Convened a Sea Turtle Training Course in Trinidad which was attended by western Pacific and Atlantic leatherback turtle program staff.
- Conducted socio-economic research on the costs and benefits of various conservation strategies for Pacific leatherback turtles to help evaluate cost-effectiveness of leatherback conservation programs in the Western Pacific and to understand the impacts of conservation projects on local community stakeholders.
- Supported an exploratory expedition to Bougainville Island, PNG to assess and ground truth leatherback turtle nesting activity.
- Attached satellite tags to leatherbacks in Indonesia to gather information regarding migratory movements and pelagic habitat use.
- Continued to work within the context of the WCPFC to modify and improve international bycatch mitigation requirements.
- Conducted capacity building and joint collaborative efforts for leatherback nesting research and conservation in Papua, Indonesia.
- Continued planning for a second workshop on swordfish and leatherback use of temperate habitat (SLUTH) along the U.S. west coast with scientists, fisheries managers, conservationists, and fishers to identify information gaps, exchange ideas, and develop a new cooperative initiative to integrate fisheries management and protected resources conservation.
- Conducted monitoring (aerial surveys) for foraging leatherbacks off central and northern California.
- Conducted capture, tagging, genetic, stable isotope, and health assessment sampling, and satellite tracking of foraging leatherbacks off central California.
- Conducted aerial and ship-based surveys to identify foraging hotspots for leatherbacks off of the coast of Oregon and Washington.
- Described the distribution and abundance of leatherback turtles within the coastal California ecosystem.
- Increased the capacity of the California stranding network to respond and necropsy dead leatherback turtles and assess the health of live-caught foraging leatherbacks off central California.

Eastern Pacific:

- Supported monitoring and protection of leatherbacks nesting in Mexico.
- Supported a longline fishery observer program and sea turtle handling and resuscitation workshops in Peru.
- Supported the collection of biological samples from stranded and bycaught leatherback sea turtles in Peru through outreach with fishermen and governmental agencies.
- Supported an observer program to collect sea turtle-fisheries information and sea turtle tissue samples from coastal artisanal driftnet fisheries and commercial longline fisheries interactions in Chile.

Atlantic Ocean and Gulf of Mexico:

- Conducted population identification of bycaught, foraging, and stranded turtles using DNA analysis, flipper tagging, and satellite telemetry.
- Supported research to assess the health of wild caught leatherback turtles in the western North Atlantic.
- Continued coordination and support of the STSSN in the Atlantic and Gulf of Mexico.
- Continued coordination and support, including training, for the Sea Turtle Disentanglement Network in the Northwest Atlantic to address sea turtle entanglement in pot and other fishing gear.
- Held a bilateral meeting to coordinate with Canada on sea turtle stranding, disentanglement, and conservation activities and worked cooperatively with Canada to identify and address threats to leatherback turtles and areas of ongoing and future research.
- Supported research to investigate leatherback movements and behavior along the U.S. Atlantic coast.
- Convened a workshop to review progress on TED gear research and discuss direction for future research in mid-Atlantic trawl fisheries.
- Conducted an inspection program for modified pound net leaders in the Chesapeake Bay to ensure gear is consistent with sea turtle requirements. Worked with the Commonwealth of Virginia and Bottlenose Dolphin Take Reduction Team to expand modified pound net leader regulations.
- Continued gear research to develop TEDs suitable for use in non-shrimp trawl fisheries such as the flynet, whelk, summer flounder, scallop, and sciaenid bottom trawl fisheries, as well as testing modifications for shrimp trawl TEDs.
- Continued TED outreach and training efforts with various foreign governments.
- Continued fishery observer programs to monitor, report, and estimate leatherback bycatch.
- Identified a list of commercial fisheries in state and Federal waters that will be required to take observers upon NMFS' request.
- Convened a workshop to discuss sea turtle injuries in northeast fisheries and develop guidance to evaluate post-release mortality from such injuries.
- Supported nesting beach monitoring of leatherbacks at St. Croix, USVI.
- Collected and analyzed genetic samples from nesting females and hatchlings at St. Croix, USVI to determine critical life history parameters, including age at first reproduction and juvenile survival rates.
- Conducted observer training workshops in West Africa to determine sea turtle bycatch in local fisheries.
- Provided scientific and technical advice on sea turtle nesting beach and bycatch projects in West Africa.
- Developed a sea turtle research and conservation strategy for the South Atlantic.
- Evaluated the primary sex ratios and stable isotope values of leatherbacks nesting in Gabon, Central Africa.
- Characterized juvenile leatherback habitat in Sao Tome and Principe.
- Conducted a preliminary survey of the Angolan coastline to determine leatherback nesting areas.
- Convened a Leatherback Turtle Expert Working Group with national and international participants to gather and assess data available on Atlantic leatherback turtles.

Priority Recovery Actions Needed: Priority recovery actions needed for the leatherback sea turtle include the following:

- Reduce bycatch in commercial and artisanal fisheries.
  - Implement regulations in the United States requiring the use of TEDs, or other suitable conservation measures, wherever the distribution of sea turtles overlaps with the use of trawl gear known to take turtles.
  - Develop a strategy to document and address the critical problem of entanglement in fixed pot gear in the Atlantic and Gulf of Mexico.
  - Continue to promote the use of large circle hooks in global longline fisheries and continue to identify other gear modifications and fishing practices to reduce bycatch in longline fisheries.
- Support nations in monitoring and implementing management measures to reduce sea turtle bycatch in pelagic and coastal fisheries.
- Continue and improve population assessments on nesting beaches and in foraging habitats.
- Improve understanding of the effects of commercial fishery harvest on key prey species.
- Continue to provide scientific and technical support to programs, help to establish standardized and reliable monitoring protocols, and facilitate community incentive programs to promote increased hatchling production and to reduce harvest of nests and nesting females.
- Continue to promote and expand outreach and education programs.
- Continue to assess factors impacting hatchling production and implement suitable, science-based and culturally appropriate management measures to reduce nest loss through predation, harvest, erosion and inundation, elevated sand temperatures, and any other factors impacting nests or hatchling production.
- Continue to investigate and identify leatherback foraging habitats and migrations.

Recovery Priority Number: 1

The recovery priority number for the leatherback sea turtle is 1. This priority number represents the critical status of this globally listed species and is based on a high magnitude of threat, a high recovery potential, and the presence of conflict with economic activities.

Loggerhead Sea Turtle (*Caretta caretta*)

Date Listed: July 28, 1978 (43 FR 32800)

Legal Status: Threatened

Recovery Plan Status:
Pacific: A final recovery plan was approved on January 12, 1998.
Atlantic: A final revised recovery plan was approved on December 31, 2008.


Photo credit: National Ocean Service

Species Status: In 2009 a biological review team (BRT) consisting of federal (NMFS and FWS) and state biologists completed a global loggerhead turtle status review. This review evaluated loggerhead turtles by ocean basin: Pacific Ocean, Atlantic Ocean (including the Mediterranean Sea), and Indian Ocean, and identified nine DPS' that are discrete and significant relative to the taxon. In the Pacific, the BRT identified a North Pacific DPS and a South Pacific DPS. In the Atlantic, the BRT identified a Northeast Atlantic DPS, Northwest Atlantic DPS, South Atlantic DPS, and Mediterranean Sea DPS. In the Indian Ocean, the BRT identified the Southwest Indian Ocean DPS and the Southeast Indo-Pacific DPS. The two populations that occur within U.S. waters are the North Pacific and Northwest Atlantic DPS's.

Nesting beach monitoring activities in Japan began in the 1950s on some beaches and expanded to all known nesting beaches beginning in 1990 by the Sea Turtle Association of Japan (STAJ) and their partners. Approximately 40% of all loggerhead nesting in Japan occurs at three primary nesting beaches on Yakushima Island (Kamezaki et al. 2003). Current research shows that there is a strong climatic signal in the nesting population in both the North Pacific and Northwest Atlantic populations, explaining up to 88% of the annual variability in these populations (Van Houtan and Halley 2011). Based on annual nesting data of 2,500 nests laid per year between 1998 and 2000, it is estimated that fewer than 1,000 females may have bred annually in Japan (Kamezaki et al. 2003). Between 2000 and 2007 nesting activity has continued to be variable (Figure 4) with 11,082 and 7,495 nests documented, respectively, in 2008 and 2009 (NMFS 2008; Matsuzawa 2010). There is no loggerhead nesting in the U.S. Pacific.

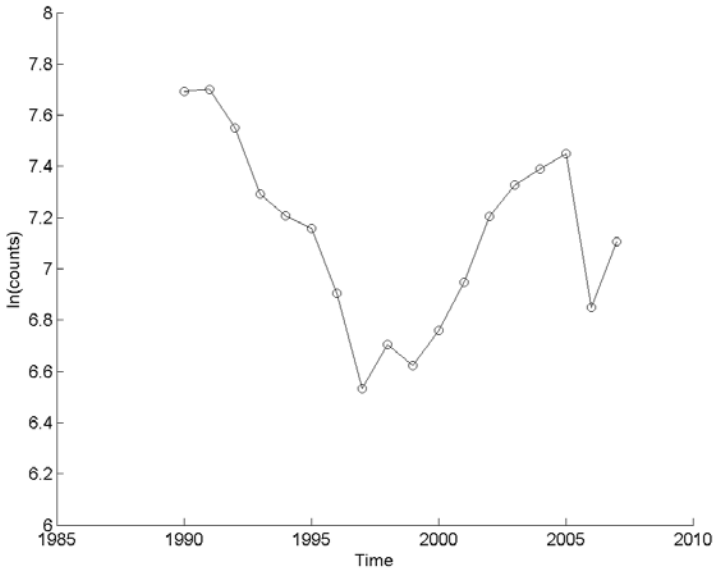


Figure 4. Nesting activity of North Pacific loggerhead turtles 1990 – 2007 (figure adapted from Conant et al. 2009).

In the Northwest Atlantic, the majority of loggerhead nesting occurs along the coast of the U.S. from southern Virginia through Alabama, with additional nesting occurring along the coast of Mexico, Central America, Colombia, Venezuela and the eastern Caribbean Islands. Total

estimated nesting in the United States has fluctuated between 47,000 and 90,000 nests per year over the last decade. Results from standardized nesting beach surveys in Florida have demonstrated a significant decline in nesting over the past two decades (Figure 5). Nesting in Georgia, South Carolina, and North Carolina has also declined, although not as significantly as in Florida. In Mexico, 1,000–2,000 loggerhead nests have been documented annually in recent years, and nesting has been declining.

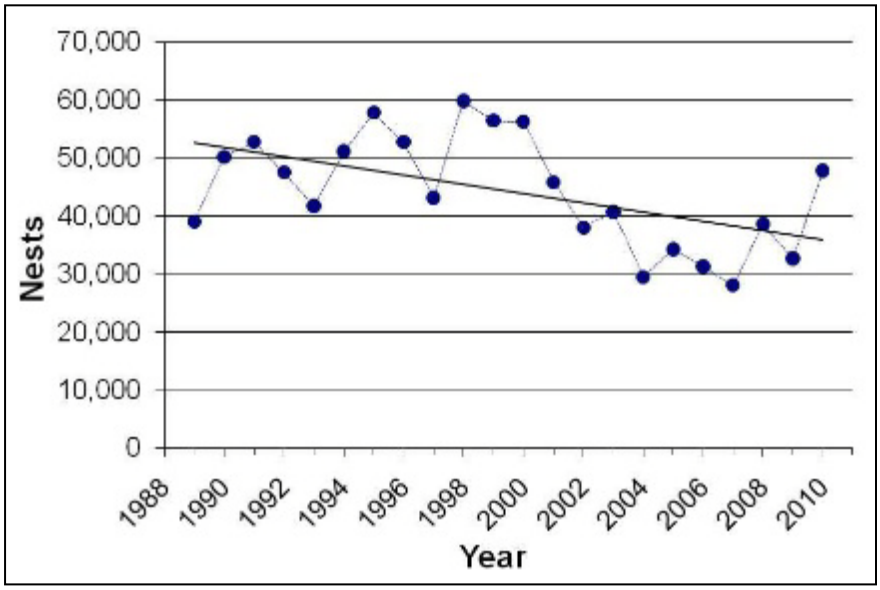


Figure 5. Number of loggerhead nests documented on Florida core index beaches, 1989–2010.

Threats and Impacts in the Marine Environment: Threats and impacts found in the marine environment affecting loggerhead turtles include the following:

- *Bycatch in domestic and international commercial and artisanal fisheries*: Fisheries known to interact with juvenile and adult loggerheads include trawl, gillnet, longline, hook and line, purse seine, pound net, dredge, and pot/trap fisheries.
- Directed take of immature loggerheads outside the United States.
- *Marine debris and entanglement*: Loggerheads can ingest a wide variety of marine debris, and effects include direct effects as well as secondary effects such as interference with digestion, metabolism as well as absorption of toxic by-products. Turtles can become entangled in marine debris, such as "ghost" fishing gear and discarded shipping and packing materials.
- *Vessel strikes*: Especially in areas where recreational and/or commercial vessel traffic (small, medium, and/or large vessels) is intense, propeller and collision injuries, many resulting in death, are common.
- Power plant entrainment and entrapment, primarily along the U.S. Atlantic coast.
- Habitat loss and alteration from anthropogenic activities in the marine environment.
- *Dredging*: Dredging can result in marine habitat destruction via both direct and indirect effects, and hopper dredges can entrain and kill turtles.
- *Oil and gas exploration, development, and transportation*: Underwater explosions (e.g., gas and oil structure removal and seismic exploration) can kill or injure turtles, and may destroy or damage habitat. Sea turtles are also at risk when encountering oil or other petroleum products in the marine environment, as respiration, skin, blood chemistry, and salt gland functions may be affected.
- *Military activities*: Various short-term and longer-term military exercises in the marine environment may impact the migratory and foraging behavior of turtles and their habitats.
- Global climate change and sea level rise may result in changes to nesting and foraging habitat (e.g., shoreline erosion, beach temperature changes), and hatching success rates.

- *Pollution*: Point and non-point source pollution (e.g., pesticides, heavy metals, and PCBs) in the marine environment have been detected in turtles and their eggs.

Conservation Actions: Conservation actions conducted in 2008–2010 for recovery of the loggerhead turtle include the following:

Pacific/Indian Ocean:

- Identified population home ranges and conducted population identification of nesting, bycaught, foraging, and stranded loggerheads using DNA analysis.
- Evaluated loggerhead turtle population trends and designed and evaluated conservation strategies via stochastic simulation models.
- Completed research to determine satellite transmitter drag for biotelemetry studies on turtles.
- Continued to manage interaction and mortality rates in U.S. Pacific longline fleets by requiring large circle hooks combined with non-squid bait; proper handling of hooked and entangled loggerheads; requiring the use of disentangling and de-hooking equipment such as dip nets, line cutters, and de-hookers; and implementing closures.
- Continued to investigate and publish results of migration routes and preferred oceanic habitats by attaching satellite transmitters and tracking loggerheads in the Pacific.
- Supported the development, completion, and dissemination of a Turtle Research Database System in collaboration with six international agencies.
- Collaborated with foreign partners to export longline fishery technologies through education and outreach, circle hook exchange program, and fishing gear experiments to evaluate options to reduce bycatch and mortality. Projects to date have occurred in Ecuador, Mexico, Guatemala, Costa Rica, Peru, Brazil, Columbia, Chile, Korea, Thailand, Japan, Philippines, Spain, Vietnam, and Indonesia.
- Convened the fifth International Fishers Forum to review and promote the transfer of commercial longline bycatch reduction technology, and discuss coastal and marine spatial planning.
- Continued to conduct skipper workshops to educate commercial fishermen on sea turtle identification and biology, and handling and resuscitation requirements
- Continued TED outreach and training efforts with various foreign governments.
- Identified a list of commercial fisheries in state and Federal waters that will be required to take observers upon NMFS' request.
- Convened a workshop to develop ecosystem-based stock assessment approaches for sea turtles.
- Archived over 3,200 loggerhead turtle tissue samples in the Southwest Fisheries Science Center Molecular Research Sample Collection for use in a variety of population structure, demographic, and trophic ecology studies.
- Convened a genetics working group meeting to share information among researchers and identify critical data gaps for nesting populations.
- Analyzed genetic samples from nesting and foraging animals with molecular markers to determine Pacific wide population stock structure.
- Supported development of quantitative methods for sea turtle management.

<u>Western and Central Pacific</u>:

- Participated in the Indian Ocean MOU on the Conservation and Management of Marine Turtles of the IOSEA, and its associated CMP, to provide a similar comprehensive framework for the conservation and protection of sea turtles and their habitats in the Indo-Pacific region. Led the development and negotiations to obtain [non-binding] agreement and passage of a resolution dedicated to reducing bycatch of sea turtles.
- Continued to educate Hawaii-based longline fishery participants about sea turtle mitigation requirements including safe handling, gear removal, resuscitation, and release of turtles caught incidental to the fishery.
- Continued to assist national observer programs and supported capacity building through in-country fishery observer training to improve sea turtle species identification, reporting, handling, and

education regarding fishery mitigation techniques. Projects to date have occurred in Palau, Indonesia, Vietnam, PNG, Solomon Islands, Marshal Islands, Federated States of Micronesia, Fiji, Cook Islands, and New Caledonia.
- Continued to support monitoring and beach management measures (to relocate doomed nests due to beach erosion and wave inundation) at loggerhead nesting beaches in Japan in collaboration with the Sea Turtle Association of Japan.
- Continued to support an education and outreach coordinator to promote loggerhead sea turtle conservation and management concerns in New Caledonia in coordination with studies to understand South Pacific pelagic habitat use and migratory movements via satellite tracking.
- Supported efforts to develop and test mitigation measures (such as escape mechanism) to reduce sea turtle bycatch in pound net fisheries in Japan.
- Continued to work within the context of the WCPFC to modify and improve international bycatch mitigation requirements.

East Pacific:
- Continued to support efforts to quantify fishery mortality (strandings) in Baja California, Mexico and implement public and fisherman education and outreach initiatives to raise capacity to mitigate and reduce artisanal fishery bycatch.
- Supported education and community outreach efforts to reduce illegal harvest, fisheries bycatch, and mortality of sea turtles along the Baja California peninsula of Mexico.
- Supported research into methods to reduce sea turtle bycatch in the Mexican halibut gillnet fishery in Baja California, including a series of tests with illuminated fishing gear.
- Supported efforts to deploy animal-borne video technology to better understand the diving and foraging behavior of loggerhead sea turtles, as well as help assess the sight ability of these turtles during aerial surveys in order to calibrate relative abundance estimates off the Pacific coast of Baja California.
- Supported an observer program in the Chilean swordfish-directed longline fishery and provided circle hooks and technical support for experiments testing modified gear.
- Conducted capacity training exercises for fishers and boat captains from Peruvian artisanal fleets to educate them on safe handling and resuscitation techniques for comatose turtles incidentally captured in gillnet and longline gear.
- Supported an observer program to collect sea turtle-fisheries information and sea turtle tissue samples from coastal artisanal driftnet fisheries and commercial longline fisheries interactions in Chile.

Atlantic Ocean and Gulf of Mexico:
- Continued gear research to develop TEDs suitable for use in non-shrimp trawl fisheries such as the flynet, whelk, summer flounder, scallop, and sciaenid bottom trawl fisheries, as well as testing modifications for shrimp trawl TEDs
- Continued TED outreach and training efforts with various foreign governments.
- Convened a workshop to review progress on TED gear research and discuss directions for future research in mid-Atlantic trawl fisheries.
- Conducted an inspection program for modified pound net leaders in the Chesapeake Bay to ensure gear is consistent with sea turtle requirements. Coordinated with the Commonwealth of Virginia and Bottlenose Dolphin Take Reduction Team to expand modified pound net leader regulations.
- Convened a workshop to discuss sea turtle injuries in northeast fisheries and develop guidance to evaluate post-release mortality from such injuries.
- Identified a list of commercial fisheries in state and Federal waters that will be required to take observers upon NMFS' request.
- Continued fishery observer programs to monitor, report, and estimate loggerhead bycatch.
- Developed average annual bycatch estimate of loggerheads in mid-Atlantic gillnet gear from 1995—2006.

- Developed estimate of observable turtle interactions in scallop dredge gear from 2001–2008.
- Continued coordination and support of the STSSN in the Atlantic Ocean and Gulf of Mexico.
- Convened workshop to discuss watercraft related injuries in sea turtles, including standardizations of data collection and identification of priorities and management needs.
- Supported in-water population studies in North Carolina and Florida.
- Identified population home ranges and conducted population identification of nesting, foraging, stranded, and bycaught loggerheads using DNA analysis, flipper tagging, and satellite telemetry.
- Evaluate the impact of fisheries on sea turtle populations in Morocco and Oman.
- Conduct observer training workshops in West Africa to determine sea turtle bycatch in local fisheries.
- Provide scientific and technical advice on sea turtle nesting beach and bycatch projects in West Africa.
- Develop a sea turtle research and conservation strategy for the South Atlantic.

Priority Recovery Actions Needed: Priority recovery actions needed for the loggerhead sea turtle include the following:

- Reduce incidental capture of loggerheads in domestic and international commercial and artisanal fisheries.
- Continue to promote the use of large circle hooks in global longline fisheries and continue to identify other gear modifications and fishing practices to reduce bycatch in longline fisheries.
- Investigate the effects of commercial fishing on loggerhead prey distribution and abundance.
- Continue and improve population assessments on nesting beaches and in foraging habitats.
- Implement regulations in the United States requiring the use of TEDs, or other suitable conservation measures, wherever the distribution of loggerhead sea turtles overlaps with the use of trawling gear known to take turtles.
- Continue to build international capacity for the conservation and management of the North Pacific DPS among the United States, Japan, and Mexico.
- Continue to assess the impact of coastal fisheries and develop measures to mitigate and reduce bycatch in coastal commercial and artisanal fisheries.

Recovery Priority Number: 5

The recovery priority number for the loggerhead sea turtle is 5. This represents a moderate magnitude of threat, a high recovery potential, and the presence of conflict with economic activities.

Olive Ridley Sea Turtle (*Lepidochelys olivacea*)

Date Listed: July 28, 1978 (43 FR 32800)

Legal Status:
Endangered (*breeding colony populations of Pacific coast of Mexico*)
Threatened (*rangewide except where listed as endangered*)

Recovery Plan Status: A recovery plan for the U.S. Pacific populations of the olive ridley sea turtle was approved on January 12, 1998.

Species Status: The olive ridley is the most abundant sea turtle in the world and population trends vary among geographic regions as well as within regions. The behavior of olive ridleys, primarily nesting as an arribada (a mass arrival of turtles to the nesting beach), makes it difficult to precisely measure annual nesting. The status of the primary nesting populations of the olive ridley in the Pacific varies from declining to increasing (Table 2). In the Pacific, there is an Eastern Pacific population occurring primarily in Mexico and Costa Rica with tens of thousands to over a million nests laid annually, and a Western Pacific population with the largest nesting population occurring in India. In the western Atlantic, olive ridleys nest in Suriname, French Guiana, and Brazil. Survey effort has fluctuated over the years at these sites and it is difficult to assess nesting trends because of incomplete surveys during many years. In recent years, no more than 5,000–6,000 olive ridley nests are documented annually in the western Atlantic. In the eastern Atlantic, there is widespread, low density olive ridley nesting along many West African beaches, but trends are unknown.

Table 2. Status and trends of Pacific olive ridley nesting populations.

Subpopulation	No. of Females Nesting Annually	Trend
Mexico – Playa Escobilla	~1 million (nests)	Increasing
Costa Rica – Playa Ostional	450,000 - 600,000	Unknown[2]
Costa Rica – Playa Nancite	25,000 – 50,000	Unknown
Guatemala	4,300,000 (eggs)	Declining
Nicaragua	Unknown	Unknown
India (Gahirmatha)	150,000 – 200,000	Mixed[3]
Indonesia	Scattered	Unknown
Malaysia	Scattered	Declining

Threats and Impacts: Threats and impacts found in the marine environment affecting olive ridley turtles include the following:

- Direct harvest.
- *Incidental capture in commercial and artisanal fisheries*: Fisheries known to interact with olive ridleys include gillnets, longline fisheries, purse seine fisheries, trawl fisheries, gillnets, and hook and line.
- *Vessel strikes*: Especially in areas where recreational and/or commercial vessel traffic (small, medium, and/or large vessels) is intense, propeller and collision injuries are not uncommon.
- Global climate change and sea level rise may result in changes to nesting and foraging habitat (e.g., shoreline erosion, beach temperature changes), and hatching success rates.
- Habitat loss and alteration from anthropogenic activities in the marine environment.

[2] Although the data are too limited for a statistically valid determination of a trend, there does appear to be a 6-year decrease in the number of nesting females.
[3] Although there has been no drastic decline in the nesting population in the past 25 years, there are differences in trends between decades. Data from the 1990s show the population is declining or on the verge of a decline, and no arribadas have been documented in recent years.

Conservation Actions: Conservation actions conducted in 2004–2006 for recovery of the olive ridley turtle include the following:

Pacific/Indian Ocean:

- Continued to educate Hawaii- and U.S. west coast-based longline, ETP purse seine, and California drift gillnet fishery participants about sea turtle mitigation requirements including safe handling, resuscitation, gear removal, and release of turtles caught incidental to the fishery.
- Supported the development, completion and dissemination of a Turtle Research Database System in collaboration with six international agencies.
- Continued to identify stock home ranges and conducted population identification of nesting, foraging, stranded, and olive ridleys caught as bycatch using DNA analysis.
- Continued population assessment work under the STSSN, including genetic sampling and analysis of age classes.
- Completed research to determine satellite transmitter drag for biotelemetry studies on turtles.
- Continued TED outreach and training efforts with various foreign governments.
- Continued to collaborate with foreign partners to export longline fishery technologies through education and outreach, circle hook exchange program, and fishing gear experiments. Projects to date have occurred in: Ecuador, Mexico, Guatemala, Costa Rica, Peru, Brazil, Columbia, Chile, Korea, Thailand, Japan, Philippines, Spain, Vietnam, and Indonesia.
- Identified a list of commercial fisheries in state and Federal waters that will be required to take observers upon NMFS' request.
- Convened the fifth International Fishers Forum to review and promote the transfer of commercial longline bycatch reduction technology and discuss coastal and marine spatial planning.
- Convened a workshop to develop ecosystem-based stock assessment approaches for sea turtles.
- Archived over 75 olive ridley turtle tissue samples in the Southwest Fisheries Science Center Molecular Research Sample Collection for use in a variety of population structure, demographic, and trophic ecology studies.
- Analyzed genetic samples from nesting, foraging, and fisheries bycatch animals with molecular markers to determine Pacific wide population stock structure.
- Supported development of quantitative methods for sea turtle management.

Western and Central Pacific:

- Participated in the Indian Ocean MOU on the Conservation and Management of Marine Turtles of the IOSEA, and its associated CMP, to provide a similar comprehensive framework for the conservation and protection of sea turtles and their habitats in the Indo-Pacific region. Led the development and negotiations to obtain [non-binding] agreement and passage of a resolution dedicated to reducing bycatch of sea turtles.
- Continued to manage the interaction and mortality rates in U.S. Pacific longline fleets (currently Hawaii-based only) by requiring large circle hooks combined with non-squid bait; requiring proper handling of hooked and entangled turtles; and requiring use of disentangling and de-hooking equipment such as dip nets, line cutters, and de-hookers.
- Continued to educate Hawaii- and U.S. west coast-based longline, Eastern Tropical Pacific purse seine, and California drift gillnet fishery participants about sea turtle mitigation requirements including safe handling, gear removal, resuscitation, and release of turtles caught incidental to the fisheries.
- Continued to assist national observer programs and supported capacity building through in-country fishery observer training to improve sea turtle species identification, reporting, handling, and education regarding fishery mitigation techniques. Projects to date have occurred in Palau, Indonesia, Vietnam, PNG, Solomon Islands, Marshal Islands, Federated States of Micronesia, Fiji, Cook Islands, and New Caledonia.
- Supported surveying of trawl and longline fishing crews at Indonesian ports to estimate capture rates of sea turtles and supported a trial observer program in Indonesian longline and trawl fisheries.

- Supported a project in Papua New Guinea to mitigate tuna and prawn fisheries interactions with sea turtles and to build the capacity of the National Fisheries Authority.
- Continued to work within the context of the WCPFC to modify and improve international bycatch mitigation requirements.

Eastern Pacific:
- Supported an observer program in the Chilean swordfish-directed longline fishery and provided circle hooks and technical support for experiments testing modified gear.
- Conducted capacity training exercises for fishers and boat captains from Peruvian artisanal fleets to educate them on safe handling and resuscitation techniques for comatose turtles incidentally captured in gillnet and longline gear.

Atlantic:
- Continued gear research to develop TEDs suitable for use in non-shrimp trawl fisheries such as the flynet, whelk, summer flounder, scallop, and sciaenid bottom trawl fisheries, as well as testing modifications for shrimp trawl TEDs.
- Continued TED outreach and training efforts with various foreign governments.
- Convened a workshop to review progress on TED gear research and discuss directions for future research in mid-Atlantic trawl fisheries.
- Identified a list of commercial fisheries in state and Federal waters that will be required to take observers upon NMFS' request.
- Continued coordination and support of the STSSN in the Atlantic Ocean and Gulf of Mexico.
- Conducted observer training workshops in West Africa to determine sea turtle bycatch in local fisheries.
- Provided scientific and technical advice on sea turtle nesting beach and bycatch projects in West Africa.
- Developed a sea turtle research and conservation strategy for the South Atlantic.

Priority Recovery Actions Needed: Priority recovery actions needed for the olive ridley sea turtle include the following:
- Support the use of large circle hooks in global longline fisheries and continue to identify other gear modifications and fishing practices to reduce bycatch in longline fisheries.
- Build capacity of foreign nations to monitor and reduce bycatch in pelagic and coastal fisheries.
- Improve understanding of the effects of commercial fishery harvest on key prey species.

Recovery Priority Number: 5 (*Breeding colony populations of Pacific coast of Mexico*); 5 (*Rangewide*)
The recovery priority number for the olive ridley sea turtle is 5. This represents a moderate magnitude of threat, a high recovery potential, and the presence of conflict with economic activities.

PACIFIC SALMON RECOVERY

Overview for 2008–2010

Salmon and Steelhead Listed Under the Endangered Species Act

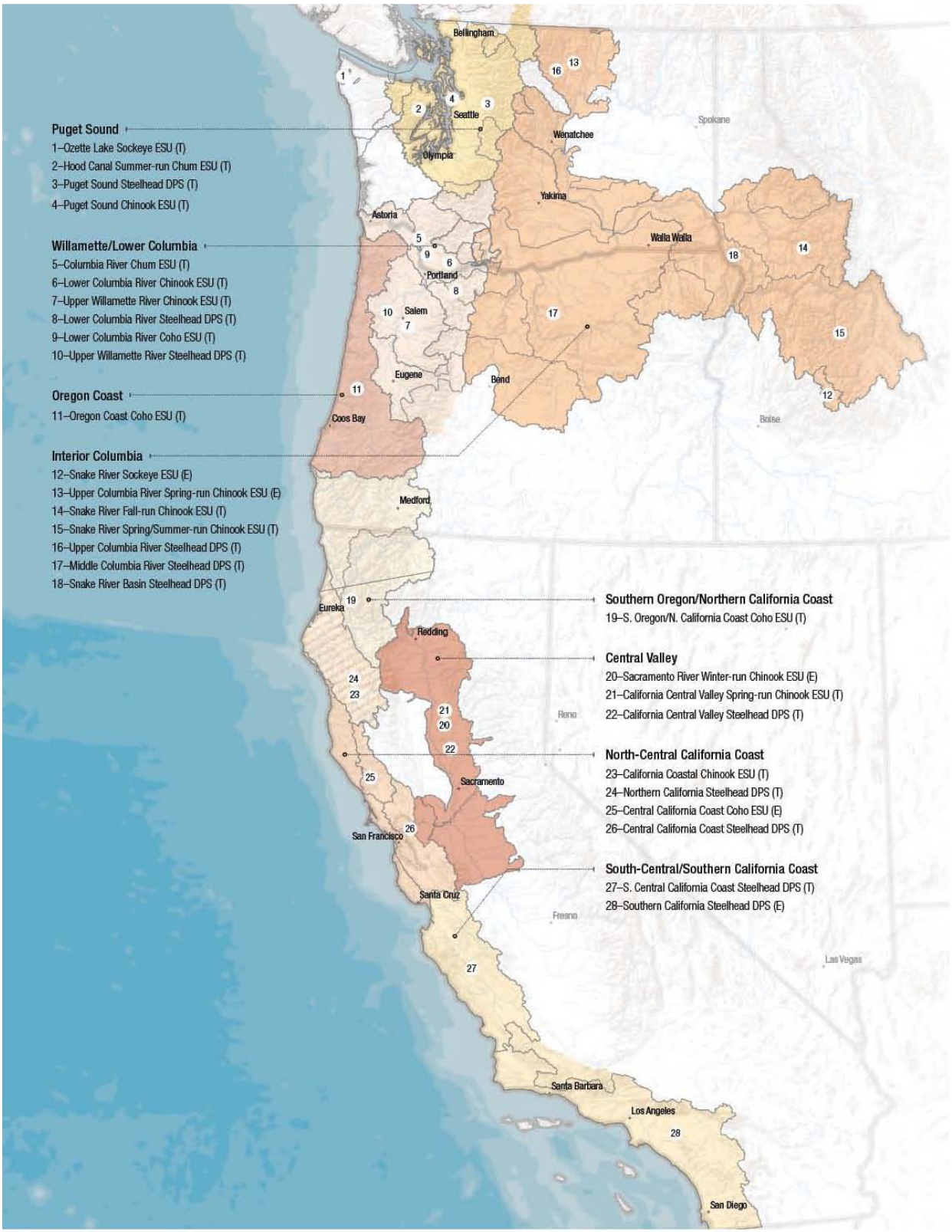
NMFS has identified 52 "species"—distinct population segments (DPS) or evolutionarily significant units (ESU)[4]—of Pacific salmon and steelhead on the West Coast of the United States. Of these 52 species, 28 are currently protected under the ESA (see "Listing Actions" below)—five are listed as endangered and 23 as threatened. Eighteen occur solely in the NMFS Northwest Region, nine occur solely in the NMFS Southwest Region, and the range of one ESU—the Southern Oregon/Northern California coast coho salmon—overlaps both Regions (Table 3). These species migrate along the West Coast as they grow to adults, before returning to the freshwater rivers where the adults spawn and their progeny are reared. Figure 6 shows the distribution of all ESA-listed Pacific salmon ESUs and steelhead DPSs by recovery domain.

Table 3. ESA Listing Status of Pacific Salmon and Steelhead.

Recovery Planning Domain	ESU/DPS	Current ESA Listing Status
Puget Sound	Puget Sound Chinook	*Threatened*
	Hood Canal Summer chum	*Threatened*
	Ozette Lake sockeye	*Threatened*
	Puget Sound steelhead	*Threatened*
Willamette/Lower Columbia	Upper Willamette River Chinook	*Threatened*
	Lower Columbia River Chinook	*Threatened*
	Lower Columbia River steelhead	*Threatened*
	Lower Columbia River coho	*Threatened*
	Columbia River chum	*Threatened*
	Upper Willamette River steelhead	*Threatened*
Interior Columbia	Upper Columbia River spring Chinook	*Endangered*
	Snake River spring/summer Chinook	*Threatened*
	Snake River fall Chinook	*Threatened*
	Upper Columbia River steelhead	*Threatened*
	Middle Columbia River steelhead	*Threatened*
	Snake River Basin steelhead	*Threatened*
	Snake River sockeye	*Endangered*
Oregon/N. California Coasts	Oregon Coast coho	*Threatened*
	Southern Oregon/Northern California Coast coho	*Threatened*
North-central California Coast	Central California coast coho	*Endangered*
	Northern California steelhead	*Threatened*
	California coastal Chinook	*Threatened*
	Central California coast steelhead	*Threatened*
South-central/Southern California Coast	South-central California coast steelhead	*Threatened*
	Southern California steelhead	*Endangered*
California Central Valley	Sacramento River winter-run Chinook	*Endangered*
	Central Valley spring-run Chinook	*Threatened*
	Central Valley steelhead	*Threatened*

[4] The ESA defines *species* as "... including any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature" (16 US.C. 1531-1544). NMFS refers to a distinct population segment of Pacific salmon as an "evolutionarily significant unit" under the ESA (56 FR 58612; November 20, 1991). The ocean-going (anadromous) steelhead has a related stream-dwelling (resident) life form that is under the jurisdiction of the U.S. Fish and Wildlife Service. The two forms delineate separate DPSs, and NMFS has listed the anadromous DPSs specified above as endangered or threatened pursuant to the ESA.

Figure 6. Distribution of ESA-Listed Pacific Salmon and Steelhead by Recovery Domain.



Recovery Planning Efforts for Pacific Salmon and Steelhead

Recovery planning is active for every listed species of Pacific salmon. Table 4 summarizes the status of ESA recovery plans for Pacific salmon and steelhead. NMFS believes it is critically important for the Pacific salmon recovery planning process to partner with the numerous federal, state, regional, tribal, local, and private conservation efforts already underway. Building on this collaborative effort, the agency has established a recovery planning process to include its partners and, to the extent practicable, capitalize on these ongoing efforts.[5] Through these local initiatives, salmon recovery plans bring people, processes, and resources together to guide investments toward a common goal of self-sustaining viable species of salmon and steelhead.

Table 4. Status of ESA Recovery Plan Development for Pacific Salmon and Steelhead.

Recovery Planning Domain	ESU/DPS	Recovery Plan underway	Co-manager & peer review completed	[6]Interim Regional Recovery Plan	Recovery Plan Proposed in Federal Register	Final ESA Recovery Plan Complete
Puget Sound	Puget Sound Chinook					✓
	Hood Canal Summer chum					✓
	Ozette Lake sockeye					✓
	Puget Sound steelhead	✓				
Willamette/Lower Columbia	Upper Willamette River Chinook				✓	
	Lower Columbia River Chinook			✓		
	Lower Columbia River steelhead			✓		
	Lower Columbia River coho		✓			
	Columbia River chum			✓		
	Upper Willamette River steelhead				✓	
Interior Columbia	Upper Columbia River spring Chinook					✓
	Snake River spring/summer Chinook	✓				
	Snake River fall Chinook	✓				
	Upper Columbia River steelhead					✓
	Middle Columbia River steelhead					✓
	Snake River Basin steelhead	✓				
	Snake River sockeye	✓				
Oregon/N. California Coasts	Oregon Coast coho	✓				
	Southern Oregon/Northern California Coast coho		✓			
North-central California Coast	Central California coast coho				✓	
	Northern California steelhead	✓				
	California coastal Chinook	✓				
	Central California coast steelhead	✓				
South-central/Southern California Coast	South-central California coast steelhead		✓			
	Southern California steelhead				✓	
California Central Valley	Sacramento River winter-run Chinook				✓	
	Central Valley spring-run Chinook				✓	
	Central Valley steelhead				✓	

[5] For more information on recovery activities, visit NMFS salmon recovery websites at http://www.nwr.noaa.gov/Salmon-Recovery-Planning/index.cfm and http://swr.nmfs.noaa.gov/salmon.htm.

[6] An Interim Regional Recovery Plan addresses portions of ESUs and DPSs and meets the requirements of the ESA for those areas. It has been announced in the *Federal Register*. It is interim until a final plan can be developed that addresses the entire ESU and DPS. It includes a locally developed plan with stakeholder buy-in and a NMFS supplement that clarifies and expands on ESA recovery requirements.

To develop recovery plans that meet ESA statutory requirements as well as goals for local involvement, NMFS organized the 28 listed species into eight recovery areas or "domains." Recovery domains in the Northwest Region are Puget Sound, Willamette/Lower Columbia, Interior Columbia, and Southern Oregon/Northern California Coast. Domains in the Southwest Region are the Southern Oregon/Northern California Coast (SONCC), North-Central California Coast, California Central Valley, and South-Central/ Southern California Coast (Figure 6). Recovery planning for the SONCC domain is managed jointly by NMFS' Northwest and Southwest Regions.

For each domain, NMFS convened technical recovery teams (TRTs), composed of regional technical experts and NMFS scientists. NMFS' intent in establishing TRTs was to seek unique geographic and species expertise and to develop a solid scientific foundation for the recovery plans. NMFS asked the TRTs to develop recommendations on biological viability criteria for each ESU/DPS and its component populations; evaluate the status of each ESU/DPS relative to viability criteria; provide scientific support to local and regional recovery planning efforts; and provide scientific evaluations and peer review of recovery plans. In the Northwest and Southwest Regions, the TRTs have developed either draft or final viability criteria for all listed species except Puget Sound steelhead, which was listed in May 2007.

In all of the Northwest Region's recovery domains except Idaho, local stakeholder groups made up of local governments, tribes, and other public and private stakeholders have taken the lead for developing recovery plans. In Idaho, NMFS is working with the state to prepare a recovery plan that is endorsed by the state, tribes, and multiple stakeholders. In the Southwest Region, NMFS staff are preparing recovery plans with the active engagement and support of the State of California, other federal agencies, and numerous tribes and stakeholders. In all cases, the TRT products are being used to develop recovery goals and criteria for delisting, assess limiting factors, and prioritize and sequence actions to address the limiting factors.

Listing Actions

On August 24, 2009, NMFS announced a change in status for the Upper Columbia River steelhead (74 FR42605). In January 2006, we reclassified the Upper Columbia River steelhead from endangered to threatened based on an updated review that noted increasing steelhead abundance, more widespread spawning, and artificial propagation programs aimed at improving local adaptation and diversity within the range of this DPS (71 FR 834; January 5, 2006). In April 2006, our decision to downlist this from endangered to threatened was challenged in the U.S. District Court for the Western District of Washington. On June 13, 2007, the district court ruled that we had erred in downlisting Upper Columbia River steelhead, concluding that we had not given appropriate consideration to self-sustaining natural populations (*Trout Unlimited v. Lohn,* C06-0483-JCC, 2007). The result of this ruling was to return Upper Columbia River steelhead to endangered status. We appealed that decision to the U.S. Court of Appeals for the Ninth Circuit and, on March 16, 2009, that court ruled that our downlisting did not violate the ESA. Accordingly, on June 18, 2009, the district court revised its ruling, effectively re-instating Upper Columbia River steelhead to threatened status under the ESA.

On April 29, 2010, we announced that we conducted a new status and listing determination for the Oregon Coast coho salmon ESU (74 FR 19528). We first proposed to list the Oregon Coast coho salmon ESU as threatened under the ESA in 1995 (60 FR 38011; July 25, 1995). Since then, we have completed several status reviews for this ESU, and its listing classification has changed between threatened and not warranted for listing a number of times. As part of a litigation settlement, we agreed to conduct a new status review for this ESU. On May 26, 2010, we announced the result of the status review and proposed to retain the threatened listing for this ESU (75 FR 29489). We plan to issue a final rule for this listing determination in 2011.

Critical Habitat

Critical habitat is presently designated for all ESA-listed salmon ESUs and steelhead DPSs except Puget Sound steelhead and Lower Columbia River coho. We are currently developing a proposal to designate critical habitat for these two ESUs.

The specific areas designated as critical habitat in the Northwest Region include approximately 30,085 miles (48,417 km) of lake, riverine, and estuarine habitat in the three northwestern states, as well as approximately 2,312 miles (3,721 km) of marine nearshore habitat in Puget Sound, Washington. The specific areas designated as critical habitat in the Southwest Region include approximately 10,052 miles (16,177 km) of riverine habitat and 470 square miles (1,212 sq km) of estuarine habitat within the geographic areas occupied by the listed species. In February 2008, NMFS designated critical habitat for the Oregon Coast coho ESU (73 FR 7816, NMFS 2008a), including 6,568 miles (10,570 km) of riverine habitat, and 15 square miles (38.8 sq km) of lake habitat.

Five-Year Reviews

NMFS completed its most recent listing determinations for Pacific salmon and steelhead in 2005. The ESA requires that, at least every 5 years, NMFS shall conduct a review of all ESA-listed species and determine whether any species should: (1) be removed from such list, (2) be changed in status from an endangered species to a threatened species, or (3) be changed in status from a threatened species to an endangered species. On March 18, 2010, NMFS announced the initiation of 5-year reviews for 16 ESUs of Pacific salmon and 11 DPSs of steelhead (75 FR 13082). The 5-year reviews will consider the best scientific and commercial data available and new information that has become available since the last listing determinations. The Northwest and Southwest Fisheries Science Centers will assist the Northwest and Southwest Regions in gathering and analyzing this information. NMFS plans to announce the results of our 5-year review process in 2011.

This biennial report includes much of the preliminary scientific information we will use to reach conclusions during the 5-year reviews. We will present much of the new information on salmon and steelhead abundance, productivity, spatial structure, and diversity.

Limiting Factors and Threats

Population declines and extirpations of Pacific salmon and steelhead are the result of numerous factors affecting habitat (such as hydropower development, land development, resource extraction, timber harvest practices, and other land uses), as well as effects from harvest, hatchery practices,[7] natural variation in ocean-climate conditions, and other factors such as predation and the introduction of non-native species. These threats and limiting factors affect each listed species differently, and no single factor is solely responsible for declines. Furthermore, it is difficult to quantify precisely the relative contribution of any one threat or factor to the decline of a given listed species. Each recovery plan evaluates the role of limiting factors and threats specific to the ESU/DPS and its component populations and identifies site-specific actions to address those factors.

Human Population Growth

Regional population growth is projected to continue and poses a potential threat to listed salmon and steelhead in both the Northwest and Southwest Regions. According to the U.S Census Bureau, California's population alone is expected to increase from 34 million people in 2000 to more than 48 million people by 2030. Over the same time frame, the combined human populations of Oregon and Washington are expected to increase from 9 million to over 13 million people. The implications of this growth include increased demand for land, water, and hydroelectricity, all of which have the potential to exacerbate factors that limit species' viability.

[7] Potential negative aspects of hatchery-bred fish include competition for food, altered genetic diversity of natural populations and changes in fitness and productivity, domestication, outbreeding depression, homogenization, and reduction in effective population size (Berejikian et al. 2008). Hatchery fish can also benefit recovery by reducing extinction risk and/or by promoting conservation when combined with actions that reduce limiting factors. Hatchery fish can augment individuals from native populations to support harvest and meet tribal treaty fishing rights.

Climate Change

Climate change represents a potentially significant threat to the recovery of listed species. Changes in climate may adversely affect habitat quality and quantity, water quantity (lower summer streamflows), and water quality (higher summer water temperatures). Warmer temperatures could result in more precipitation falling as rain rather than snow. In addition, snow pack may diminish and the timing of stream flow could be altered. Changes in environmental conditions could affect salmon and steelhead health and survival in the ocean through a variety of mechanisms, including increased ocean temperatures, increased stratification of some waters, changes in the ocean upwelling, shifts in the distribution of salmon and steelhead, greater prevalence of disease, and increased acidity, among others (ISAB 2007).

ESA Activities Contributing to Recovery

Many federal and non-federal actions are regulated by the ESA in order to help alleviate the many threats to listed species. The contributions of the ESA's statutory and regulatory tools are summarized below.

4(d) Rule Activities

ESA section 9(a)(1) prohibits "take" and import/export of, and commercial transactions involving, all species listed as endangered. *Take* is defined under the ESA as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct" (Section 3(19)). In the case of threatened species, section 4(d) of the ESA directs the Secretary of Commerce to issue regulations he or she deems necessary and advisable for the conservation of the species. The 4(d) protective regulations may prohibit, with respect to threatened species, some or all of the acts that section 9(a)(1) of the ESA prohibits with respect to endangered species. These 9(a)(1) prohibitions and 4(d) regulations apply to all individuals, organizations, and agencies subject to U.S. jurisdiction. Under section 4(d), NMFS has tailored specific "limits" or exemptions from the take prohibitions applicable to threatened Pacific salmonids to authorize certain activities, provided they are consistent with conservation and recovery needs. The Northwest and Southwest Regions have approved hundreds of programs and activities under the 4(d) protective regulations, ensuring that hatchery and harvest management plans, habitat restoration projects in Washington State, resource management plans, road maintenance activities, and tribal resource management plans benefit threatened West Coast salmonids.

Section 7 Activities

Under section 7 of the ESA, NMFS conducts hundreds of informal and formal consultations every year with federal agencies that authorize, fund, or carry out actions that may affect Pacific salmon. In FY 2008 to 2010, the Northwest Region conducted 1,324 section 7 consultations, and the Southwest Region conducted 589. These consultations ensure federal actions are conducted in ways that are not likely to jeopardize the continued existence of listed species or to adversely modify or destroy critical habitat. The scope of section 7 consultations includes actions related to land and water management, transportation, restoration, fill and removal of materials in stream channels, hydropower operations, hatchery operations, and fishery management.

Section 10 Activities

Section 10 of the ESA provides authorization for take that may occur as a part of otherwise lawful activities carried out by non-federal entities (e.g., timber harvest, water supply management, and other resource extraction and land management activities) or as part of scientific research or enhancement activities. Such authorization allows those conducting such activities to proceed with the certainty of ESA compliance and ensures that any adverse impacts caused to listed species are being avoided, minimized, mitigated, and monitored.

Pacific Coastal Salmon Recovery Fund

The Pacific Coastal Salmon Recovery Fund (PCSRF) was established by Congress in FY 2000 to assist state, local, and tribal salmon recovery efforts. The goal of the PCSRF is to make significant contributions to the conservation and restoration of healthy and sustainable Pacific salmon runs and the habitats on which they

depend. The PCSRF has funded many successful projects that are beginning to show direct benefits, such as salmon using newly accessible or improved habitat. A majority of the PCSRF funds have been spent on habitat restoration activities, as this is a significant need for salmon recovery. The PCSRF program has also filled a vital need by supporting regional and locally based recovery planning and building organizational infrastructure, so the long-term goal of salmon recovery can be achieved. Since the program's inception in FY 2000, Congress has appropriated a total of $804.9 million for restoration projects in Alaska, Washington, Oregon, California, Idaho, and Nevada. The states have provided over 33 percent matching funds to these federal funds. Since FY 2000, over 8,000 projects have been funded for habitat protection and restoration; watershed and sub-basin planning and assessment; research, monitoring, and evaluation; and public outreach and education. Over 6,600 instream and riparian stream miles have been treated, over 1,900 barriers to fish passage have been removed opening over 4,400 miles of habitat, and over 695,000 acres of habitat have been created, treated or protected. The 2010 PCSRF report is currently available at http://www.nwr.noaa.gov/Salmon-Recovery-Planning/PCSRF/upload/PCSRF-Rpt-2010.pdf

Puget Sound Chinook ESU (*Oncorhynchus tshawytscha*)

Date Listed: March 24, 1999; reaffirmed June 28, 2005

Legal Status: Threatened

Recovery Plan Status: The Shared Strategy for Puget Sound—a coalition of tribes, governments, and stakeholders—provided a locally developed recovery plan for Puget Sound salmon to NMFS in June 2005. NMFS published a *Federal Register* Notice of Availability for a proposed recovery plan for the Puget Sound Chinook ESU in December 2005 (70 FR 76445, NMFS 2005). The final recovery plan for this ESU, including the NMFS Final Supplement, was published in January 2007.

Technical Recovery Team Products: The Puget Sound Technical Recovery Team (TRT) produced an independent-population identification report, draft ESU and population viability recommendations, review notes for watershed recovery plan reviews, and technical guidance for local recovery planners.

Species Status: All Puget Sound Chinook populations are well below the Puget Sound TRT planning range for recovery escapement levels. Most populations are also consistently below the spawner recruit levels identified by the TRT as consistent with recovery. Across the ESU, most populations have declined in abundance somewhat since the last status review in 2005, and trends since 1995 are mostly flat. Several of the risk factors identified by Good et al. (2005) are also still present, including high fractions of hatchery fish in many populations and widespread loss and degradation of habitat. Many of the habitat and hatchery actions identified in the Puget Sound Chinook salmon recovery plan are expected to take years or decades to be implemented and to produce significant improvements in natural population attributes, and these trends are consistent with these expectations.

Limiting Factors and Threats: Limiting factors and threats to the Puget Sound Chinook salmon ESU include the following:

- *Degraded nearshore and estuarine habitat*: Nearshore and estuarine habitat throughout the ESU has been altered and lost as a result of human activities. Residential and commercial development has reduced the amount of functioning habitat available for salmon rearing and migration. The loss of mudflats, eelgrass meadows, and macroalgae further limits salmon foraging and rearing opportunities in nearshore and estuarine areas.
- *Degraded freshwater habitat:* Floodplain connectivity and function, channel structure and complexity, riparian areas and large wood supply, stream substrate, and water quality have been degraded as a result of cumulative impacts of agriculture, forestry, and development.
- *Anadromous salmonid hatchery programs:* Salmon and steelhead released from Puget Sound hatcheries operated for harvest augmentation purposes pose ecological, genetic, and demographic risks to natural-origin Chinook salmon populations.
- *Salmon harvest management:* Total fishery exploitation rates have decreased 14 to 63 percent from rates in the 1980s, but weak natural-origin Chinook salmon populations in Puget Sound still require enhanced protective measures to reduce the risk of overharvest in Chinook salmon–directed fisheries.

Conservation Actions: Major accomplishments from 2008 to 2010 for this ESU include the following:

- *Improved forest management practices on non-federal lands:* The Northwest Forest Plan Aquatic Conservation Strategy is designed to conserve and restore salmon and steelhead habitat, and provides an anchor for federal lands' contribution to salmon recovery. In addition, implementation of the Forest Practices Habitat Conservation Plan (HCP), which covers 9.3 million acres of private timber land in

Washington and which NMFS approved in 2005, is well underway. The plan ensures functional watershed conditions and riparian habitats as state forest practice rules are implemented for the recovery of listed salmonids. In addition, a separate HCP for Washington State Forest Trust Lands provides assurances for a high level of ecological function on those state forest lands.

- *Approved 4(d) limit for the Washington State Department of Transportation Routine Road Maintenance activities:* The limit is implemented by local governments.
- Instream flows on two rivers are assured by separate HCPs being implemented by the cities of Seattle and Tacoma.
- *Planned dam removal:* Completed ESA section 7 consultation with the Olympic National Park on the removal of two dams on the Elwha River that have blocked salmon access to 70 miles of habitat since the early 1900s. The removal of these two dams beginning in 2012 will greatly aid salmon recovery in this system. The project will restore freshwater habitat access, improve habitat conditions within the watershed, and improve estuary habitat at the mouth of the Elwha River.
- *Improved harvest and hatchery management:* The Puget Sound Harvest Plan includes harvest objectives consistent with optimizing habitat potential and integrating hatchery objectives. Harvest objectives were revised to be consistent with what is known of the productivity in the various watersheds and the contribution of hatchery spawners. The harvest plan also includes implementation, monitoring, and evaluation procedures designed to ensure fisheries are consistent with fishery objectives for conservation and resource use. Co-managers have also implemented time, area, and gear restrictions to maximize harvest opportunity on hatchery and healthy listed Chinook populations and to minimize impacts on weaker populations. These actions include complete closure of some terminal fisheries, non-retention of Chinook, and selective fishing techniques. Several conservation hatchery programs have been implemented to preserve severely depressed Chinook populations while habitat needed to sustain the populations in a natural state is restored.
- *Negotiated a new Chinook harvest agreement as part of the Pacific Salmon Treaty re-negotiations:* The United States achieved significant harvest reductions in west coast Canadian fisheries that will complement ongoing U.S. harvest measures to benefit listed Puget Sound populations.
- *Implemented hatchery management modifications:* The implementation of hatchery reform measures—based to a significant extent on recommendations developed independently by the Hatchery Scientific Review Group (HSRG) and resulting from consultations between hatchery co-managers and NMFS—has led to operational changes that are expected to benefit natural Chinook populations. Specific threat-reduction measures for hatcheries to benefit natural populations are provided in two co-manager Puget Sound hatchery resource management plans and 115 Hatchery and Genetic Management Plans submitted to NMFS for evaluation and determination through the National Environmental Policy Act (NEPA) and ESA processes.
- Washington's Puget Sound Partnership completed its 2020 Action Agenda, establishing a blueprint for recovery of the Puget Sound Ecosystem by 2020.
- Approximately $110.3 million was awarded for 212 habitat restoration and protection projects.
- Also during 2008–2010, restored 762 acres in the Nisqually Estuary with the completion of the exterior dikes initiated in 2008.
- Began hatchery supplementation for the South Fork Nooksack population.
- Began hatchery supplementation for the South Fork Stillaguamish population.
- Removed five fish passage barriers and funded 26 fish passage barrier projects.
- Funded 14 projects for riparian habitat invasive-species restoration.
- Restored 7.96 miles of stream access and funded 46 stream access restoration projects.
- Funded 43 projects for wetland habitat restoration.
- Restored 9 acres of estuarine and freshwater habitat infested with invasive species and funded 89 projects for estuarine and freshwater habitat invasive species restoration.
- Restored 78.1 acres of estuarine and freshwater habitat and funded 105 projects for estuarine and freshwater habitat restoration.
- Restored 23.37 miles of instream habitat and funded 235 instream habitat restoration projects.
- Protected 8.22 miles of stream bank and funded 69 stream bank protection projects.

Priority Recovery Actions Needed: Priority recovery actions needed for this ESU include the following:

- Restore degraded floodplain and channel structure.
- Restore and protect estuarine habitat.
- Improve and restore degraded riparian forests and increase large woody debris recruitment.
- Restore natural sediment routing processes.
- Improve water quality, particularly stormwater from paved surfaces and developed lands.
- Curtail nearshore habitat loss and restore nearshore habitat quality.
- Restore natural hydrologic processes and improve flow management.
- Continue to apply measures that reduce the risk of adverse effects from hatchery and harvest management activities to survival and recovery.
- Continue to implement conservation hatchery programs that preserve at-risk Chinook salmon populations, preventing their extinction until natural habitat can be restored.
- Continue to implement hatchery operational and management measures developed by the co-managers, NMFS, and following recommendations from the HSRG, to reduce the risk of hatchery-related genetic, ecological, and demographic risks to natural-origin Chinook salmon populations.
- Continue to manage Puget Sound fisheries to meet Rebuilding Exploitation Rates developed by NMFS and the co-managers to manage harvests at levels appropriate for the rebuilding of natural-origin Chinook salmon populations to abundances that will meet spawning escapement targets and sustain fisheries.

Recovery Priority Number: 1

With a high magnitude of threat, high recovery potential, and the presence of conflict, this ESU has been assigned a recovery priority number of 1. The magnitude of threat to this ESU has been classified as high because of strong risks to its abundance, productivity, spatial structure, and diversity (which largely have persisted since its status was first reviewed), and because this ESU faces a strong extinction risk in the foreseeable future. This ESU does not meet the criteria for a moderate magnitude of threat (which stipulate that the species will not face extinction if recovery is temporarily held off, although there is a continuing population decline or threat to its habitat). Delaying implementation of actions to recover this ESU would likely result in a mounting extinction risk rather than maintaining the status quo level of risk. The recovery potential for this ESU has also been classified as high. Although numerous factors limit the recovery of this ESU, the source of these factors and their demographic impacts are somewhat understood and recovery planning is being implemented. Although it would be cost-prohibitive to completely address every limiting factor, there is a general belief that integrated reduction of most threats can eventually achieve recovery of this ESU. Finally, as a complex variety of activities and management practices continue to affect the conservation and recovery of all Pacific salmon ESUs listed under the ESA, NMFS has determined "conflict" exists with regard to this ESU. Taken together, these three factors correspond to a recovery priority number of 1.

Hood Canal Summer-Run Chum ESU (*Oncorhynchus keta*)

Date Listed: March 25, 1999; reaffirmed June 28, 2005

Legal Status: Threatened

Recovery Plan Status: The Hood Canal Coordinating Council (a regional council of governments) provided NMFS a locally developed recovery plan for Hood Canal Summer Chum in November 2005. NMFS published a Notice of Availability for the proposed recovery plan for the Hood Canal Summer Chum ESU in the *Federal Register* in August 2006 (71 FR 47180, NMFS 2006a). The final ESA Hood Canal Summer Chum Recovery Plan, with the NMFS Final Supplement to the Plan, was published in the *Federal Register* in May 2007.

Technical Recovery Team Products: The Puget Sound TRT identified two independent populations of Hood Canal Summer Chum and established draft population and ESU viability criteria in February 2007.

Species Status: The spawning abundance of the Hood Canal summer-run chum salmon has clearly increased since the time of listing, although the recent abundance is down from the previous 5 years. While spawning abundances have remained relatively high compared to the low levels in the early 1990s, productivity has decreased significantly for the past 5 brood years, being lower for brood years 2002–2006 than any previous 5-year average since 1971. This is a concern for future production. The increase in abundance and decrease in productivity suggest that improvements in habitat and ecosystem function are needed. Diversity is increasing from the low values seen in the 1990s due both to the reintroduction of spawning aggregates into formerly occupied coastal streams and the more uniform relative abundance between populations. This is a good sign for viability in terms of spatial structure and diversity. Spawning survey data show that the spawning distribution within most streams has been extended further upstream as abundance has increased (WDFW and PNPTT 2007). Overall, the new information considered does not indicate a change in the biological risk category since the time of the last status review.

Limiting Factors and Threats: Limiting factors and threats to the Hood Canal Summer-Run Chum ESU include the following:

- Nearshore and estuarine habitat throughout the ESU has been altered by human activities. Nutrient loading disturbs the ecosystem's natural nutrient and sediment balance. The low dissolved oxygen levels that result from nutrient loading can kill or stress marine organisms, including salmon. Residential and commercial development has reduced the amount of functioning habitat available for salmon rearing and migration. The loss of mudflats, eelgrass meadows, and macroalgae further limits salmon foraging and rearing opportunities in nearshore and estuarine areas.
- *Degraded freshwater habitat*: floodplain connectivity and function, channel structure and complexity, riparian areas and large wood supply, stream substrate, and stream flow have been degraded as a result of cumulative impacts of agriculture, forestry, and development.

Conservation Actions: Major accomplishments from 2008 to 2010 for this ESU include the following:

- Conducted collaborative habitat restoration efforts with the Washington Department of Fish and Wildlife and the Point No Point Treaty Council; projects in the Jimmycomelately Creek in partnership with the Jamestown S'Klallam tribes; and other projects in the Quilcene, Snow/Salmon, Chimacum, Tahuya, and Dewatto watersheds.
- Implemented eight ESA-approved conservation hatchery programs that preserved at-risk populations, bolstered the abundance of naturally spawning and natural-origin fish, and reintroduced summer chum salmon spawning in two watersheds where the native populations had become extirpated. Implemented measures at hatcheries producing other salmon species that reduce the risk of adverse impacts to summer chum salmon.
- Continued to implement the Harvest Management component of the Summer Chum Salmon Conservation Initiative. Approved under ESA 4(d) Rule limit 6 in 2001, the plan establishes an annual fishing regime designed to minimize incidental take of summer chum salmon, while providing an opportunity for fisheries harvesting other salmon species. The regime includes complete closure of some terminal fisheries, non-retention of summer chum, and gear restrictions. Harvest rates in both the United States and Canada have been well below expectations.
- Improved forest management practices on non-federal lands: implementation of forest practices consistent with the Washington Forest and Fish Agreement, to which NMFS is a party, will improve aquatic habitat conditions for fish and wildlife on state and private timber lands in Washington State.
- Approved 4(d) limit for the Washington State Department of Transportation Routine Road Maintenance activities. The limit is implemented by local governments.
- Completed several sections of the final Hood Canal Summer Chum salmon recovery plan. The Hood Canal Coordinating Council completed these sections of the plan.

Priority Recovery Actions Needed: Conservation and recovery actions needed for this ESU include the following:

- Restore degraded floodplain and channel structure.
- Restore and protect estuarine habitat.
- Restore degraded riparian forest and enhance large woody debris recruitment.
- Restore natural sediment routing processes.
- Restore natural hydrologic processes and improve flow management.
- Continue to implement recovery-directed hatchery and harvest management actions.

Recovery Priority Number: 1

With a high magnitude of threat, high recovery potential, and the presence of conflict, this ESU has been assigned a recovery priority number of 1. The magnitude of threat to this ESU has been classified as high because of strong risks to its abundance, productivity, spatial structure, and diversity (which largely have remained the same since its status was first reviewed), and the fact that this ESU faces a strong extinction risk in the foreseeable future. This ESU does not meet the criteria for a moderate magnitude of threat (which stipulate that the species will not face extinction if recovery is temporarily held off, although there is a continuing population decline or threat to its habitat). Delaying recovery for this ESU would likely result in mounting extinction risks rather than maintaining the status quo level of risk. The recovery potential for this ESU has also been classified as high. Although numerous factors limit the recovery of this ESU, the source of these factors and their demographic impacts are relatively well understood and recovery planning is currently underway. Although it may be cost-prohibitive to completely address every limiting factor, it is likely that integrated reduction of most threats can achieve recovery of this ESU. Finally, as a complex variety of activities and management practices continue to impact the conservation and recovery of all Pacific salmon ESUs listed under the ESA, NMFS has determined "conflict" exists with regard to this ESU. Taken together, these three factors correspond to a recovery priority number of 1.

Ozette Lake Sockeye ESU (*Oncorhynchus nerka*)

Date Listed: March 25, 1999; reaffirmed June 28, 2005

Legal Status: Threatened

Recovery Plan Status: A proposed recovery plan was noticed for public comment on April 23, 2008 (73 FR 21913, NMFS 2008b) and a final recovery plan was adopted on May 29, 2009 (74 FR 25706).

Species Status: Estimates of population data for Lake Ozette sockeye remain highly variable and uncertain. This makes it impossible to detect changes in abundance or in productivity in recent years. It is obvious, though, that population levels remain very low compared to historical levels when harvest on these stocks was plentiful. Assessment methods must improve in order to evaluate the status of this ESU and its responses to recovery actions.

Limiting Factors and Threats: Limiting factors and threats to the Ozette Lake sockeye ESU include the following:

- *Degraded freshwater habitat*: floodplain connectivity and function, channel structure and complexity, riparian areas and large wood supply, lake beach spawning habitat, and stream substrate have been degraded as a result of cumulative impacts of forest practices, agriculture, and development.
- *Predation*: harbor seals and river otters, and predaceous non-native and native fish species, are having an adverse effect on the abundance of adult fish that successfully spawn, and on the abundance of sockeye smolts escaping seaward from the watershed each year.

Conservation Actions: Major accomplishments from 2008–2010 for this ESU include the following:

- Conducted quarterly multi-stakeholder Steering Committee meetings to develop and implement the Lake Ozette Sockeye Recovery Plan adopted on May 29, 2009.
- Implemented a conservation hatchery program under the ESA-approved joint tribal-state Lake Ozette Sockeye Salmon Resource Management Plan that established a naturally spawning sockeye aggregation in an Ozette Lake tributary, and led to the collection of sockeye salmon life history and status information needed for recovery planning.
- Approved the Washington State Department of Transportation's Routine Road Maintenance 4(d) limit and its implementation by Clallam County.
- Implemented forest practices consistent with the Washington Forest and Fish Agreement, to which NMFS is a party, which will improve aquatic habitat conditions for fish and wildlife on state and private timber lands in Washington State.
- Continued harvest restrictions in place since the early 1980s specifying that no fisheries directed at Ozette Lake sockeye will occur until the population is recovered.

Priority Recovery Actions Needed: Conservation and recovery actions needed for this ESU include the following:

- Implement the recovery plan by developing action implementation and research/monitoring priorities and schedules and pursuing funding for plan actions.
- Restore natural sediment routing processes.
- Restore large woody debris recruitment and riparian habitat.
- Restore degraded tributary and river habitat structure.

- Control harbor seal, river otter, and fish predation.
- Restore natural river and lake hydrologic processes.
- Restore lake beach spawning habitat.

Recovery Priority Number: 1

With a high magnitude of threat, high recovery potential, and the presence of conflict, this ESU has been assigned a recovery priority number of 1. The magnitude of threat to this ESU has been classified as high, because of strong risks to its abundance, productivity, spatial structure, and diversity (which largely have persisted since its status was first reviewed), and the fact that this ESU faces a strong extinction risk in the foreseeable future. This ESU does not meet the criteria for a moderate magnitude of threat (which stipulate that the species will not face extinction if recovery is temporarily held off, although there is a continuing population decline or threat to its habitat). Delaying recovery for this ESU would likely result in mounting extinction risks rather than maintaining the status quo level of risk. The recovery potential for this ESU has also been classified as high. Although numerous factors limit the recovery of this ESU, the source of these factors and their demographic impacts are relatively well understood and recovery planning is currently underway. Although it may be cost-prohibitive to completely address every limiting factor, it is likely that integrated reduction of most threats can achieve recovery of this ESU. Finally, as a complex variety of activities and management practices continue to affect the conservation and recovery of all Pacific salmon ESUs listed under the ESA, NMFS has determined "conflict" exists with regard to this ESU. Taken together, these three factors correspond to a recovery priority number of 1.

Puget Sound Steelhead DPS (*Oncorhynchus mykiss*)

Date Listed: May 11, 2007

Legal Status: Threatened

Recovery Plan Status: NFMS convened a TRT early in 2008 to identify the historical spawning populations of *O. mykiss* in Puget Sound and establish viability criteria for the listed DPS. That work is underway.

Concurrent with the creation of the TRT, NMFS Northwest Regional Office began recovery planning for listed *O. mykiss*. NMFS drafted a recovery plan framework and initiated outreach to other recovery planning efforts in Puget Sound. NMFS anticipates continued coordination with the Puget Sound Partnership's Salmon Recovery Council, Washington Department of Fish and Wildlife, Puget Sound tribal governments, and other interested parties as recovery plan development for Puget Sound steelhead proceeds.

Upon completion of the population identification and viability criteria by the Puget Sound Steelhead TRT, NMFS will develop a draft recovery plan, including site specific actions necessary to achieve recovery of the DPS.

Technical Recovery Team Products: The Puget Sound Steelhead TRT is identifying the historical spawning populations of Puget Sound steelhead within the listed DPS. Once that effort is concluded and populations are identified, the TRT will establish the viability criteria for Puget Sound steelhead.

Species Status: NMFS determined that all naturally spawned winter-run and summer-run steelhead populations within the Puget Sound DPS are threatened. The Puget Sound steelhead range extends from the river basins of the Strait of Juan de Fuca, Puget Sound, and Hood Canal, Washington, bounded to the west by the Elwha River and to the north by the Nooksack River and Dakota Creek (inclusive). The listed group of steelhead includes only anadromous (ocean-going) forms of *O. mykiss*, but not resident forms (commonly called rainbow trout). The listed DPS also includes two winter-run steelhead hatchery stocks: the Green River natural and Hamma Hamma River stocks.

The status of the listed Puget Sound steelhead DPS has not changed substantially since the 2007 listing. Most populations within the DPS are showing continued downward trends in estimated abundance, a few sharply so. Most of the demographically independent populations of steelhead in Puget Sound show declining redd counts, typically 3 to 10 percent annually. Extinction risk within 100 years for most populations in the DPS is estimated to be moderate to high, especially for populations in the putative South Sound and Olympic Major Population Groups tentatively identified by the Puget Sound Steelhead TRT. This indicates that steelhead in the Puget Sound DPS remain at risk of extinction throughout all or a significant portion of their range in the foreseeable future, but are not currently in danger of imminent extinction.

Limiting Factors and Threats: Primary biological concerns include: (1) the widespread declines in adult abundance (total run size), despite significant reductions in harvest in recent years; (2) the threats to diversity posed by use of two hatchery steelhead stocks (Chambers Creek and Skamania) inconsistent with wild stock

diversity throughout the DPS; (3) the declining diversity in the DPS, including the uncertain but weak status of summer-run fish in the DPS; and (4) a reduction in spatial structure for steelhead in the DPS.

Habitat utilization by steelhead has been most affected by reductions in habitat quality and by fragmentation. A number of large dams in Puget Sound basins have affected steelhead. In addition to eliminating accessibility to habitat, dams affect habitat quality through changes in river hydrology, temperature profile, downstream gravel recruitment, and the movement of large woody debris. Many of the lower reaches of rivers and their tributaries in Puget Sound have been dramatically altered by urban development. Urbanization and suburbanization have resulted in the loss of historical land cover in exchange for large areas of impervious surface (buildings, roads, parking lots, etc.).

The loss of wetland and riparian habitat has dramatically changed the hydrology of many urban streams. This shift in hydrology results in a reduction in floodplain connectivity and function, which increases flood frequency and peak flow during storm events, and results in decreases in groundwater-driven summer flows. Flood events result in gravel scour, bank erosion, and sediment deposition. Land development for agricultural purposes has also altered the historical land cover. However, because much of this development took place in river floodplains, there has been a direct impact on river morphology. River braiding and sinuosity have been reduced through the construction of dikes, hardening of banks with riprap, and channelization of the mainstem. Constriction of rivers, especially during high flow events, increases likelihood of gravel scour and dislocation of rearing juveniles.

Conservation Actions: Major accomplishments from 2008 to 2010 for this DPS include the following:

- Improved forest management practices on non-federal lands: implementation of forest practices consistent with the Washington Forest and Fish Agreement, to which NMFS is a party, will improve aquatic habitat conditions for fish and wildlife on state and private timber lands in Washington State.
- Approved 4(d) limit for the Washington State Department of Transportation Routine Road Maintenance activities. The limit is implemented by local governments.
- Planned dam removal: Completed ESA section 7 consultation with the Olympic National Park on the removal of two dams on the Elwha River that have blocked salmon access to 70 miles of habitat since the early 1900s. The removal of these two dams beginning in 2012 will greatly aid salmon and steelhead recovery in this system. The project will restore freshwater habitat access, improve habitat conditions within the watershed, and improve estuary habitat at the mouth of the Elwha River.
- Improved harvest and hatchery management: NMFS worked with the Washington State and Puget Sound tribal co-managers on the development of a harvest management plan for Puget Sound wild steelhead. We are currently reviewing the plan for consistency with ESA requirements.
- Implemented hatchery management modifications: the implementation of hatchery reform measures—based to a significant extent on recommendations developed independently by the HSRG, and resulting from consultations between hatchery co-managers and NMFS—has led to operational changes, including the recent implementation of six native stock conservation hatchery programs, cessation of truck planting of hatchery steelhead that has previously led to increased straying, and increased use of weirs to remove hatchery fish. These measures are expected to benefit natural steelhead populations. Other specific threat-reduction measures for hatcheries that will benefit natural populations are being developed by the co-managers in 18 Hatchery and Genetic Management Plans under review through ongoing NEPA and ESA evaluation processes.

Priority Recovery Actions Needed: Priority recovery actions needed for this ESU include the following:

- Restore degraded floodplain and channel structure.
- Improve and restore degraded riparian forests and increase large woody debris recruitment.
- Restore natural sediment routing processes.
- Improve water quality, particularly stormwater from paved surfaces and developed lands.
- Restore natural hydrologic processes and improve flow management.

- Continue to apply measures that reduce the risk of adverse effects from hatchery and harvest management activities to survival and recovery.
- Continue implementation of steelhead and salmon hatchery risk minimization measures that will reduce hatchery-related genetic, ecological, and demographic threats to natural-origin steelhead populations.

Recovery Priority Number: 1

With a high magnitude of threat, high recovery potential, and the presence of conflict, this DPS has been assigned a recovery priority number of 1. The magnitude of threat to this DPS has been classified as high because of strong risks to its abundance, productivity, spatial structure, and diversity, and because this DPS faces a strong extinction risk in the foreseeable future. This DPS does not meet the criteria for a moderate magnitude of threat (which stipulate that the species will not face extinction if recovery is temporarily held off, although there is a continuing population decline or threat to its habitat). Delaying implementation of actions to recover this DPS would likely result in a mounting extinction risk rather than maintaining the status quo level of risk. The recovery potential for this DPS has also been classified as high. Although numerous factors limit the recovery of this DPS, the source of these factors and their demographic impacts are somewhat understood and recovery planning is being initiated. Although it would be cost-prohibitive to completely address every limiting factor, there is a general belief that integrated reduction of most threats can eventually achieve recovery of this DPS. Finally, as a complex variety of activities and management practices continue to affect the conservation and recovery of all Pacific salmon DPSs and ESUs listed under the ESA, NMFS has determined "conflict" exists with regard to this DPS. Taken together, these three factors correspond to a recovery priority number of 1.

Upper Willamette River Chinook ESU (*Oncorhynchus tshawytscha*)

Date Listed: March 24, 1999; reaffirmed June 28, 2005

Legal Status: Threatened

Recovery Plan Status: The Willamette/Lower Columbia TRT has identified independent populations and completed the population and ESU viability criteria. Notice that the proposed recovery plan for this ESU was available for public comment was published in the *Federal Register* on October 22, 2010 (75 FR 65299).

Species Status: Two related status evaluations of Upper Willamete River Chinook salmon have been conducted since the last status review in 2005 (McElhany et al. 2007, ODFW 2010). Both evaluations were based on the Willamette/Lower Columbia TRT viability criteria and both concluded that the ESU is currently at very high risk of extinction. Of the seven historical populations in the ESU, five are considered at very high risk. The remaining two (Clackamas and McKenzie) are considered at moderate to low risk. New data collected since the last status review have verified the high fraction of hatchery origin fish in all of the populations in the ESU (even the Clackamas and McKenzie have hatchery fractions above Willamette/Lower Columbia TRT viability thresholds). The new data have also highlighted the substantial risks associated with pre-spawning mortality. Although the proposed recovery plan targets key limiting factors for future actions, there have been no significant on-the-ground actions since the last status review to resolve the lack of access to historical habitat above dams, nor have there been substantial actions removing hatchery fish from the spawning grounds. Overall, the new information considered does not indicate a change in the biological risk category since the time of the last status review.

Limiting Factors and Threats: Limiting factors and threats to the Upper Willamette River Chinook ESU include the following:

- Significantly reduced access to spawning and rearing habitat because of tributary dams.
- Degraded freshwater habitat, especially floodplain connectivity and function, channel structure and complexity, and riparian areas and large wood recruitment as a result of cumulative impacts of agriculture, forestry, and development.
- Degraded water quality and altered temperature as a result of both tributary dams and the cumulative impacts of agriculture, forestry, and urban development.
- Hatchery-related effects.
- Ocean harvest rates are approximately 30 percent.

Conservation Actions: Major accomplishments from 2008 to 2010 for this ESU include the following:

- ESA section 7 consultation completed between NMFS and the U.S. Army Corps of Engineers, U.S. Bureau of Reclamation, and Bonneville Power Administration on the continued operation of 13 multipurpose dams in the Willamette Basin. Beneficial actions to the ESU that are called for in the Biological Opinion and Reasonable and Prudent Alternative (RPA) include: enhanced upstream fish passage (the dams block access to most historical spawning habitat for this ESU), retrofitting of dams to provide more normative temperature regimes below the projects, enhanced downstream passage at certain projects, and enhanced flow management to ensure safe migration, spawning, incubation, and rearing.

- ESA consultation at hydroelectric projects as part of Federal Energy Regulatory Commission (FERC) re-licensing, new licenses, and settlement agreements. Benefits to salmonids include improved streamflows, habitat restoration, gravel augmentation below dams for spawning, and improved upstream and downstream fish passage at dams. Improvements were made at Willamette Falls Dam, Albany/Lebanon Dam, and Upper Bennett Dam. Agreements also were made for improvements at Clackamas, Dorena, and Trail Bridge dams in the coming years.
- As a result of NMFS' Open Rivers Initiative, the Brownsville Dam on the Calapooia River was removed and a second dam was removed.
- *Habitat restoration projects*: Hundreds of projects during 2008–2010 have improved riparian areas, fish passage at culvert barriers, and stream and floodplain function. ESA section 7 programmatic consultation with the U.S. Corps of Engineers was completed in 2008 to expedite permitting of these types of salmonid recovery actions.
- *Improved forest management practices on federal lands*: The Northwest Forest Plan Aquatic Conservation Strategy continued in 2008–2010. The strategy is designed to conserve and restore salmon and steelhead habitat, and to provide an anchor for federal lands' contribution to salmon recovery.
- *Hatchery reforms*: Recent changes have helped develop locally adapted broodstocks and reintroduced fish into habitats above impassable dams to explore the potential for reestablishing self-sustaining populations in those areas.
- *Harvest reforms*: Selective fisheries continue to be successfully implemented and have reduced impacts to wild fish by more than 75 percent while still allowing recreational and commercial fisheries. Overall harvest impacts remain at or below 25 percent.
- *Harvest reforms*: In a new Chinook harvest agreement as part of the Pacific Salmon Treaty re-negotiations, the United States achieved significant harvest reductions in west coast Canadian fisheries that will complement ongoing U.S. harvest measures to benefit listed Upper Willamette Chinook.

Priority Recovery Actions Needed: Priority recovery actions needed for this ESU include the following:

- Congressional authorization and funding for the new recovery actions described in the section 7 biological opinion on the 13 federal dams in the Willamette Basin—an ESA consultation between NMFS and the U.S. Army Corps of Engineers, U.S. Bureau of Reclamation, and Bonneville Power Administration.
- Improved land use practices to protect existing high-quality habitat and prevent further degradation, along with continued, targeted restoration of other priority locations and issues identified in the proposed recovery plan. Protection and restoration are particularly important in lowland floodplain stream reaches where channel complexity and floodplain connectivity are severely degraded.
- Continued improvements in hatchery management to reduce genetic risks, improve hatchery Chinook survival for recovery efforts, and minimize impacts from non-native summer steelhead.

Recovery Priority Number: 1

With a high magnitude of threat, high recovery potential, and the presence of conflict, this ESU has been assigned a recovery priority number of 1. The magnitude of threat to this ESU has been classified as high because of very high risks to its abundance, productivity, spatial structure, and diversity (which largely have persisted since its status was first reviewed), and because this ESU faces a high extinction risk in the foreseeable future. This ESU does not meet the criteria for a moderate magnitude of threat (which stipulate that the species will not face extinction if recovery is temporarily held off, although there is a continuing population decline or threat to its habitat). Delaying recovery for this ESU would likely result in mounting extinction risks rather than maintaining the status quo level of risk. The recovery potential for this ESU has also been classified as high. Although numerous factors limit the recovery of this ESU, the source of many, but not all, of these factors and their demographic impacts are relatively well understood and recovery planning is currently underway. Although it may be cost-prohibitive to completely address every limiting factor, it is likely that integrated reduction of most threats can achieve recovery of this ESU, particularly if the corrective actions for the federal dams are implemented. Finally, as a complex variety of activities and

management practices continue to impact the conservation and recovery of all Pacific salmon ESUs listed under the ESA, NMFS has determined "conflict" exists with regard to this ESU. Taken together, these three factors correspond to a recovery priority number of 1.

Lower Columbia River Chinook ESU (*Oncorhynchus tshawytscha*)

Date Listed: March 24, 1999; reaffirmed June 28, 2005

Legal Status: Threatened

Recovery Plan Status:
A recovery plan for the Washington portion of the ESU was completed by Washington's Lower Columbia Fish Recovery Board and, after public comment, approved by NMFS in February 2006 as an Interim Regional Recovery Plan. The Lower Columbia River Fish Recovery Board updated this plan in 2010, and the Oregon Fish and Wildlife Commission adopted a plan for the Oregon portion of the ESU. NMFS will combine these plans, along with a plan for the White Salmon basin, and make a draft ESU-level plan, along with the three management unit plans, available in the fall of 2011.

Technical Recovery Team Products: The Willamette/Lower Columbia TRT has identified independent populations and completed population and ESU viability criteria and ESU recovery goals for this ESU.

Species Status: Three status evaluations of LCR Chinook, all based on Willamette/Lower Columbia TRT criteria, have been conducted since the last status update in 2005 (McElhany et al. 2007, ODFW 2010, LCFRB 2010). All three evaluations concluded that the ESU is currently at very high risk of extinction. Of the 32 historical populations in the ESU, 28 are considered extirpated or at very high risk. Based on the recovery plan analyses, all of the tule populations are considered very high risk, except one that is considered at high risk. Modeling conducted in association with tule harvest management suggests that three of the populations (Coweeman, Lewis, and Washougal) are at a somewhat lower risk. However, even these more optimistic evaluations suggest that the remaining 18 populations are at substantial risk because of very low natural origin spawner abundance (<100/population), high hatchery fraction, habitat degradation, and harvest impacts. Lower Columbia River spring Chinook populations remain cut off from access to essential spawning habitat by hydroelectric dams. Projects to allow access have been initiated in the Cowlitz and Lewis systems but have yet to produce self-sustaining populations. The Sandy spring Chinook population, without a mainstem dam, is considered at moderate risk and is the only spring Chinook salmon population in this ESU not considered extirpated or nearly so. The Hood River currently contains an out-of-ESU hatchery stock. The two late fall populations, Lewis and Sandy, are the only populations considered at low or very low risk. They contain relatively few hatchery fish and have maintained high spawner abundances (especially Lewis) since the last status review.

Limiting Factors and Threats: Limiting factors and threats to the Lower Columbia River Chinook ESU include the following:

- Degraded estuarine and near-shore marine habitat resulting from cumulative impacts of land use and flow management by the Columbia River hydropower system.
- *Degraded freshwater habitat*: floodplain connectivity and function, channel structure and complexity, riparian areas, stream substrate, stream flow, and water quality have been degraded as a result of cumulative impacts of agriculture, forestry, and development.
- Reduced access to spawning and rearing habitat mainly as a result of tributary hydropower projects.
- Hatchery-related effects.
- Harvest-related effects to fall Chinook salmon.

Conservation Actions: Major accomplishments for this ESU from 2008 to 2010 include the following:

- *Tributary hydropower operational changes and agreements for dam removal*: Continued implementation of FERC Re-licensing Settlement Agreements for the Cowlitz, Lewis, and Clackamas rivers. These agreements included reintroduction efforts into previously blocked habitat, improved flow releases, dam passage survival studies, plans for passage improvements, hatchery reforms, and habitat improvements. In addition, implementation of FERC de-commissioning settlement agreements resulted in the removal of Marmot Dam and the Little Sandy River Dam from the Sandy River, in 2007 and 2008 respectively, and of Powerdale Dam from the Hood River in 2010, restoring unimpeded passage to upstream habitat in those basins.
- *Habitat restoration projects:* Hundreds of local restoration projects have improved riparian areas, fish passage at culvert barriers, and stream and floodplain function.
- *Improved forest management practices on federal lands and some state and private lands*: The Northwest Forest Plan Aquatic Conservation Strategy continued in 2008–2010. The strategy is designed to conserve and restore salmon and steelhead habitat and to provide an anchor for federal lands' contribution to salmon recovery. In addition, implementation of the Forest Practices HCP, which covers 9.3 million acres of private timber land in Washington and which NMFS approved in 2005, is well underway. The plan ensures functional watershed conditions and riparian habitats as state forest practice rules are implemented for the recovery of listed salmonids. In addition, a separate HCP for Washington State Forest Trust Lands provides assurances for a high level of ecological function on those state forest
- *Hatchery reforms*: The HSRG evaluated hatchery programs to identify additional reforms needed to ensure that hatcheries benefit conservation efforts and reduce risks to the ESU. NMFS and co-managers are using this report, along with additional science-based recommendations, to identify and implement additional reforms. Reforms that are complete or underway for Lower Columbia River Chinook include hatchery closures, production changes, and installation of weirs on the Grays, Washougal, and North Fork Toutle rivers to trap and remove non-local hatchery fish. Also, as of 2008, all hatchery production is externally marked to allow for selective harvest and evaluation of hatchery and natural escapement to spawning grounds.
- *Harvest reforms and implementation of Fisheries Management and Evaluation Plans:* Since this ESU's listing, harvest rates have been steadily reduced, from approximately 70 percent to below 40 percent. The U.S. and Canadian governments approved a new agreement under the Pacific Salmon Treaty that will reduce harvest impacts on Lower Columbia River fall Chinook salmon by 3 percent relative to the previous agreement, as a result of significant reductions (15 percent and 30 percent, respectively) in the Southeast Alaskan and West Coast Vancouver Island Canadian fisheries. NMFS will use its authorities over U.S. ocean fisheries to ensure that the benefits of these reductions accrue to naturally produced Lower Columbia River fall Chinook salmon. Mark-selective fisheries for spring Chinook continue to be implemented to maintain low harvest rates on naturally produced spring Chinook salmon. A 2008 agreement, and NMFS ESA Biological Opinion for managing Columbia River tribal and non-tribal fishing, protects 13 ESUs and steelhead DPSs in the Columbia Basin, including Lower Columbia River Chinook. The Federal Court, under the authority of *U.S. v. Oregon,* has adopted the new agreement and Biological Opinion. Parties to the agreement include the states of Washington, Oregon, and Idaho; the Umatilla, Yakama, Nez Perce, and Warm Springs tribes; the FWS; and NMFS.
- The 2010 Federal Columbia River Power System (FCRPS) Supplemental Biological Opinion, which integrates the 2008 RPA and the Adaptive Management Implementation Plan,
  - — Includes a habitat program to protect and improve estuary habitat.
  - — Supports hatchery reforms.
  - — Expands efforts to reduce juvenile and adult losses from predation by birds, other fish, and marine mammals.

Priority Recovery Actions Needed: Priority recovery actions needed for this ESU include the following:

- Continued implementation of locally developed plans for the Oregon and Southwest Washington portions of this ESU, and of the plan that NMFS developed, with local participation, for the White Salmon portion of the ESU.
- Continued implementation of tributary hydropower re-licensing agreements in the Cowlitz, Lewis, Hood, Sandy, and Clackamas basins to achieve operational changes, reintroduction into previously blocked habitats, improved fish passage, and flow management.
- Implementation of recovery actions to reestablish Chinook salmon in the White Salmon River after removal of Condit Dam.
- Improved land use practices to protect existing high-quality tributary and estuarine habitats and prevent further degradation, along with continued, targeted habitat restoration based on priority issues and locations identified in recovery plans.
- Improvements to hatchery practices, including continued marking of all hatchery fall Chinook, updating adult traps and weirs, using alternate release strategies, developing localized broodstocks; and implementation of applicable HSRG and other science-based recommendations.
- Improved fisheries management to address impacts to Lower Columbia River fall Chinook salmon (e.g., by developing additional reference populations by which to gauge harvest impacts and help guide harvest management decisions implementing mark-selective fisheries when feasible as a tool to sustain important fisheries, implementing abundance-based management when feasible, and applying weak-stock management principles).

Recovery Priority Number: 1

With a high magnitude of threat, high recovery potential, and the presence of conflict, this ESU has been assigned a recovery priority number of 1. The magnitude of threat to this ESU has been classified as high because of strong risks to its abundance, productivity, spatial structure, and diversity (which largely have persisted since its status was first reviewed), and because this ESU faces a strong extinction risk in the foreseeable future. This ESU does not meet the criteria for a moderate magnitude of threat (which stipulate that the species will not face extinction if recovery is temporarily held off, although there is a continuing population decline or threat to its habitat). Delaying recovery for this ESU would likely result in mounting extinction risks rather than maintaining the status quo level of risk. The recovery potential for this ESU has also been classified as high. Although numerous factors limit the recovery of this ESU, the source of these factors and their demographic impacts are relatively well understood and recovery planning is currently underway. Although it may be cost-prohibitive to completely address every limiting factor, it is likely that integrated reduction of most threats can achieve recovery of this ESU. Finally, as a complex variety of activities and management practices continue to impact the conservation and recovery of all Pacific salmon ESUs listed under the ESA, NMFS has determined "conflict" exists with regard to this ESU. Taken together, these three factors correspond to a recovery priority number of 1.

Lower Columbia River Steelhead DPS (*Oncorhynchus mykiss*)

Date Listed: March 19, 1998; reclassified as a DPS January 5, 2006

Legal Status: Threatened

Recovery Plan Status:
A recovery plan for the Washington portion of the DPS was completed by Washington's Lower Columbia Fish Recovery Board and, after public comment, approved by NMFS in February 2006 as an interim recovery plan. The Lower Columbia River Fish Recovery Board updated this plan in 2010, and the Oregon Fish and Wildlife Commission adopted a plan for the Oregon portion of the DPS. NMFS will combine these plans, along with a plan for the White Salmon basin, and make a draft ESU-level plan, along with the three management unit plans, available in fall 2011.

Technical Recovery Team Products: The Willamette/Lower Columbia TRT has identified independent populations and completed the population and ESU viability criteria.

Species Status: Three evaluations of Lower Columbia River steelhead status, all based on Willamette/Lower Columbia TRT criteria, have been conducted since the last status update in 2005 (McElhany et al. 2007, ODFW 2010, LCFRB 2010). All three evaluations concluded that the DPS is currently at high risk of extinction. Of the 26 historical populations in the DPS, 17 are considered at high or very high risk. Populations in the upper Lewis, Cowlitz, and White Salmon watersheds remain cut off from access to essential spawning habitat by hydroelectric dams. Projects to allow access have been initiated in the Cowlitz and Lewis systems but have not yet produced self-sustaining populations. The populations generally remain at relatively low abundance with relatively low productivity.

Limiting Factors and Threats: Threats and impacts to the Lower Columbia River steelhead DPS include the following:

- Degraded estuarine and nearshore marine habitat resulting from cumulative impacts of land use and flow management by the Columbia River hydropower system.
- *Degraded freshwater habitat*: floodplain connectivity and function, channel structure and complexity, riparian areas and recruitment of large wood, stream substrate, stream flow, and water quality have been degraded as a result of cumulative impacts of agriculture, forestry, and development.
- Reduced access to spawning and rearing habitat as a result of tributary hydropower projects and lowland development.
- Avian and marine mammal predation in the lower mainstem Columbia River and estuary.
- Hatchery-related effects.

Conservation Actions: Major accomplishments for this DPS from 2008 to 2010 include the following:

- *Hydropower operational changes and agreements for dam removal*: Continued implementation of FERC Re-licensing Settlement Agreements for the Cowlitz, Lewis, and Clackamas rivers. These agreements included reintroduction efforts into previously blocked habitat, improved flow releases, dam passage survival studies, plans for passage improvements, hatchery reforms, and habitat improvements. In addition, implementation of FERC de-commissioning settlement agreements resulted in the removal of Marmot Dam and the Little Sandy River Dam from the Sandy River, in 2007 and 2008

respectively, and of Powerdale Dam from the Hood River in 2010, restoring unimpeded passage to upstream habitat in those basins.

- *Habitat restoration projects*: Hundreds of local restoration projects have improved riparian areas, fish passage at culvert barriers, and stream and floodplain function.
- *Improved forest management practices on federal lands and some state and private lands*: The Northwest Forest Plan Aquatic Conservation Strategy continued in 2008–2010. The strategy is designed to conserve and restore salmon and steelhead habitat and to provide an anchor for federal lands' contribution to salmon recovery. In addition, implementation of the Forest Practices HCP, which covers 9.3 million acres of private timber land in Washington and which NMFS approved in 2005, is well underway, formally recognizing the conservation value of state forest practice rules to the recovery of listed salmonids.
- *Hatchery reforms*: The HSRG evaluated hatchery programs to identify additional reforms needed to ensure that hatcheries benefit conservation efforts and reduce risks to the DPS. NMFS and co-managers are using this report, along with additional science-based recommendations, to identify and implement additional reforms.
- Improved management of in-river fisheries through the implementation of Fisheries Management and Evaluation Plans designed to minimize impacts from fisheries on wild steelhead. Reductions in impacts to juvenile steelhead from resident trout fisheries have been maintained; harvest impacts on wild steelhead are reduced from a historical high of 75 percent to an overall impact of 8.5 percent. Co-managers are evaluating whether alternative harvest methods are feasible and could reduce harvest impacts further. A 2008 agreement and NMFS ESA Biological Opinion for managing Columbia River tribal and non-tribal fishing protects 13 ESUs and steelhead DPSs in the Columbia Basin, including Lower Columbia River steelhead. The Federal Court, under the authority of *U.S. v. Oregon,* has adopted the new agreement and Biological Opinion. Parties to the agreement include the states of Washington, Oregon, and Idaho; the Umatilla, Yakama, Nez Perce, and Warm Springs tribes; the FWS; and NMFS.
- The 2010 FCRPS Supplemental Biological Opinion, which integrates the 2008 RPA and the Adaptive Management Implementation Plan,
  - Includes a habitat program to protect and improve tributary and estuary habitat.
  - Supports hatchery reforms.
  - Expands efforts to reduce juvenile and adult losses from predation by birds, other fish, and marine mammals.

Priority Recovery Actions Needed: Priority recovery actions needed for this DPS include the following:

- Continued implementation of locally developed plans for the Oregon and Southwest Washington portions of this ESU, and of the plan that NMFS developed with local participation, for the White Salmon portion of the ESU.
- Continued implementation of tributary hydropower relicensing agreements in the Cowlitz, Lewis, Hood, Sandy, and Clackamas basins to achieve operational changes, reintroduction into previously blocked habitats, improved fish passage, and flow management.
- Improved land use practices to protect existing high-quality habitat and prevent further degradation, along with continued, targeted restoration based on priority locations and issues identified in recovery plans. Protection and restoration of lowland off-channel habitats are particularly important.
- Further improvements to hatchery practices, including continued reform.

Recovery Priority Number: 1

With a high magnitude of threat, high recovery potential, and the presence of conflict, this DPS has been assigned a recovery priority number of 1. The magnitude of threat to this DPS has been classified as high because of strong risks to its abundance, productivity, spatial structure, and diversity (which largely have persisted since its status was first reviewed), and because this DPS faces a strong extinction risk in the foreseeable future. This DPS does not meet the criteria for a moderate magnitude of threat (which stipulate that the species will not face extinction if recovery is temporarily held off, although there is a continuing

population decline or threat to its habitat). Delaying recovery for this DPS would likely result in mounting extinction risks rather than maintaining the status quo level of risk. The recovery potential for this DPS has also been classified as high. Although numerous factors limit the recovery of this DPS, the source of these factors and their demographic impacts are relatively well understood and recovery planning is currently underway. Although it may be cost-prohibitive to completely address every limiting factor, it is likely that integrated reduction of most threats can achieve recovery of this DPS. Finally, as a complex variety of activities and management practices continue to impact the conservation and recovery of all Pacific salmon and steelhead ESUs and DPSs listed under the ESA, NMFS has determined "conflict" exists with regard to this DPS. Taken together, these three factors correspond to a recovery priority number of 1.

Lower Columbia River Coho (*Oncorhynchus kisutch*)

Date Listed: June 28, 2005 (Originally part of a larger Lower Columbia River/Southwest Washington ESU)

Legal Status: Threatened

Recovery Plan Status: The Lower Columbia River Fish Recovery Board has completed a plan for the southwest Washington portion of this ESU, and the Oregon Department of Fish and Wildlife has completed a plan for the Oregon portion of the ESU. NMFS will combine these plans, along with a plan for the White Salmon basin, and make a draft ESU-level plan, along with the three management unit plans, available in the fall of 2011.

Technical Recovery Team Products: The Willamette/Lower Columbia TRT has identified independent populations and completed the population and ESU viability criteria.

Species Status: Three status evaluations of Lower Columbia River coho salmon status, all based on Willamette/Lower Columbia TRT criteria, have been conducted since the last status review in 2005 (McElhany et al. 2007, ODFW 2010, LCFRB 2010). All three evaluations concluded that the ESU is currently at very high risk of extinction. Of the 27 historical populations in the ESU, 24 are considered at very high risk. The remaining three (Sandy, Clackamas, and Scappose) are considered at high to moderate risk. All of the Washington populations are considered at very high risk, although uncertainty is high because of a lack of adult spawner surveys. As was noted in the 2005 status review, smolt traps indicate some natural production in Washington populations, although, given the high fraction of hatchery origin spawners suspected to occur in these populations, it is not clear that any are self-sustaining.

Limiting Factors and Threats: Limiting factors and threats to the Lower Columbia River coho ESU include the following:

- Degraded estuarine and near-shore marine habitat resulting from cumulative impacts of land use and flow management by the Columbia River hydropower system.
- *Degraded freshwater habitat*: floodplain connectivity and function, channel structure and complexity, riparian areas and large wood supply, stream substrate, stream flow, and water quality have been degraded as a result of cumulative impacts of agriculture, forestry, and development.
- Hatchery-related effects.
- Harvest-related effects.

Conservation Actions: Major accomplishments for this ESU from 2008 to 2010 include the following:

- *Tributary hydropower operational changes and agreements for dam removal:* Implementation of FERC Re-licensing Settlement Agreements for the Cowlitz, Lewis, and Clackamas rivers has continued. These agreements included reintroduction efforts into previously blocked habitat, improved flow releases, dam passage survival studies, plans for passage improvements, hatchery reforms, and habitat improvements. In addition, implementation of FERC de-commissioning settlement agreements resulted in the removal of Marmot Dam and the Little Sandy River Dam in 2007 and 2008 respectively, and of Powerdale Dam from the Hood River in 2010, restoring unimpeded passage to upstream habitat in those basins.
- *Habitat restoration projects:* Hundreds of projects have improved riparian areas, fish passage at culvert barriers, and stream and floodplain function.
- *Improved forest management practices on federal lands and some state and private lands:* The Northwest Forest Plan Aquatic Conservation Strategy continued in 2008–2010. The strategy is designed to conserve and restore salmon and steelhead habitat and to provide an anchor for federal lands' contribution to salmon recovery. In addition, implementation of the Forest Practices HCP, which covers 9.3 million acres of private timber land in Washington and which NMFS approved in 2005, is well underway.

This plan ensures functional watershed conditions and riparian habitats as state forest practice rules are implemented for the recovery of listed salmonids. In addition, a separate HCP for Washington State Forest Trust Lands provides assurances for a high level of ecological function on those state forest lands.

- *Hatchery reforms:* Hatchery reforms have included integrating some coho hatchery programs with local natural-origin populations to increase abundance and reduce adverse impacts of hatcheries, program closures, and production changes. Hatchery coho continue to be externally marked so that fisheries can target hatchery coho and to allow identification of hatchery and wild fish at weirs and traps, on the spawning grounds, and during broodstock collection. The HSRG evaluated hatchery programs to identify additional reforms needed to ensure that hatcheries benefit conservation efforts and reduce risks to the ESU. NMFS and co-managers are using this report, along with additional science-based recommendations, to identify and implement additional reforms.
- *Harvest reforms*: The marking of hatchery coho salmon continues to allow implementation of selective commercial and recreational fisheries for coho salmon, reducing impacts to wild coho salmon from 85 percent to 18 percent. A new coho agreement under the Pacific Salmon Treaty (see discussion under the LCR Chinook salmon ESU section of this report) will continue to constrain ocean fishery impacts depending on the annual status of natural populations of coho in Canadian and Washington and Oregon fisheries. A 2008 agreement and NMFS ESA Biological Opinion for managing Columbia River tribal and non-tribal fishing protects 13 ESUs and steelhead DPSs in the Columbia Basin, including Lower Columbia River coho. The Federal Court, under the authority of *U.S. v. Oregon,* has adopted the new agreement and Biological Opinion. Parties to the agreement include the states of Washington, Oregon, and Idaho; the Umatilla, Yakama, Nez Perce, and Warm Springs tribes; the FWS; and NMFS.
- The 2010 FCRPS Supplemental Biological Opinion, which integrates the 2008 RPA and the Adaptive Management Implementation Plan,
  - Includes a habitat program to protect and improve estuary habitat.
  - Supports hatchery reforms.
  - Expands efforts to reduce juvenile and adult loses from predation by birds, other fish, and marine mammals.

Priority Recovery Actions Needed: Priority recovery actions needed for this ESU include the following:

- Continued implementation of locally developed plans for the Oregon and Southwest Washington portions of this ESU and of the plan that NMFS developed, with local participation, for the White Salmon portion of the ESU.
- Continued implementation of tributary hydropower relicensing agreements in the Cowlitz, Lewis, Hood, Sandy, and Clackamas basins to achieve operational changes, reintroduction into previously blocked habitats, improved fish passage, and flow management.
- Implementation of recovery plan actions to re-establish coho salmon into the White Salmon River after removal of Condit Dam.
- Improved land use practices to protect existing high-quality tributary habitats and prevent further degradation, along with continued, targeted restoration based on priority locations and issues identified in recovery plans.
- Increased monitoring of natural-origin populations to provide statistically reliable estimates of abundance and proportion of natural-origin fish.
- Improvements at hatchery facilities to implement hatchery reforms.
- Further adjustments to coho harvest management through refinement of the existing coho harvest management matrix, continued use of mark-selective sport fisheries, further use and development of mark-selective commercial fisheries, and improved monitoring of harvest mortality.

Recovery Priority Number: 1

With a high magnitude of threat, high recovery potential, and the presence of conflict, this ESU has been assigned a recovery priority number of 1. The magnitude of threat to this ESU has been classified as high because of strong risks to its abundance, productivity, spatial structure, and diversity (which largely have persisted since its status was first reviewed), and because this ESU faces a strong extinction risk in the foreseeable future. This ESU does not meet the criteria for a moderate magnitude of threat (which stipulate that the species will not face extinction if recovery is temporarily held off, although there is a continuing population decline or threat to its habitat). Delaying recovery for this ESU would likely result in mounting extinction risks rather than maintaining the status quo level of risk. The recovery potential for this ESU has also been classified as high. Although numerous factors limit the recovery of this ESU, the source of these factors and their demographic impacts are relatively well understood and recovery planning is currently underway. Although it may be cost-prohibitive to completely address every limiting factor, it is likely that integrated reduction of most threats can achieve recovery of this ESU. Finally, as a complex variety of activities and management practices continue to impact the conservation and recovery of all Pacific salmon ESUs listed under the ESA, NMFS has determined "conflict" exists with regard to this ESU. Taken together, these three factors correspond to a recovery priority number of 1.

Columbia River Chum ESU (*Oncorhynchus keta*)

Date Listed: March 25, 1999; reaffirmed June 28, 2005

Legal Status: Threatened

Recovery Plan Status:
A recovery plan for the Washington portion of the ESU was completed by Washington's Lower Columbia Fish Recovery Board and, after public comment, was approved by NMFS in February 2006 as an interim recovery plan. The Lower Columbia River Fish Recovery Board updated this plan in 2010, and the Oregon Fish and Wildlife Commission adopted a plan for the Oregon portion of the ESU. NMFS will combine these plans, along with a plan for the White Salmon basin, and make a draft ESU-level plan, along with the three management unit plans, available in the fall of 2011.

Technical Recovery Team Products: The Willamette/Lower Columbia TRT has identified independent populations and completed the population and ESU viability criteria.

Species Status: The vast majority (14 of 17) chum populations remain extirpated or nearly so. The Grays River and Lower Gorge populations showed a sharp increase in 2002, but have since declined back to relatively low abundance levels in the range of variation observed over the past several decades. Chinook and coho salmon populations in the Lower Columbia and Willamette rivers show similar increases in the early 2000s followed by declines to typical recent levels, suggesting the increase in chum salmon may be related to ocean conditions. Recent data on the mainstem Columbia River component of the Washougal population (under the I-205 bridge) are not available, but we suspect they follow a pattern similar to the Grays and Lower Gorge populations.

Limiting Factors and Threats: Threats and impacts to the Columbia River chum ESU include the following:

- Degraded estuarine and nearshore marine habitat resulting from cumulative impacts of land use and flow management by the Columbia River hydropower system.
- Degraded freshwater habitat, in particular of floodplain connectivity and function, channel structure and complexity, stream substrate, and riparian areas and large wood recruitment as a result of cumulative impacts of agriculture, forestry, and development.
- Degraded stream flow as a result of hydropower and water supply operations.
- Loss of access and loss of some habitat types as a result of passage barriers such as roads and railroads.
- Current or potential predation from hatchery-origin salmonids, including coho.

Conservation Actions: Major accomplishments for this ESU from 2008 to 2010 include the following:

- *Habitat restoration projects*: Federal, state, and local governments and private entities carried out several habitat restoration projects to increase natural production and add to the ESU's spatial structure, helping to protect against catastrophic loss.
- *Improved forest management practices on federal lands and some state and private lands*: The Northwest Forest Plan Aquatic Conservation Strategy continued in 2008–2010. The strategy is designed to conserve and restore salmon and steelhead habitat and to provide an anchor for federal lands' contribution to salmon recovery. In addition, implementation of the Forest Practices HCP, which covers 9.3 million

acres of private timber land in Washington and which NMFS approved in 2005, is well underway. The plan ensures functional watershed conditions and riparian habitats as state forest practice rules are implemented for the recovery of listed salmonids. In addition, a separate HCP for Washington State Forest Trust Lands provides assurances for a high level of ecological function on those state forest lands.

- *Continued and expanded "adult capture/juvenile release" hatchery programs*: Adults taken from the wild are spawned in a hatchery and the resulting juveniles are released to rear in natural habitat. These programs are designed to reseed historical habitat while minimizing the risk of reduced reproductive success due to captivity.
- Completed genetic analysis of chum salmon returning to Washington tributaries outside of the two primary chum production areas.
- The 2010 FCRPS Supplemental Biological Opinion, which integrates the 2008 RPA and the Adaptive Management Implementation Plan,
  - Includes a habitat program to protect and improve tributary and estuary habitat.
  - Supports conservation hatchery programs for reintroduction in the Lower Gorge population.
  - Expands efforts to reduce juvenile and adult losses from predation by birds, other fish, and marine mammals.
- A 2008 agreement and NMFS ESA Biological Opinion for managing Columbia River tribal and non-tribal fishing protects 13 ESUs and steelhead DPSs in the Columbia Basin, including Columbia River chum. The Federal Court, under the authority of *U.S. v. Oregon*, has adopted the new agreement and Biological Opinion.

Priority Recovery Actions Needed: Priority recovery actions needed for this ESU include:

- Continued implementation of locally developed plans for the Oregon and Southwest Washington portions of this ESU, and of the plan that NMFS developed, with local participation, for the White Salmon portion of the ESU.
- Restoration and protection of natural channel processes at additional tributary sites, which includes reconnecting lower tributary mainstems with side channels and floodplains.
- Monitoring of historical production areas and active restoration of populations in lower Columbia River tributaries where there is currently no known spawning activity.
- Restoration of shallow-water rearing habitat in the lower Columbia River and monitoring and evaluation to identify additional restoration sites.
- Avoidance of continued degradation and loss of chum spawning and rearing habitat through land and water practices that promote conservation.
- Increased attention to the potential predation of chum by hatchery coho and other salmonids.

Recovery Priority Number: 1

With a high magnitude of threat, high recovery potential, and the presence of conflict, this ESU has been assigned a recovery priority number of 1. The magnitude of threat to this ESU has been classified as high because of strong risks to its abundance, productivity, spatial structure, and diversity (which largely have remained the same since its status was first reviewed), and the fact that this ESU faces a strong extinction risk in the foreseeable future. This ESU does not meet the criteria for a moderate magnitude of threat (which stipulate that the species will not face extinction if recovery is temporarily held off, although there is a continuing population decline or threat to its habitat). Delaying recovery for this ESU would likely result in mounting extinction risks rather than maintaining the status quo level of risk. The recovery potential for this ESU has also been classified as high. Although numerous factors limit the recovery of this ESU, the source of these factors and their demographic impacts are relatively well understood and recovery planning is currently underway. Although it may be cost-prohibitive to completely address every limiting factor, it is likely that integrated reduction of most threats can achieve recovery of this ESU. Finally, as a complex variety of activities and management practices continue to impact the conservation and recovery of all Pacific salmon ESUs listed under the ESA, NMFS has determined "conflict" exists with regard to this ESU. Taken together, these three factors correspond to a recovery priority number of 1.

Upper Willamette River Steelhead DPS (*Oncorhynchus mykiss*)

Date Listed: March 25, 1999; reclassified as a DPS January 5, 2006

Legal Status: Threatened

Recovery Plan Status: Notice that the proposed recovery plan for this DPS was available for public comment was published in the *Federal Register* on October 22, 2010 (75 FR 65299).

Technical Recovery Team Products: The Willamette/Lower Columbia TRT has identified independent populations and completed the population and DPS viability criteria.

Species Status: Since the last status update, Upper Willamette steelhead initially increased in abundance but subsequently declined, and current abundance is at the levels observed in the mid-1990s when the DPS was first listed. The DPS appears to be at lower risk than the Upper Willamette Chinook ESU, but continues to demonstrate the overall low abundance pattern that was of concern during the last status review. The elimination of winter-run hatchery release in the basin reduces hatchery threats, but non-native summer steelhead hatchery releases are still a concern. Human population growth within the Willamette Basin constitutes a significant risk factor for these populations. Overall, the new information considered does not indicate a change in the biological risk category since the time of the last status review.

Limiting Factors and Threats: Threats and impacts to the Upper Willamette River steelhead DPS include the following:

- *Degraded freshwater habitat*: floodplain connectivity and function, channel structure and complexity, riparian areas and large wood recruitment, and stream flow have been degraded as a result of cumulative impacts of agriculture, forestry, and development.
- Degraded water quality and altered temperature as a result of both tributary dams and the cumulative impacts of agriculture, forestry, and urban development.
- Reduced access to spawning and rearing habitats mainly as a result of artificial barriers in spawning tributaries.
- *Hatchery-related effects*: impacts from the non-native summer steelhead hatchery program.

Conservation Actions: Major accomplishments from 2008 to 2010 for this DPS include the following:

- ESA section 7 consultation completed between NMFS and the U.S. Army Corps of Engineers, U.S. Bureau of Reclamation, and Bonneville Power Administration on the continued operation of 13 multipurpose dams in the Willamette Basin. Beneficial actions to the ESU include: enhanced upstream fish passage facilities (the dams block access some historical spawning habitat for this DPS), retrofitting of dams to provide more normative temperature regimes below the projects that affect steelhead spawning and rearing, enhanced downstream passage of juvenile steelhead at certain projects, and enhanced flow management to ensure safe migration, spawning, incubation, and rearing of steelhead.
- ESA consultation at hydroelectric projects as part of FERC re-licensing, new licenses, and settlement agreements. Benefits to salmonids include improved streamflows, habitat restoration, gravel augmentation below dams for spawning, and improved upstream and downstream fish passage at dams. Improvements were made at Willamette Falls Dam, Albany/Lebanon Dam, and Upper Bennett Dam.
- As a result of funding from NMFS' Open River Initiative, the Brownsville Dam on the Calapooia River was removed
- *Habitat restoration projects*: Hundreds of projects during 2008–2010 have improved riparian areas, fish passage at culvert barriers, and stream and floodplain function. ESA section 7 programmatic consultation with the U.S. Army Corps of Engineers was completed in 2008 to expedite permitting of these types of salmonid recovery actions.

- *Improved forest management practices on federal lands*: The Northwest Forest Plan Aquatic Conservation Strategy continued in 2008–2010. The strategy is designed to conserve and restore salmon and steelhead habitat, and to provide an anchor for federal lands' contribution to salmon recovery. The U.S. Forest Service and Bureau of Land Management worked with NMFS in 2006 to develop a programmatic approach to designing and approving timber sales that would result in minimal impacts to salmonids.
- *Hatchery reforms*: Hatchery programs have been modified to reduce the effects of non-native summer steelhead hatchery fish on native, naturally produced winter steelhead populations.
- *Harvest reforms*: Catch-and-release fisheries have substantially reduced harvest impacts to winter steelhead.

Priority Recovery Actions Needed: Priority recovery actions needed for this DPS include the following:

- Congressional authorization and funding for the new recovery actions described in the section 7 biological opinion on the 13 federal dams in the Willamette Basin—an ESA consultation between NMFS and the U.S. Army Corps of Engineers, U.S. Bureau of Reclamation, and Bonneville Power Administration.
- Improved land use practices to protect existing high-quality habitat and prevent further degradation, along with continued, targeted restoration of other priority locations and issues identified in the draft recovery plan. Protection and restoration are particularly important in lowland floodplain stream reaches where channel complexity and floodplain connectivity are severely degraded.
- Work with local stakeholders in the Molalla River Subbasin to secure enhanced riparian and upland management protections in the priority areas for salmonid spawning and rearing.
- Reduce point and non-point sources of thermal and toxic pollution and continued clean-up efforts for contaminated stream areas where juvenile steelhead live.
- Reduce hatchery-related effects from the non-native summer steelhead hatchery program.

Recovery Priority Number: 1

With a high magnitude of threat, high recovery potential, and the presence of conflict, this DPS has been assigned a recovery priority number of 1. The magnitude of threat to this DPS has been classified as high because of strong risks to its abundance, productivity, spatial structure, and diversity (which largely have persisted since its status was first reviewed), and because this DPS faces a strong extinction risk in the foreseeable future. This DPS does not meet the criteria for a moderate magnitude of threat (which stipulate that the species will not face extinction if recovery is temporarily held off, although there is a continuing population decline or threat to its habitat). Delaying recovery for this DPS would likely result in mounting extinction risks rather than maintaining the status quo level of risk. The recovery potential for this DPS has also been classified as high. Although numerous factors limit the recovery of this DPS, the source of these factors and their demographic impacts are relatively well understood and recovery planning is currently underway. Although it may be cost-prohibitive to completely address every limiting factor, it is likely that integrated reduction of most threats can achieve recovery of this DPS. Finally, as a complex variety of activities and management practices continue to impact the conservation and recovery of all Pacific salmon and steelhead ESUs and DPSs listed under the ESA, NMFS has determined "conflict" exists with regard to this DPS. Taken together, these three factors correspond to a recovery priority number of 1.

Upper Columbia River Spring-Run Chinook ESU (*Oncorhynchus tshawytscha*)

Date Listed: March 24, 1999; reaffirmed on June 28, 2005

Legal Status: Endangered

Recovery Plan Status: A proposed ESA recovery plan was completed and approved by both the Upper Columbia Salmon Recovery Board and NMFS in July 2006. A *Federal Register* Notice of Availability for the proposed recovery plan was released on September 29, 2006 (71 FR 57472, NMFS 2006c) for a 60-day review period, and extended for an additional 60 days on November 28, 2006. The final ESA recovery plan for this ESU was adopted by NMFS on October 9, 2007.

Technical Recovery Team Products: The Interior Columbia TRT identified three independent populations (Wenatchee, Entiat, and Methow) in this ESU and recommended population and ESU viability criteria.

Species Status: The Upper Columbia Spring Chinook salmon ESU is not currently meeting the viability criteria (adapted from the Interior Columbia TRT) in the Upper Columbia Recovery Plan. Although increases in natural-origin abundance relative to the extremely low spawning levels observed in the mid-1990s are encouraging, average productivity levels remain extremely low. Large-scale directed supplementation programs are underway in two of the three extant populations in the ESU. These programs are intended to mitigate short-term demographic risks while actions to improve natural productivity and capacity are implemented. While these programs may provide short-term demographic benefits, there are significant uncertainties regarding the long-term risks of relying on high levels of hatchery influence to maintain natural populations. The Upper Columbia Recovery Plan includes a number of strategies for improving survival in tributary habitats and the mainstem migration corridor along with complementary harvest management and hatchery management regimes. The time frames for implementing actions and for those actions to result in improved survivals vary across strategies. Improved passage survivals relative to conditions prevalent at the time of listing are expected to be relatively immediate. Given the anticipated action implementation schedule and assumptions regarding time lags for realizing target habitat improvements incorporated into the Upper Columbia Recovery Plan, improvements in survival due to changes in habitat conditions are expected accrue over a 10- to 50-year period.

Limiting Factors and Threats: Limiting factors and threats to the Upper Columbia River Spring-Run Chinook ESU include the following:

- Mainstem Columbia River Hydropower–related adverse effects.
- *Degraded freshwater habitat*: Floodplain connectivity and function, channel structure and complexity, riparian areas and large woody debris recruitment, stream flow, and water quality have been degraded as a result of cumulative impacts of agriculture, forestry, and development.
- Hatchery related effects.
- Harvest in Columbia River fisheries.

Conservation Actions: Major accomplishments from 2008 to 2010 for this ESU include the following:

- *Conducted and facilitated local habitat restoration and protection projects*: Conservation easements and land purchases of riparian areas along rivers and streams have been used to protect critical spawning and rearing areas; the Natural Resources Conservation Service Conservation Reserve and Enhancement Program protects riparian areas on farms and ranches.
- Equipped irrigation diversion withdrawals with screens, leading to greater productivity and abundance.
- *Improved forest management practices on non-federal lands*: The Northwest Forest Plan Aquatic Conservation Strategy is designed to conserve and restore salmon and steelhead habitat, and provides an anchor for federal lands' contribution to salmon recovery. In addition, implementation of the Forest Practices HCP, which covers 9.3 million acres of private timber land in Washington and which NMFS approved in 2005, is well underway. The plan ensures functional watershed conditions and riparian habitats as state forest practice rules are implemented for the recovery of listed salmonids.
- Habitat actions in the tributaries have increased protection of some areas of intact habitat and improved quality of degraded habitats under several funding sources, including the two HCPs with local public utility districts and a Settlement Agreement with another public utility district. In particular, the Bureau of Reclamation has assisted in implementing several significant passage improvement projects in the Methow and Wenatchee basins.
- A new ESA section 7 biological opinion and new *U.S. v. Oregon* harvest agreement protect these fish during their migration in the lower Columbia River.
- A new ESA section 7 consultation protects these fish from over-harvest in the upper Columbia River. Fisheries were authorized in the upper Columbia under an ESA section 10 permit for the incidental harvest of listed Upper Columbia spring Chinook at levels that would not jeopardize their survival.
- The 2010 FCRPS Supplemental Biological Opinion, which integrates the 2008 RPA and the Adaptive Management Implementation Plan,
  - Sets standards for survival of juvenile and adult salmon and steelhead migrating through the dams.
  - Includes a habitat program to protect and improve tributary and estuary habitat.
  - Provides new and expanded hatchery facilities and safety net conservation programs and supports hatchery reforms.
  - Expands efforts to reduce juvenile and adult losses from predation by birds, other fish, and marine mammals.
- A 2008 agreement and NMFS ESA Biological Opinion for managing Columbia River tribal and non-tribal fishing protects these fish in the mainstem and lower Columbia River basin. The new agreement and Biological Opinion have been adopted by the Federal Court (under the authority of *U.S. v. Oregon*) and parties to the agreement include the states of Washington, Oregon, and Idaho; the Umatilla, Yakama, Nez Perce, and Warm Springs tribes; the FWS; and NMFS.

Priority Recovery Actions Needed: Priority recovery actions needed for this ESU include:

- Protect high-quality habitat—particularly productive, sensitive floodplain habitats—from residential development.
- Improve fish passage at barriers along the migration corridor.
- Improve irrigation efficiencies to improve instream flows.
- Restore habitat and increase habitat complexity.

Recovery Priority Number: 1

With a high magnitude of threat, high recovery potential, and the presence of conflict, this ESU has been assigned a recovery priority number of 1. The magnitude of threat to this ESU has been classified as high because of strong risks to its abundance, productivity, spatial structure, and diversity (which largely have persisted since its status was first reviewed), and because this ESU faces a strong extinction risk in the

foreseeable future. This ESU does not meet the criteria for a moderate magnitude of threat (which stipulate that the species will not face extinction if recovery is temporarily held off, although there is a continuing population decline or threat to its habitat). Delaying recovery for this ESU would likely result in mounting extinction risks rather than maintaining the status quo level of risk. The recovery potential for this ESU has also been classified as high. Although numerous factors limit the recovery of this ESU, the source of these factors and their demographic impacts are relatively well understood and recovery planning is currently underway. Although it may be cost-prohibitive to completely address every limiting factor, it is likely that integrated reduction of most threats can achieve recovery of this ESU. Finally, as a complex variety of activities and management practices continue to impact the conservation and recovery of all Pacific salmon ESUs listed under the ESA, NMFS has determined "conflict" exists with regard to this ESU. Taken together, these three factors correspond to a recovery priority number of 1.

Snake River Spring/Summer-Run Chinook ESU (*Oncorhynchus tshawytscha*)

Date Listed: April 22, 1992; reaffirmed June 28, 2005

Legal Status: Threatened

Recovery Plan Status: A draft recovery plan for this ESU was developed in March 1995, but was not adopted. A recovery plan has not been completed for this ESU, but recovery planning is underway.

Technical Recovery Team Products: The Interior Columbia TRT identified major population groups each with several independent populations and completed the ESU and population-level viability criteria.

Species Status: Population-level status remains at high risk across all major population groups within the ESU. Although recent natural spawning abundance estimates have increased, all populations remain below minimum natural origin abundance thresholds. Relatively low natural production rates and spawning levels below minimum abundance thresholds remain a major concern across the ESU. The ability of populations to be self-sustaining through normal periods of relatively low ocean survival remains uncertain. Factors cited in the 2005 status review (Good et al. 2005) remain as concerns or key uncertainties.

Limiting Factors and Threats: Limiting factors and threats to the Snake River Spring/Summer-Run Chinook ESU include the following:

- *Degraded freshwater habitat*: Floodplain connectivity and function, channel structure and complexity, riparian areas and large wood supply, stream substrate, elevated water temperature, stream flow, and water quality have been degraded as a result of cumulative impacts of agriculture, forestry, and development.
- Mainstem Columbia River hydropower impacts.
- Harvest-related effects.
- Predation.

Conservation Actions: Major accomplishments from 2008 to 2010 for this ESU include the following:

- The 2010 FCRPS Supplemental Biological Opinion, which integrates the 2008 RPA and the Adaptive Management Implementation Plan,
  - Sets standards for survival of juvenile and adult salmon and steelhead migrating through the dams.
  - Includes a habitat program to protect and improve tributary and estuary habitat.
  - Provides new and expanded hatchery facilities and safety net conservation programs and supports hatchery reforms.
  - Expands efforts to reduce juvenile and adult losses from predation by birds, other fish, and marine mammals.
- A 2008 agreement and NMFS ESA Biological Opinion for managing Columbia River tribal and non-tribal fishing protects 12 ESUs and steelhead DPSs in the Columbia Basin. The new agreement and Biological Opinion have been adopted by the Federal Court (under the authority of *U.S. v. Oregon*) and parties to the agreement include the states of Washington, Oregon, and Idaho; the Umatilla, Yakama, Nez Perce, and Warm Springs tribes; the FWS; and NMFS.

- *Improved federal land management practices*: Land management plans of the U.S. Forest Service and Bureau of Land Management are being designed to protect and restore habitat.
- Improved water-quality permitting procedures, by working with EPA to develop procedures that enhance salmon considerations.
- *Conducted local habitat restoration and restoration of stream flows*: This includes efforts by the Northwest Power Planning Council Fish and Wildlife Program, PCSRF, Natural Resources Conservation Service, and NOAA Restoration Center.
- Worked to improve water quantity via the Snake River basin adjudication settlement of water claims between the Nez Pierce Tribe and the State of Idaho, including a program to improve instream flows in the Lemhi River.
- Equipped hundreds of irrigation diversions with fish screens.
- Reduced overall harvest rates.

Priority Recovery Actions Needed: Priority recovery actions needed for this ESU include:

- Continue the structural and operational modifications to hydropower dams to improve salmon survival in the migration corridor.
- Protect high-quality habitats.
- Conduct habitat restoration.
- Increase instream flows.
- Implement and continue abundance-based management to reduce harvest impacts during low-return years when protections are most needed.
- Control predation.
- Complete and implement Fishery Management and Evaluation Plans and Tribal Resource Management Plans for tributary fisheries.
- Implement harvest agreements from *U.S. v. Oregon*.
- Complete and implement Hatchery and Genetic Management Plans and Tribal Resource Management Plans for tributary hatcheries.

Recovery Priority Number: 1

With a high magnitude of threat, high recovery potential, and the presence of conflict, this ESU has been assigned a recovery priority number of 1. The magnitude of threat to this ESU has been classified as high because of strong risks to its abundance, productivity, spatial structure, and diversity (which largely have persisted since its status was first reviewed), and because this ESU faces a strong extinction risk in the foreseeable future. This ESU does not meet the criteria for a moderate magnitude of threat (which stipulate that the species will not face extinction if recovery is temporarily held off, although there is a continuing population decline or threat to its habitat). Delaying recovery for this ESU would likely result in mounting extinction risks rather than maintaining the status quo level of risk. The recovery potential for this ESU has also been classified as high. Although numerous factors limit the recovery of this ESU, the source of these factors and their demographic impacts are relatively well understood and recovery planning is currently underway. Although it may be cost-prohibitive to completely address every limiting factor, it is likely the integrated reduction of most threats can achieve recovery of this ESU. Finally, as a complex variety of activities and management practices continue to impact the conservation and recovery of all Pacific salmon ESUs listed under the ESA, NMFS has determined "conflict" exists with regard to this ESU. Taken together, these three factors correspond to a recovery priority number of 1.

Snake River Fall-Run Chinook ESU (*Oncorhynchus tshawytscha*)

Date Listed: April 22, 1992; reaffirmed June 28, 2005

Legal Status: Threatened

Recovery Plan Status: A draft recovery plan for this ESU was developed in March of 1995, but was not adopted. No recovery plan has been completed for this ESU, but recovery planning is underway.

Technical Recovery Team Products: The Interior Columbia TRT identified independent populations and completed the population and ESU viability criteria.

Species Status: Abundance and productivity estimates for the single remaining population of Snake River Fall Chinook salmon have improved substantially relative to the time of listing. However, the current combined estimates of abundance and productivity population still result in a moderate risk of extinction of between 5 and 25 percent in 100 years. Only one population of Snake River Fall Chinook exists from a historical ESU that also included large mainstem populations upstream of the current location of the Hells Canyon Dam complex. The recent increases in natural origin abundance are encouraging. However, hatchery origin spawner proportions have increased dramatically in recent years—on average, 78 percent of the estimated adult spawners have been of hatchery origin over the most recent brood cycle.

Limiting Factors and Threats: Limiting factors and threats to the Snake River Fall-Run Chinook ESU include the following:

- Degraded habitat such as fish passage.
- *Degraded freshwater habitat*: Floodplain connectivity and function, and channel structure and complexity have been degraded as a result of cumulative impacts of agriculture, forestry, and development.
- Harvest-related effects.
- Mainstem Columbia River hydropower impacts.
- Hatchery-related effects.
- Degraded estuarine and nearshore habitat.

Conservation Actions: Major accomplishments from 2008 to 2010 for this ESU include the following:

- The 2010 FCRPS Supplemental Biological Opinion, which integrates the 2008 RPA and the Adaptive Management Implementation Plan,
  - Sets standards for survival of juvenile and adult salmon and steelhead migrating through the dams.
  - Includes a habitat program to protect and improve tributary and estuary habitat.
  - Provides new and expanded hatchery facilities and safety net conservation programs, and supports hatchery reforms.
  - Expands efforts to reduce juvenile and adult losses from predation by birds, other fish, and marine mammals.
- A 2008 agreement and NMFS ESA Biological Opinion for managing Columbia River tribal and non-tribal fishing protects 12 ESUs and steelhead DPSs in the Columbia Basin. The new agreement and Biological Opinion have been adopted by the Federal Court (under the authority of *U.S. v. Oregon*)

and parties to the agreement include the states of Washington, Oregon, and Idaho; the Umatilla, Yakama, Nez Perce, and Warm Springs tribes; the FWS; and NMFS.
- Negotiated a new Chinook harvest agreement as part of the Pacific Salmon Treaty re-negotiations. The U.S. achieved significant harvest reductions in west coast Canadian fisheries that will complement ongoing U.S. harvest measures to benefit Snake River fall Chinook salmon.
- *Continued improvements in federal land management practices*: Land management plans of the U.S. Forest Service and Bureau of Land Management are being designed to protect and restore habitat.
- Continued improvements in water quality, working with the Environmental Protection Agency and the States.
- *Conducted local habitat restoration and restoration of stream flows*: This work includes efforts by the Northwest Power Planning Council's Fish and Wildlife Program, PCSRF, Natural Resources Conservation Service, and the NOAA Restoration Center.
- Worked to improve water quantity via the Snake River basin adjudication settlement of water claims between the Nez Perce Tribe and the State of Idaho, including a program to improve instream flows in the Lemhi River—this was approved by Congress in late 2004 and by the State of Idaho and the Nez Perce Tribe in 2005.
- Continued programs to improve priority irrigation diversions by adding fish screens.

Priority Recovery Actions Needed: Priority recovery actions needed for this ESU include the following:
- Continue the structural and operational modifications to hydropower dams to improve salmon survival in the migration corridor.
- Protect high-quality habitats.
- Conduct habitat restoration, as 80 percent of historical habitat for this ESU has been lost.
- Manage river temperatures to benefit this ESU.
- Reduce hatchery fish on the spawning grounds.

Recovery Priority Number: 1

With a high magnitude of threat, high recovery potential, and the presence of conflict, this ESU has been assigned a recovery priority number of 1. The magnitude of threat to this ESU has been classified as high because of strong risks to its abundance, productivity, spatial structure, and diversity (which largely have persisted since its status was first reviewed), and because this ESU faces a strong extinction risk in the foreseeable future. This ESU does not meet the criteria for a moderate magnitude of threat (which stipulate that the species will not face extinction if recovery is temporarily held off, although there is a continuing population decline or threat to its habitat). Delaying recovery for this ESU would likely result in mounting extinction risks rather than maintaining the status quo level of risk. The recovery potential for this ESU has also been classified as high. Although numerous factors limit the recovery of this ESU, the source of these factors and their demographic impacts are relatively well understood and recovery planning is currently under way. Although it may be cost-prohibitive to completely address every limiting factor, it is likely that integrated reduction of most threats can achieve recovery of this ESU. Finally, as a complex variety of activities and management practices continue to impact the conservation and recovery of all Pacific salmon ESUs listed under the ESA, NMFS has determined "conflict" exists with regard to this ESU. Taken together, these three factors correspond to a recovery priority number of 1.

Upper Columbia River Steelhead DPS (*Oncorhynchus mykiss*)

Date Listed: Listed as endangered on August 18, 1997, and on August 24, 2009, NMFS announced a change in status for the Upper Columbia River steelhead (74 FR42605). In January 2006, we reclassified the Upper Columbia River steelhead from endangered to threatened based on an updated review that noted increasing steelhead abundance, more widespread spawning, and artificial propagation programs aimed at improving local adaptation and diversity within the range of this DPS (71 FR 834; January 5, 2006). In April 2006, our decision to downlist this DPS from endangered to threatened was challenged in the U.S. District Court for the Western District of Washington. On June 13, 2007, the district court ruled that we had erred in downlisting Upper Columbia River steelhead, concluding that we had not given appropriate consideration to self-sustaining natural populations (*Trout Unlimited v. Lohn,* C06-0483-JCC, 2007). The result of this ruling was to return Upper Columbia River steelhead to endangered status. We appealed that decision to the U.S. Court of Appeals for the Ninth Circuit and, on March 16, 2009, that court ruled that our downlisting did not violate the ESA. Accordingly, on June 18, 2009, the district court revised its ruling, effectively re-instating Upper Columbia River steelhead to threatened status under the ESA.

Legal Status: Threatened

Recovery Plan Status: A proposed ESA recovery plan was completed and approved by both the Upper Columbia Salmon Recovery Board and NMFS in July 2006. NMFS published a *Federal Register* Notice of Availability for a proposed recovery plan on September 29, 2006 (71 FR 57472, NMFS 2006c), for a 60-day review period, and extended for an additional 60 days on November 28, 2006. The final ESA recovery plan for this DPS was adopted by NMFS on October 7, 2007.

Technical Recovery Team Products: The Interior Columbia TRT identified independent populations and recommended population and DPS viability criteria.

Species Status: Upper Columbia steelhead populations have increased in natural-origin abundance in recent years, but productivity levels remain low. The proportions of hatchery-origin returns in natural spawning areas remain extremely high across the DPS, especially in the Methow and Okanogan River populations. The modest improvements in natural returns in recent years are probably primarily the result of several years of relatively good natural survival in the ocean and tributary habitats. Tributary habitat actions called for in the Upper Columbia Recovery Plan are anticipated to be implemented over the next 25 years and the benefits of some of those actions will require some time to be realized. Overall, the new information considered does not indicate a change in the biological risk category since the time of the last status review.

Limiting Factors and Threats: The limiting factors and threats for this DPS include:

- Mainstem Columbia River Hydropower–related adverse effects.
- *Degraded freshwater habitat*: floodplain connectivity and function, channel structure and complexity, riparian areas and large woody debris recruitment, stream flow, and water quality have been degraded as a result of cumulative impacts of agriculture, forestry, and development.
- Hatchery-related effects.
- Harvest-related effects.

Conservation Actions: Major accomplishments from 2008 to 2010 for this DPS include the following:

- Worked to improve stream flows through water conservation, leases, and purchases in over-appropriated streams (where available water is insufficient to meet existing water rights).
- Conducted complex negotiations each season through the *U.S. v. Oregon* forum to direct Columbia River harvest rates and fishery structure for the protection of listed steelhead.
- Equipped irrigation diversion withdrawals with screens, leading to greater productivity and abundance.

- Conducted and facilitated local habitat restoration projects. Conservation easements and land purchases of riparian areas along rivers and streams were used to protect critical spawning and rearing areas. The Farm Service Agency's Conservation Reserve and Enhancement Program protects riparian areas on farms and ranches.
- Hatchery program operational changes were made to benefit listed steelhead by reducing risks of hatchery-reared steelhead.
- Habitat actions protected some areas of intact habitat and improved areas of degraded habitat in the tributaries of the Columbia River and continued improvements in mainstem juvenile and adult passage under three HCPs with two local public utility districts and a Settlement Agreement with another public utility district. In particular, the Bureau of Reclamation has assisted in implementing several significant passage improvement projects in the Methow and Wenatchee basins.
- The 2010 FCRPS Supplemental Biological Opinion, which integrates the 2008 RPA and the Adaptive Management Implementation Plan,
  - Sets standards for survival of juvenile and adult salmon and steelhead migrating through the dams.
  - Includes a habitat program to protect and improve tributary and estuary habitat.
  - Provides new and expanded hatchery facilities and safety net conservation programs and supports hatchery reforms.
  - Expands efforts to reduce juvenile and adult losses from predation by birds, other fish, and marine mammals.
- A 2008 agreement and NMFS ESA Biological Opinion for managing Columbia River tribal and non-tribal fishing protects 12 ESUs and steelhead DPSs in the Columbia Basin. The new agreement and Biological Opinion have been adopted by the Federal Court (under the authority of *U.S. v. Oregon*) and parties to the agreement include the states of Washington, Oregon, and Idaho; the Umatilla, Yakama, Nez Perce, and Warm Springs tribes; the FWS; and NMFS.

Priority Recovery Actions Needed: Priority recovery actions needed for this DPS include the following:

- Protect high-quality habitat—particularly productive, sensitive floodplain habitats—from residential development.
- Improve fish passage at barriers along the migration corridor.
- Improve instream flows in priority tributaries.
- Restore habitat and increase habitat complexity.
- Update, complete, and implement Hatchery and Genetic Management Plans.

Recovery Priority Number: 1

With a high magnitude of threat, high recovery potential, and the presence of conflict, this DPS has been assigned a recovery priority number of 1. The magnitude of threat to this DPS has been classified as high because of strong risks to its abundance, productivity, spatial structure, and diversity (which largely have persisted since its status was first reviewed), and because this DPS faces a strong extinction risk in the foreseeable future. This DPS does not meet the criteria for a moderate magnitude of threat (which stipulate that the species will not face extinction if recovery is temporarily held off, although there is a continuing population decline or threat to its habitat). Delaying recovery for this DPS would likely result in mounting extinction risks rather than maintaining the status quo level of risk. The recovery potential for this DPS has also been classified as high. Although numerous factors limit the recovery of this DPS, the source of these factors and their demographic impacts are relatively well understood and recovery planning is currently underway. Although it may be cost-prohibitive to completely address every limiting factor, it is likely that integrated reduction of most threats can achieve recovery of this DPS. Finally, as a complex variety of activities and management practices continue to impact the conservation and recovery of all Pacific salmon ESU/DPSs listed under the ESA, NMFS has determined "conflict" exists with regard to this DPS. Taken together, these three factors correspond to a recovery priority number of 1.

Middle Columbia River Steelhead DPS (*Oncorhynchus mykiss*)

Date Listed: March 25, 1999; reclassified as a DPS January 5, 2006

Legal Status: Threatened

Recovery Plan Status: A final recovery plan for MCR steelhead was published on September 30, 2009 (74 FR 50165).

Technical Recovery Team Products: The Interior Columbia TRT identified independent populations and recommended population and DPS viability criteria.

Species Status: There have been improvements in the viability ratings for some of the component populations, but the Mid-Columbia steelhead DPS is not currently meeting the viability criteria (adopted from the Interior Columbia TRT) in the Mid-Columbia Steelhead Recovery Plan. In addition, several of the factors cited by the 2005 BRT (Good et al. 2005) remain as concerns or key uncertainties. Natural-origin spawning estimates are highly variable relative to minimum abundance thresholds across the populations in the DPS. Updated information indicates that stray levels into at least the Lower John Day River population are also high. Returns to the Yakima River basin and to the Umatilla and Walla Walla Rivers have been higher over the most recent brood cycle, while natural-origin returns to the John Day River have decreased. Out-of-basin hatchery stray proportions, although reduced, remain very high in the Deschutes River basin. Overall the new information considered does not indicate a change in the biological risk category since the time of the last status review.

Limiting Factors and Threats: The limiting factors and threats for this DPS include:

- *Degraded freshwater habitat*: Floodplain connectivity and function, channel structure and complexity, riparian areas, fish passage, stream substrate, stream flow, and water quality have been degraded as a result of cumulative impacts of agriculture, forestry, tributary hydro system activities, and development.
- Mainstem Columbia River Hydropower–related impacts.
- Hatchery-related effects.
- Harvest-related effects.

Conservation Actions: Major accomplishments from 2008 to 2010 for this DPS include the following:

- Accomplished hydropower operational changes.
- Conducted local habitat restoration projects, including reconnecting streams and side channels (e.g., Meacham and Iskuulpa Creeks in the Umatilla basin and Wilson Creek and Manastash Creek in the Yakima River). Conservation easements and land purchases of riparian areas along rivers and streams were used to protect critical spawning and rearing areas. The Farm Service Agency's Conservation Reserve and Enhancement Program has been used to establish riparian areas on farms and ranches in some watersheds (notably the Walla Walla River Basin).
- Opened 25+ miles of habitat with completion of passage project on Birch Creek (tributary to the Umatilla River).
- Water was saved and adult and juvenile passage provided with completion of Lower Touchet River Irrigation Diversion Project.

- Conducted complex negotiations each season through the *U.S. v. Oregon* forum to direct Columbia River harvest rates and fishery structure for the protection of listed steelhead.
- Equipped dozens of irrigation diversion withdrawals with screens, leading to greater productivity and abundance.
- Conducted water conservation projects in over-appropriated streams (where available water is insufficient to meet existing water rights) to transfer water rights to a state trust water program.
- Continued to operate the Warm Springs National Fish Hatchery weir to remove hatchery steelhead creating natural-origin steelhead refuge in upper Warms Springs River.
- Completed the juvenile fish passage facility at the Round Butte Complex dams on the Deschutes River and implemented a plan to reintroduce anadromous salmon and steelhead fry into historical habitat above the dams.
- The 2010 FCRPS Supplemental Biological Opinion, which integrates the 2008 RPA and the Adaptive Management Implementation Plan,
  - Sets standards for survival of juvenile and adult salmon and steelhead migrating through the dams.
  - Includes a habitat program to protect and improve tributary and estuary habitat.
  - Provides new and expanded hatchery facilities and safety net conservation programs and supports hatchery reforms.
  - Expands efforts to reduce juvenile and adult losses from predation by birds, other fish, and marine mammals.
- A 2008 agreement and NMFS ESA Biological Opinion for managing Columbia River tribal and non-tribal fishing protects 12 ESUs and steelhead DPSs in the Columbia Basin. The new agreement and Biological Opinion have been adopted by the Federal Court (under the authority of *U.S. v. Oregon*) and parties to the agreement include the states of Washington, Oregon, and Idaho; the Umatilla, Yakama, Nez Perce, and Warm Springs tribes; the FWS; and NMFS.
- Completed and implemented Hatchery and Genetic Management Plans and Tribal Resource Management Plans for tributary hatcheries.

Priority Recovery Actions Needed: Priority recovery actions needed for this DPS include the following:

- Protect high-quality habitat, particularly productive, sensitive floodplain habitats.
- Improve fish passage at barriers along the migration corridor.
- Increase instream flows in priority streams and achieve more normative flow regimes in watersheds regulated by the U.S. Bureau of Reclamation.
- Restore habitat and increase habitat complexity.
- Comprehensively mark all hatchery-produced steelhead to identify and remove hatchery strays, and to determine source of the out-of-basin strays.
- Continue implementation of Phase III of Umatilla Water Rights Project.
- Continue Yakima Basin steelhead kelt reconditioning program and initiate similar programs in other middle Columbia basins.
- Continue to develop locally adapted populations for steelhead mitigation hatchery programs and provide facility improvements (e.g., Dayton Acclimation Pond Trap) to collect broodstock and manage returning adult steelhead.
- Implement HSRG recommendations, including measures to reduce straying of Snake River basin steelhead into Middle Columbia tributaries.

Recovery Priority Number: 1

With a high magnitude of threat, high recovery potential, and the presence of conflict, this DPS has been assigned a recovery priority number of 1. The magnitude of threat to this DPS has been classified as high because of strong risks to its abundance, productivity, spatial structure, and diversity (which largely have persisted since its status was first reviewed), and because this DPS faces a strong extinction risk in the foreseeable future. This DPS does not meet the criteria for a moderate magnitude of threat (which stipulate

that the species will not face extinction if recovery is temporarily held off, although there is a continuing population decline or threat to its habitat). Delaying recovery for this DPS would likely result in mounting extinction risks rather than maintaining the status quo level of risk. The recovery potential for this DPS has also been classified as high. Although numerous factors limit the recovery of this DPS, the source of these factors and their demographic impacts are relatively well understood and recovery implementation is currently underway. Although it may be cost-prohibitive to completely address every limiting factor, it is likely that integrated reduction of most threats can achieve recovery of this DPS. Finally, as a complex variety of activities and management practices continue to impact the conservation and recovery of all Pacific salmon ESU/DPSs listed under the ESA, NMFS has determined "conflict" exists with regard to this DPS. Taken together, these three factors correspond to a recovery priority number of 1.

Snake River Basin Steelhead DPS (*Oncorhynchus mykiss*)

Date Listed: August 18, 1997; reclassified as a DPS January 5, 2006

Legal Status: Threatened

Recovery Plan Status: A draft plan was developed in March 1995, but was not adopted. No recovery plan has been completed, but recovery planning is underway.

Technical Recovery Team Products: The Interior Columbia TRT identified independent populations and completed the DPS and population-level viability criteria and population-level recovery goals.

Species Status: The level of natural production in the two populations with full data series and the Asotin Creek index reaches is encouraging, but the status of most populations in this DPS remains highly uncertain. Population-level natural-origin abundance and productivity inferred from aggregate data and juvenile indices indicate that many populations are likely below the minimum combinations defined by the Interior Columbia TRT viability criteria. A great deal of uncertainty remains regarding the relative proportion of hatchery fish in natural spawning areas near major hatchery release sites. There is little evidence for substantial change in the DPS's viability relative to the previous status reviews. Overall, the new information considered does not indicate a change in the biological risk category since the time of the last status review.

Limiting Factors and Threats: Limiting factors and threats to the Snake River basin steelhead DPS include the following:

- Mainstem Columbia River Hydropower–related adverse effects.
- *Degraded freshwater habitat*: Floodplain connectivity and function, channel structure and complexity, riparian areas and large woody debris recruitment, stream flow, and water quality have been degraded as a result of cumulative impacts of agriculture, forestry, and development.
- Impaired water quality and increased water temperature.
- Related harvest effects, particularly for B-run steelhead.
- Predation.
- Genetic diversity effects from out-of-population hatchery releases.

Conservation Actions: Major accomplishments from 2008 to 2010 for this DPS include the following:

- Accomplished structural and operational modification to hydropower system
- *Improved federal land management practices*: Land management plans of the U.S. Forest Service and Bureau of Land Management are being designed to protect and restore habitat.
- Improved water quality permitting procedures by working with EPA to develop procedures that enhance salmon considerations.
- Conducted local habitat restoration and restoration of stream flows. This includes efforts by the Northwest Power and Conservation Council Fish and Wildlife Program, PCSRF, Natural Resources Conservation Service, and NOAA Restoration Center, who have funded numerous projects to improve habitat conditions.
- Equipped hundreds of irrigation diversions with fish screens.
- Reduced overall harvest rates.
- Conducted efforts in hatchery conservation.

- Worked to improve water quantity via the Snake River basin adjudication settlement of water claims between the Nez Pierce Tribe and the State of Idaho, including a program to improve instream flows in the Lemhi River.
- The 2010 FCRPS Supplemental Biological Opinion, which integrates the 2008 RPA and the Adaptive Management Implementation Plan,
  - Sets standards for survival of juvenile and adult salmon and steelhead migrating through the dams.
  - Includes a habitat program to protect and improve tributary and estuary habitat.
  - Provides new and expanded hatchery facilities and safety net conservation programs and supports hatchery reforms.
  - Expands efforts to reduce juvenile and adult losses from predation by birds, other fish, and marine mammals.
- A 2008 agreement and NMFS ESA Biological Opinion for managing Columbia River tribal and non-tribal fishing protects 12 ESUs and steelhead DPSs in the Columbia Basin. The new agreement and Biological Opinion have been adopted by the Federal Court (under the authority of *U.S. v. Oregon*) and parties to the agreement include the states of Washington, Oregon, and Idaho; the Umatilla, Yakama, Nez Perce, and Warm Springs tribes; the FWS; and NMFS.
- Complete and implement Hatchery and Genetic Management Plans and Tribal Resource Management Plans for tributary hatcheries.

Priority Recovery Actions Needed: Priority recovery actions needed for this DPS include the following:

- Continue the structural and operational modifications to hydropower dams to improve salmon survival in the migration corridor.
- Protect high-quality habitats.
- Conduct habitat restoration.
- Increase instream flows.
- Complete and implement Fishery Management and Evaluation Plans and Tribal Resource Management Plans for tributary fisheries.
- Implement harvest agreements from *U.S. v. Oregon*.
- Complete and implement Hatchery and Genetic Management Plans.
- Control predation.
- Reduce harvest of B-run steelhead in mainstem fisheries

Recovery Priority Number: 1

With a high magnitude of threat, high recovery potential, and the presence of conflict, this DPS has been assigned a recovery priority number of 1. The magnitude of threat to this DPS has been classified as high, because of strong risks to its abundance, productivity, spatial structure, and diversity (which largely have persisted since its status was first reviewed), and because this DPS faces a strong extinction risk in the foreseeable future. This DPS does not meet the criteria for a moderate magnitude of threat (which stipulate that the species will not face extinction if recovery is temporarily held off, although there is a continuing population decline or threat to its habitat). Delaying recovery for this DPS would likely result in mounting extinction risks rather than maintaining the status quo level of risk. The recovery potential for this DPS has also been classified as high. Although numerous factors limit the recovery of this DPS, the source of these factors and their demographic impacts are relatively well understood and recovery planning is currently underway. Although it may be cost-prohibitive to completely address every limiting factor, it is likely that integrated reduction of most threats can achieve recovery of this DPS. Finally, as a complex variety of activities and management practices continue to impact the conservation and recovery of all Pacific salmon species listed under the ESA, NMFS has determined "conflict" exists with regard to this DPS. Taken together, these three factors correspond to a recovery priority number of 1.

Snake River Sockeye ESU (*Oncorhynchus nerka*)

Date Listed: November 20, 1991; reaffirmed June 28, 2005

Legal Status: Endangered

Recovery Plan Status: A draft plan was developed in March 1995, but was not adopted. No recovery plan has been completed, but recovery planning is underway. The Interior Columbia TRT identified independent populations and completed the population and ESU viability criteria.

Species Status: Substantial progress has been made with the Snake River sockeye captive brood stock-based hatchery program, but natural production levels of anadromous returns remain extremely low for this ESU. Record returns of adult fish to the Stanley Basin were observed in 2008 and 2009 (Ford et al. 2010). In recent years, sufficient numbers of eggs, juveniles, and returning hatchery adults have been available from the captive brood–based program to allow some returning adults to spawn naturally. This is occurring in three of the Stanley Basin lakes that are candidates for sockeye restoration. The availability of increased numbers of adults and juveniles in recent years is also allowing direct evaluation of juvenile downstream passage survival and adult upstream survival. Although the captive brood program has been successful in providing substantial numbers of hatchery-produced sockeye for use in supplementation efforts, substantial increases in survival rates across life history stages must occur in order to re-establish sustainable natural production (e.g., Hebdon et al. 2004, Keefer et al. 2008). The increased abundance of hatchery-reared Snake River sockeye reduces the risk of immediate loss, but levels of naturally produced sockeye returns remain extremely low. As a result, overall, although the risk status of the Snake River sockeye salmon ESU appears to be on an improving trend, the new information considered does not indicate a change in the biological risk category since the time of the last status review.

Limiting Factors and Threats: The key factor limiting recovery for this ESU is survival outside of the Stanley Basin. Portions of the migration corridor in the Salmon River are impeded by water quality and temperature (IDEQ 2002). Increased temperatures may reduce the survival of adult sockeye returning to the Stanley Basin. The natural hydrological regime in the upper mainstem Salmon River Basin has been altered by water withdrawals. In most years, sockeye adult returns to Lower Granite suffer catastrophic losses (> 50 percent mortality in one year; Reed et al. 2003) before reaching the Stanley Basin, although the factors causing these losses have not been identified. In the Columbia and lower Snake River migration corridor, predation rates on juvenile sockeye salmon are unknown, but terns and cormorants consume 12 percent of all salmon smolts reaching the estuary, and piscivorous fish consume an estimated 8 percent of migrating juvenile salmon.

Conservation Actions: Major accomplishments from 2008 to 2010 for this ESU include the following:

- The 2010 FCRPS Supplemental Biological Opinion, which integrates the 2008 RPA and the Adaptive Management Implementation Plan,
  - — Enables improvements in safe passage for juvenile and adult sockeye salmon migration corridors.
  - — Identifies projects that will protect and improve tributary and estuary habitat for sockeye salmon.
  - — Will fund expansion of captive propagation program.
  - — Expands efforts to reduce juvenile and adult loses from predation by birds, other fish, and marine mammals.
- Increased captive propagation program capacity toward goal of 1 million juveniles.

- Expanded diversity of locations for releases of captive propagation program fish, and continued release of fish at variety of life stages (eggs, juveniles, and adults).
- Conducted local habitat restoration and restoration of stream flows. This work includes efforts by the Northwest Power Planning Council Fish and Wildlife Program, PCSRF, Natural Resources Conservation Service, and the NOAA Restoration Center.
- Continued installation of fish screens on irrigation diversions.
- MOUs between NMFS and five states and three tribal commissions established criteria and processes for funding priority PCSRF projects.
- MOU between federal action agencies and Shoshone-Bannock Tribes provides funding commitments for habitat and other projects in the Snake River Basin.
- A 2008 agreement and NMFS ESA Biological Opinion for managing Columbia River tribal and non-tribal fishing protects 12 ESUs and steelhead DPSs in the Columbia Basin. The new agreement and Biological Opinion have been adopted by the Federal Court (under the authority of *U.S. v. Oregon*) and parties to the agreement include the states of Washington, Oregon, and Idaho; the Umatilla, Yakama, Nez Perce, and Warm Springs tribes; the FWS; and NMFS.

Priority Recovery Actions Needed: Priority recovery actions needed for this ESU include the following:

- Continue to explore expansion of releases to multiple locations and at multiple life-history stages.
- Expand captive propagation program size to maintain genetic diversity.
- Expand marking of releases to evaluate habitat usage success and to identify downstream sources of mortality.
- Improve survival in the migration corridor for adults and juveniles.
- Continue the structural and operational modifications to hydropower dams to improve salmon survival in the migration corridor.
- Continue to protect high-quality habitats and conduct habitat restoration.
- Provide increases in instream flows.
- Continue efforts to control predation.

Recovery Priority Number: 3

With a high magnitude of threat, a low to moderate recovery potential, and the presence of conflict, this ESU has been assigned a recovery priority number of 3. The magnitude of threat to this ESU has been classified as high because of strong risks to its abundance, productivity, spatial structure, and diversity (which largely have persisted since its status was first reviewed), and because this ESU faces a strong extinction risk in the foreseeable future. This ESU does not meet the criteria for a moderate magnitude of threat (which stipulate that the species will not face extinction if recovery is temporarily held off, although there is a continuing population decline or threat to its habitat). Delaying recovery for this ESU would likely result in mounting extinction risks rather than maintaining the status quo level of risk. The recovery potential for this ESU has been classified as low to moderate. Numerous factors limit the recovery of this ESU; the source of these factors and their demographic impacts are not well understood and research is needed. Finally, as a complex variety of activities and management practices continue to impact the conservation and recovery of all Pacific salmon ESUs listed under the ESA, NMFS has determined "conflict" exists with regard to this ESU. Taken together, these three factors correspond to a recovery priority number of 3.

Oregon Coast Coho (*Oncorhynchus kisutch*)

Date Listed: February 11, 2008 (NMFS conducted a new status review of this ESU in 2010 and proposed to retain the threatened listing (75 FR 29489, May 26, 2010)

Legal Status: Threatened

Recovery Plan Status: Recovery planning was initiated in 2005 when the ESU was previously listed. The State of Oregon adopted an Oregon Coast Coho Conservation Plan in 2007 prior to the ESU's relisting in 2008. Based on the recent listing of this ESU, recovery planning is being re-initiated in coordination with the State of Oregon.

Technical Recovery Team Products: The Oregon and Northern California Coasts TRT has identified independent populations and completed the population and ESU viability criteria.

Species Status: NMFS completed a new status review for this ESU in 2010. After considering new information, we proposed to retain the threatened listing for this ESU. While some previously identified threats—such as those from overharvest and hatchery practices—have been greatly reduced, others continue as sources of significant risk to the ESU. In particular, continued declines in freshwater habitat conditions, and effects of expected climate change on freshwater, estuarine, and marine habitats are concerning. Although significantly higher spawner returns in recent years is encouraging, these increases more likely reflect short-term favorable marine productivity conditions than long-term improvement in freshwater productivity. This ESU remains at risk of becoming endangered in the foreseeable future.

Limiting Factors and Threats: Threats and impacts to the Oregon Coast Coho ESU include degraded freshwater habitat: floodplain connectivity and function, channel structure and complexity, riparian areas and large wood supply, stream substrate, stream flow, and water quality have been degraded as a result of cumulative impacts of agriculture, forestry, and development.

Conservation Actions: Major accomplishments since the 2008 listing of this ESU include the following:

- The State of Oregon adopted an Oregon Coast Coho Conservation Plan in 2007, which identifies limiting factors and threats and identifies actions to recover the ESU. The Plan establishes ambitious conservation goals and identifies a monitoring program to evaluate the effectiveness of conservation actions that contribute to rebuilding the ESU.
- Implementation of the State's Oregon Coast Coho Conservation Plan has included outreach, education, and training of watershed councils, as well as outreach to coastal lowland landowners in areas of high habitat value for this ESU, with particular emphasis on the agricultural community.
- *Habitat restoration projects*: Hundreds of projects have improved riparian areas, fish passage at culvert barriers, and stream and floodplain function.
- *Improved forest management practices on federal lands and some state and private lands*: The Northwest Forest Plan Aquatic Conservation Strategy continued in 2008–2010. The strategy is designed to conserve and restore salmon and steelhead habitat and provide an anchor for federal lands' contribution to salmon recovery.
- *Hatchery reforms*: Oregon's aggressive hatchery reform work has resulted in substantial reductions of this threat. Hatchery coho are released in only three out of more than 56 populations in the ESU, and the magnitude of releases has declined from a peak of 35 million smolts in 1981 to approximately 500,000 in 2008. The reduction in the number of hatchery fish released has reduced the potential for competition with, and predation on, natural coho. All hatchery coho releases in the ESU are now marked, affording improved monitoring and assessment of co-existing naturally produced coho populations.

- *Harvest reforms*: Restrictive harvest regulations, developed concurrently with the State of Oregon, have imposed conservative restrictions on directed and incidental fishery mortality, and appropriately consider marine survival conditions and the biological status of naturally produced coho populations.

Priority Recovery Actions Needed: Priority recovery actions needed for this ESU include the following:

- Develop a recovery plan in coordination with the State of Oregon.
- Improve land use practices to protect existing high-quality habitats and prevent further degradation, along with continued targeted restoration based on priority locations and issues identified in the Oregon Coast Coho Conservation Plan.
- Educate private landowners and develop incentives for lowland landowners to protect and restore high-quality coastal coho habitat.
- Research and monitor the distribution, status, and trends of coho salmon.
- Improve agricultural and forestry practices to address limiting factors and threats, particularly regarding riparian protections, road construction, and road maintenance.
- Continue to remove and upgrade high-priority human-made fish passage barriers.
- Conduct freshwater habitat restoration to address erosion, stabilize banks, protect and restore riparian habitat, and reintroduce large wood.
- Improve freshwater habitat quality and quantity.

Recovery Priority Number: 1

With a high magnitude of threat, high recovery potential, and the presence of conflict, this ESU has been assigned a recovery priority number of 1. The magnitude of threat to this ESU has been classified as high, because of strong risks to its abundance, productivity, spatial structure, and diversity (which largely have persisted since its status was first reviewed), and because this ESU faces a strong extinction risk in the foreseeable future. This ESU does not meet the criteria for a moderate magnitude of threat (which stipulate that the species will not face extinction if recovery is temporarily held off, although there is a continuing population decline or threat to its habitat). Delaying recovery of this ESU would likely result in mounting extinction risks rather than maintaining the status quo level of risk. The recovery potential for this ESU has also been classified as high. Although numerous factors limit the recovery of this ESU, the source of these factors and their demographic impacts are relatively well understood and recovery planning is currently underway. Although it may be cost-prohibitive to completely address every limiting factor, it is likely that integrated reduction of most threats can achieve recovery of this ESU. Finally, as a complex variety of activities and management practices continue to impact the conservation and recovery of all Pacific salmon ESUs listed under the ESA, NMFS has determined "conflict" exists with regard to this ESU. Taken together, these three factors correspond to a recovery priority number of 1.

Southern Oregon/Northern California Coast Coho ESU (*Oncorhynchus kisutch)*

Date Listed: May 6, 1997 (62 FR 24588); reaffirmed June 28, 2005 (70 FR 37160)

Legal Status: Threatened

Recovery Plan Status: The recovery plan is currently in development. NMFS completed a co-manager/peer review draft of the recovery plan in June 2009, and expects to release a public review draft in 2011.

Photo credit: Thomas Dunklin

Species Status: The SONCC coho salmon ESU is made up of 45 populations, which generally correspond to river basins. The number of spawners in each of these populations is well below that needed to persist over time without the protections of the ESA. Many of these populations contain so few spawners that an individual spawner's reproductive success suffers due to an inability to find mates or an increased chance of being preyed upon. These populations include those in the Shasta River, Upper Klamath River, Salmon River, Mattole River, Middle Mainstem Eel River, Mainstem Eel River, and Lower Eel/Van Duzen River. Several independent populations no longer support any coho salmon, including those in the Middle Fork Eel River and North Fork Eel River.

All available information indicates that coho salmon abundance in this ESU has decreased since the last status review in 2005. The longest existing time series from the past 9 years for Shasta River has a significant negative trend, and two extensive time series from the Rogue River Basin show recent negative trends.

Threats and Impacts: The declining trends and low spawner abundance for most populations in the ESU demonstrate the need to improve freshwater habitat conditions across the ESU so that the populations can regain some aspects of their historical resiliency to counter fluctuations in marine survival.

Critical threats to SONCC coho salmon include: (1) timber harvest practices on private lands, (2) roads, (3) agriculture operations and grazing, (4) urbanization, (5) water withdrawal; (6) stream channelization, (7) small population dynamics, and (8) climate change. As a result of past and current threats, the following critical stresses persist in the ESU: (1) lack of floodplain and channel structure, (2) impaired water quality, (3) altered hydrologic function due to altered amount and timing of river flows, (4) degraded riparian forest conditions, (5) altered sediment supply, and (6) impaired estuarine function.
Unlike the other four listing factors (habitat alteration, overutilization, disease and predation, and regulatory mechanisms), threats from natural or man-made factors have worsened in the past 5 years, primarily due to four factors: small population dynamics, climate change, multi-year drought, and poor ocean survival conditions.

1. Small populations experience dynamics that significantly increase the risk of extinction. Given the small size of many populations in the ESU, stochastic processes are likely contributing to population instability and decline.

2. Expected impacts on SONCC coho salmon from climate change include greater climate extremes, decreased streamflows as a result of decreasing snowpack, warmer instream water temperatures, warmer stream and coastal ocean temperatures, more frequent wildfires, delays in the onset of coastal upwelling and associated delays in ocean spring bloom, and declining ocean conditions.
3. Three consecutive years of drought in California from water years 2007 to 2009 led to decreased instream flows and worsened habitat conditions for juvenile SONCC coho salmon in two-thirds of the range.
4. Data from hatchery fish released in Oregon indicate extremely low marine survival for the 2005 and 2006 brood years.

Conservation Actions: During 2008–2010, key conservation actions included:

- Continued work on recovery plan, including preparation of 45 profiles explaining each of the populations, completion of a threats assessment, and identification of recovery actions.
- On February 18, 2010, NOAA signed the Klamath Hydroelectric Settlement Agreement and issued a strong letter of support for the Klamath Basin Restoration Agreement. Together, these Agreements represent the largest dam removal and watershed restoration effort in United States history.
- NMFS worked very closely with PacifiCorp on developing a HCP for operation and maintenance of its Klamath Hydroelectric Project—which includes a $500,000 coho enhancement fund.
- NMFS has worked very closely with PacifiCorp and the California Department of Fish and Game (CDFG) on a Hatchery Genetic Management Plan to modify operations at Iron Gate Hatchery on the Klamath River so they are consistent with conservation principles to benefit coho salmon.
- Conducted over 200 ESA section 7 consultations with federal action agencies that fund, authorize, or carry out projects such as irrigation, water diversion, timber harvest, watershed restoration, fish passage, gravel mining, grazing, and transportation projects.
- Collaborated with California Department of Transportation, the Federal Highway Administration, and the U.S. Army Corps of Engineers on program-level consultation for routine road maintenance activities. Recently developed streamlined consultation procedures will be used.
- Provided technical assistance to the Corps of Engineers on how to reduce effects of gravel and vegetation removal, and flood control activities, on coho salmon in lower Redwood Creek.
- Completed consultation with the Corps of Engineers addressing gravel mining at multiple sites along rivers in Del Norte, Humboldt, and Mendocino Counties.
- Collaborated with Fruit Growers Supply Company on an HCP for lands in the Klamath River basin. The HCP covers approximately 154,000 acres of industrial timberlands.
- Continued implementation monitoring on three existing HCPs. The HCPs for Humboldt Redwood Company (formerly Pacific Lumber Company) and Green Diamond Resource Company pertain to management of industrial timberlands and include activities related to timber management and forest road development and maintenance. The Humboldt Bay Municipal Water District HCP was developed to reduce direct salmonid mortality at the water diversion and better coordinate withdrawals to improve flow in the Mad River.
- Continued collaboration with the Bureau of Reclamation on the Rogue River Basin Project for several irrigation districts.
- Consulted with the Bureau of Reclamation on the Savage Rapids Dam removal and irrigation pump installation. Savage Rapids Dam was removed in 2009.
- Completed consultation with the city of Gold Hill, the Rogue Valley Council of Governments, and other agencies involved with the removal of the Gold Hill Dam on the Rogue River. Gold Hill Dam was removed in 2008.
- Worked with the Corps of Engineers and other agencies on the removal of Elk Creek Dam, which was completed in 2008.
- Consulted with Jackson County and other agencies on the removal of Gold Ray Dam on the Rogue River. Gold Ray Dam was removed in 2010.
- Provided technical assistance and funding to multiple stakeholders on activities to restore SONCC coho salmon habitat. Restoration activities included removing barriers to fish passage, creating off-

channel overwintering habitat, installing complex instream structures, restoring estuarine function, removing invasive plants, planting native vegetation, and using fencing to exclude cattle from streams.

Priority Recovery Actions Needed:

- Restore upstream and downstream passage at dams in the Klamath River basin and other critically important locations.
- Restore juvenile summer and winter rearing habitat, including estuarine habitat, by reconnecting channels to floodplains and increasing channel complexity.
- Ensure sufficient water supply and allocation by establishing water rights programs, designating fully appropriated watersheds, developing passive diversion devices or off-stream storage, eliminating illegal water diversions, and improving water drafting and dam operation practices.
- Reduce chronic sediment input from roads by conducting focused road treatment and decommissioning at key locations and improving road building and maintenance practices.
- Restore riparian vegetation by improving riparian protection requirements associated with agricultural and forestry practices, and planting vegetation near streams.
- Monitor distribution, status, and trends of coho salmon and its freshwater and estuarine habitat.

Recovery Priority Number: 1

This priority number is based on a high magnitude of threat, a high potential for recovery, and anticipated conflict with current and future land disturbance and water-associated development within the range of the ESU.

Central California Coast Coho Salmon ESU (Oncorhynchus kisutch)

Date Listed: October 31, 1996 (61 FR 56138) relisted June 28, 2005 (70 FR 37160)

Legal Status: Endangered (reclassified from original threatened listing)

Recovery Plan Status: The Recovery Outline was completed in October 2005. The Public Draft recovery plan for CCC coho salmon was released to the public in March 2010. A final recovery plan is scheduled for late 2011 or early 2012.

Photo credit: Morgan Bond, Southwest Fisheries Science Center

Species Status: *Near Extinction*

The Central California Coast coho salmon ESU includes all naturally spawned populations from Punta Gorda in northern California to the south (including the San Lorenzo River in central California), as well as populations in tributaries to San Francisco Bay (excluding the Sacramento–San Joaquin River system). Four artificial propagation programs are considered part of this ESU: the Don Clausen/Warm Springs Fish Hatchery Captive Broodstock Program, Scott Creek/King Fisher Flats Conservation Program, Scott Creek Captive Broodstock Program, and the Noyo River Fish Station Egg-take Program coho hatchery program. The artificially propagated stocks are no more than moderately divergent genetically from natural populations.

All population data and information indicate that the CCC coho salmon ESU is critically close to extinction. Only a few hundred adults have returned annually over the past several years. CCC coho salmon are extirpated in all but a few watersheds south of the Navarro River. Poor freshwater survival and poor ocean conditions/ocean survival are acting on the population in synchrony to result in the population collapse. The NMFS Southwest Fisheries Science Center indicates that: "Near final data from across the range of coho salmon on the coast of California reveal there was a 72% decline in returning adults in 2007/08 compared to the same cohort in 2004/05" (MacFarlane *et al.* 2008).

Information on the abundance and productivity trends for the naturally spawning component of the CCC coho ESU is extremely limited. No long-term time series of spawner abundance exist for individual river systems. Data are particularly lacking for many river basins in the southern two-thirds of the ESU, where naturally spawning populations are considered to be at the greatest risk. Analyses of juvenile coho presence-absence information, juvenile density surveys, and irregular adult counts for the South Fork Noyo River indicate low abundance and long-term downward trends. The extirpation or near extirpation of natural coho salmon populations in several major river basins and across most of the southern historical range of the ESU represents a significant risk to ESU spatial structure and diversity. Trend data for this ESU show a continuing decline in abundance and a population that is on a trajectory toward extinction. The status and ESU boundary for CCC coho salmon will be reviewed by the BRT in the near future; however, consideration of new information for the status review update suggests that extinction risk for CCC coho salmon has worsened.

Threats and Impacts: The following limiting factors, and their level of threat to this ESU, were evaluated during the development of the draft Recovery Plan:

Degraded Habitat-Estuarine and Nearshore Marine: High Threat

Degraded Habitat-Floodplain Connectivity and Function: High Threat
Degraded Habitat-Channel Structure and Complexity: Moderate Threat
Degraded Habitat-Riparian Areas and Large Woody Debris Recruitment: High Threat
Degraded Habitat-Stream Substrate: Moderate to High Threat
Degraded Habitat-Stream Flow: Moderate Threat
Degraded Habitat-Water Quality: Moderate to High Threat
Degraded Habitat-Fish Passage: Moderate to High Threat
Hatchery-related Adverse Effects: Low Threat
Harvest-related Adverse Effects: High Threat
Predation/Competition/ Disease: High Threat

The remaining CCC coho salmon persist predominantly on non-federal forestlands except for Lagunitas Creek. Final Rules were adopted by the Governor-appointed Board of Forestry in 2009; however, questions remain regarding their adequacy to fully protect salmon and steelhead. Other critical sources of threats to this ESU include: (1) lack of oversight on county grading activities; (2) water use, riparian forest removal, erosion, road building, and other practices associated with agricultural operations; (3) changes to channel morphology and reduced floodplain connectivity due to levee construction, flood control structures, roads, erosion control structures, and urbanization; (4) urbanization and rural development leading to reduced riparian forests, pollution, unscreened water diversions, and water demands exceeding availability; (5) potential genetic modification in hatchery stocks resulting from domestication selection; (6) incidental mortality from catch-and-release hooking; (7) climatic variation leading to drought, flooding, and variable ocean conditions; and (8) predation.

Conservation Actions: During 2008–2010, key conservation actions included:

- Secured first Conservation Bank for CCC coho salmon.
- Conducted section 7 consultations with key water agencies to improve conservation (includes 2008 completed Russian River Biological Opinion for U.S. Army Corps of Engineers and Sonoma County Water Agency operations).
- Worked with California Board of Forestry as they proposed new rules for the protection of salmonids and their habitats.
- Continued to implement the Fish Friendly Farming program, a multi-agency, third-party certification and technical assistance program for wine grape growers practicing best management practices for salmon. Over 10,000 acres of private property have been inspected and certified through this program.
- Collaborated proactively with counties on Grading Ordinances and Riparian Ordinances.
- Worked to implement white papers for instream flow, gravel mining, and summer dams.
- Encouraged FishNet 4C, a multi-county group, dedicating resources to county restoration activities focused on salmon and steelhead restoration.
- Continued hatchery improvements for coho salmon broodstock at Warm Springs Dam.
- Continued participation with the PCSRF Grant program.

Priority Recovery Actions Needed: ***The first priority is to act immediately to prevent the extinction of CCC coho salmon from California's central coast.*** This would include:

1. Protect all existing populations and increase survival for individuals and their offspring.
2. Conduct focused and careful restoration work in areas known to support the last remaining populations to increase probability of juvenile/smolt survival.
3. Consider expanding captive broodstock programs to preserve the remaining genetic diversity. Funding for the Monterey Bay Salmon and Trout Project is critical in preserving the last genetic stock for the southern extent of coho salmon.
4. Conduct immediate outreach to inform the public, anglers, agencies, etc., of the critical status of CCC coho.

Other Needs:

- Research and monitor distribution, status, and trends of coho salmon.
- Encourage landowners to implement instream restoration, which includes incentivizing permitting processes and providing additional financial assistance.
- Address water diversions in the core watersheds where coho salmon are persisting.
- Provide a process to allow large wood input to be conducted in association with logging.
- Protect and restore habitat complexity and connectivity across the watershed.
- Conduct focused freshwater habitat restoration in anadromous salmonid streams (e.g., erosion control, bank stabilization, riparian protection/restoration, and large wood input).
- Improve baseflows via innovations in the water rights program, designate fully appropriated watersheds, develop passive diversion devices or off-stream storage, eliminate illegal water diversions, and improve criteria for drafting and dam operations.
- Improve agricultural and forestry practices, in particular riparian protections, road construction, and road maintenance.
- Improve county and city planning, regulations (e.g., riparian and grading ordinances), and county road maintenance programs.
- Remove/upgrade high-priority man-made fish passage barriers (e.g., watercourse crossings and non-hydropower dams) and implement screening of all water diversions.
- Replace existing outdated septic systems and improve wastewater management.
- Identify and treat point and non-point source pollution of streams from wastewater, agricultural practices, and urban environments.
- Modify channel and flood control maintenance and eliminate artificial breeching of sandbars for improvements in channel and estuarine habitats.

Recovery Priority Number: 1

Ranking for CCC coho salmon was based on a high degree of threat, a high recovery potential, and an anticipated conflict with economic activity. The BRT agreed in 2005 that natural populations of coho salmon in the CCC coho ESU are in danger of extinction. This determination was based on the following factors: (1) substantially low abundance of coho salmon from historical levels (e.g., more than 50 percent of coho streams no longer have spawning runs), (2) long-term trends clearly downward, (3) degraded habitats, (4) threats to genetic integrity due to hatchery plantings, and (5) recent droughts and change in ocean productivity. The status reviews underway are likely to determine that the extinction risk for CCC coho salmon has worsened. NMFS believes that a moderate to high potential for recovery is possible for CCC coho salmon because of the likelihood that freshwater impacts can be substantially controlled or reduced through habitat protection, implementation of best management practices, and focused restoration. Over 80 percent of the range of CCC coho lies under private ownership. Forestry is the predominant land use; however, high levels of forest conversion to agriculture and urbanization are currently underway. Imminent land use changes are anticipated to conflict with the conservation needs of CCC coho salmon.

Northern California Steelhead DPS (*Oncorhynchus mykiss*)

Date Listed: June 7, 2000 (65 FR 36074) and reaffirmed January 5, 2006 (71 FR 834)

Legal Status: Threatened

Recovery Plan Status: The Recovery Outline was completed and signed July 16, 2007. A Draft Multi-Species (Northern California steelhead, Coastal California (CC) Chinook, Central California Coast (CCC) steelhead) Recovery Plan is in development and expected to be released for peer and co-manager review in 2011.

Photo credit: Josh Fuller, NMFS Santa Rosa

Species Status: The Northern California steelhead DPS includes all naturally spawned populations of steelhead in California coastal river basins from Redwood Creek (inclusive) southward to the Russian River (exclusive). Two artificial propagation programs are considered part of the DPS: the Yager Creek Hatchery and the North Fork Gualala River Hatchery (Gualala River Steelhead Project).

Little historical abundance information exists for the naturally spawning portion of the Northern California steelhead DPS. Although data were relatively limited, analysis by the original BRT in the 1996 status review suggested the following conclusions: (1) population abundances were low relative to historical estimates, (2) recent trends were downward, and (3) summer-run steelhead abundance was very low. The BRT was also concerned about the negative influences of hatchery stocks, especially from the Mad River Hatchery which is not considered part of the DPS. The Mad River Hatchery program was terminated in 2004, thus reducing the genetic risks associated with propagation of these fish.

Data for the 2005 status review showed both upward and downward trends for populations within this DPS. The Middle Fork Eel River and Mad River portions showed a downward trend in adult returns, while juvenile abundance for 10 independent populations showed both upward and downward trends. Overall, the 2005 status review showed that the DPS was declining during the time for which data were available.

The 2011 status review update is underway with the boundaries and status of both CCC steelhead and Northern California steelhead DPS' to be reviewed by a BRT in the near future. Thus, the status of the Northern California steelhead DPS remains unchanged for this biennial review.

The two artificial propagation programs that are part of the Northern California steelhead DPS are thought to decrease risk of extinction to some degree by contributing to increased abundance. Additionally, changes to regulations concerning sport fishing likely reduce the extinction risk for the DPS. Ultimately, however, the most recent status review concluded that steelhead in the Northern California steelhead DPS remain likely to become endangered in the foreseeable future.

Threats and Impacts: The following limiting factors, and their level of threat to this DPS, were evaluated during the development of the Internal Draft Multi-Species Recovery Plan:

Degraded Habitat-Estuarine and Nearshore Marine: High Threat
Degraded Habitat-Floodplain Connectivity and Function: Moderate to High Threat
Degraded Habitat-Channel Structure and Complexity: Moderate Threat

Degraded Habitat-Riparian Areas and Large Woody Debris Recruitment: Moderate Threat
Degraded Habitat-Stream Substrate: Moderate to High Threat
Degraded Habitat-Stream Flow: Moderate Threat
Degraded Habitat-Water Quality: Moderate to High Threat
Degraded Habitat-Fish Passage: High Threat
Hatchery-related Adverse Effects: Low Threat
Harvest-related Adverse Effects: Moderate to High Threat
Predation/Competition/ Disease: High Threat

California's non-federal forest harvest operations are identified in the final listing notice as a critical threat to this DPS. Although this threat continues, California is revising their Forest Practice Rules with the intent to protect watersheds with anadromous salmonids. Final Rules were adopted by the Governor-appointed Board of Forestry in 2009; however, questions remain regarding their adequacy to fully protect salmon and steelhead.

Other critical sources of threats to this DPS include: (1) lack of oversight on county grading activities that may affect steelhead; (2) water use, riparian forest removal, erosion, road building, and other practices associated with agricultural operations; (3) changes to channel morphology and reduced floodplain connectivity due to levee construction, flood control structures, roads, erosion control structures, and urbanization; (4) urbanization and rural development leading to reduced riparian forests, pollution, unscreened water diversions, and water demands exceeding availability; (5) potential genetic modification in hatchery stocks resulting from domestication selection; (6) incidental mortality from catch-and-release hooking; (7) climatic variation leading to drought, flooding, and variable ocean conditions; and (8) predation.

Conservation Actions: During 2008–2010, key conservation actions included:

- Continued to work with California Board of Forestry as they revised their forest practice rules to provide for salmonids and their habitats.
- Improved baseflows via improvements to the water rights program, by working to designate fully appropriated watersheds, develop passive diversion devices or off-stream storage, eliminate illegal water diversions, and improve criteria for water drafting and dam operations.
- Continued to implement Fish Friendly Farming program, a multi-agency, third-party certification and technical assistance program for wine grape growers practicing best management practices for salmon. Over 10,000 acres of private property have been inspected and certified through this program.
- Collaborated proactively with counties on General Plan Updates, Grading Ordinances, and Riparian Ordinances.
- Implemented white papers and policies for instream flow, gravel mining, and summer dams.
- Encouraged FishNet 4C, a multi-county group, dedicating resources to county restoration activities focused on salmon and steelhead restoration.
- Continued participation with PCSRF Grant program.

Priority Recovery Actions Needed:

- Research and monitor distribution, status, and trends of steelhead.
- Continue to improve baseflows via innovations to the water rights program, designate fully appropriated watersheds, develop passive diversion devices or off-stream storage, eliminate illegal water diversions, and improve criteria for water drafting and dam operations.
- Continue working with the California Board of Forestry regarding non-federal timber harvest operations and possible statewide forestry plan.
- Promote operations of current recovery hatcheries and develop Hatchery and Genetics Management Plans to minimize negative influences of hatcheries.
- Improve freshwater habitat quantity and quality.
- Protect and restore habitat complexity and connectivity from the upper watershed to the ocean.

- Conduct focused freshwater habitat restoration in anadromous salmonid streams (e.g., erosion control, bank stabilization, riparian protection and restoration, and reintroduction of large woody debris).
- Improve agricultural and forestry practices, in particular riparian protections, road construction, and road maintenance.
- Improve county and city planning, regulations (e.g., riparian and grading ordinances), and county road maintenance programs.
- Remove/upgrade high-priority man-made fish passage barriers (e.g., watercourse crossings and non-hydropower dams).
- Implement screening of all water diversion structures.
- Replace existing outdated septic systems and improve wastewater management.
- Identify and treat point and non-point source pollution of streams from wastewater, agricultural practices, and urban environments.
- Modify channel and flood control maintenance and eliminate artificial breeching of sandbars for improvements in channel and estuarine habitats.

Recovery Priority Number: 5

The recovery priority number for the Northern California steelhead DPS is based on a moderate degree of threat, a high recovery potential, and anticipated conflict with development projects or other economic activity. A majority of the BRT that conducted the 2005 status review of steelhead populations in Washington, Oregon, and California concluded that natural populations of Northern California steelhead are likely to become endangered. Abundance and productivity were of concern, while spatial structure and diversity were of lower concern. Uncertainty resulting from lack of data was considered by the BRT to be a source of risk, especially for the winter-run portion of this DPS. Due to the lack of data, the recovery priority number will be reevaluated in the future as the recovery plan is developed. A high potential for recovery exists for the Northern California steelhead DPS because the majority of the DPS is not presently in urban environments. Imminent land use changes and economic activities (timber, ranching, and agriculture) are anticipated to conflict with the conservation needs of Northern California steelhead.

California Coastal Chinook Salmon ESU (*Oncorhynchus tshawytscha*)

Date Listed: September 16, 1999 (64 FR 50394) and reaffirmed June 28, 2005 (70 FR 37160)

Legal Status: Threatened

Recovery Plan Status: The Recovery Outline was completed and signed July 16, 2007. A Multi-Species (Northern California steelhead, CC Chinook, CCC steelhead) Recovery Plan is in development and expected to be released for peer and co-manager review in 2011.

Photo credit: Cathy Myers

Species Status: The California Coastal (CC) Chinook salmon ESU includes all naturally spawned populations of Chinook salmon from rivers and streams south of the Klamath River (exclusive) to the Russian River (inclusive). Seven artificial propagation programs are considered part of the ESU: the Humboldt Fish Action Council (Freshwater Creek), Yager Creek, Redwood Creek, Hollow Tree, Van Arsdale Fish Station, Mattole Salmon Group, and Mad River Hatchery fall-run Chinook hatchery programs.

Information on abundance and productivity trends for the naturally spawning component of the CC Chinook salmon ESU is extremely limited. A status review conducted by the BRT in 2005 concluded that CC Chinook salmon continue to exhibit depressed population sizes relative to historical abundances. A reduction of geographic distribution was also noted, particularly for spring-run Chinook salmon (which may no longer be extant anywhere in the range of this ESU) and from basins in the southern portion of the ESU. Analyses of the few time series of data available for this ESU showed mixed trends. Positive trends seemed apparent at Freshwater Creek and Mad River, while trends from the Eel River were generally negative. Recent strong return numbers to the Russian River have been documented, but the genetic relatedness of these fish to others in the ESU is uncertain. The lack of data and resultant uncertainty associated with estimates of abundance contribute substantially to assessments of risk facing the CC Chinook salmon ESU.

For the current 2011 status review underway, new data are available for CC Chinook salmon. However, these new data create uncertainty regarding status and, thus, a change of status is not being recommended at this time.

Artificial propagation of Chinook salmon from the seven hatcheries included in the CC Chinook salmon ESU remains at low levels. It is unknown whether these hatcheries are a benefit or detriment to the naturally spawning portion of the ESU.

Threats and Impacts: The following limiting factors, and their level of threat to this ESU, were evaluated during the development of the Multi-Species draft Recovery Plan:

Degraded Habitat-Estuarine and Nearshore Marine: High Threat
Degraded Habitat-Floodplain Connectivity and Function: High Threat
Degraded Habitat-Channel Structure and Complexity: Moderate Threat
Degraded Habitat-Riparian Areas and Large Woody Debris Recruitment: Moderate Threat
Degraded Habitat-Stream Substrate: Moderate Threat
Degraded Habitat-Stream Flow: Moderate to High Threat

Degraded Habitat-Water Quality: Moderate Threat
Degraded Habitat-Fish Passage: High Threat
Hatchery-related Adverse Effects: Very Low Threat
Harvest-related Adverse Effects: High Threat
Predation/Competition/ Disease: High Threat

Chinook populations overlay with large tracts of non-federal forestlands. Final Rules were adopted by the Governor-appointed Board of Forestry in 2009; however, questions remain regarding their adequacy to fully protect salmon and steelhead.

Other critical sources of threats to this ESU include: (1) lack of oversight on county grading activities that may affect salmon; (2) water use, riparian forest removal, erosion, road building, and other practices associated with agricultural operations; (3) changes to channel morphology and reduced floodplain connectivity due to levee construction, flood control structures, roads, erosion control structures, and urbanization; (4) urbanization and rural development leading to reduced riparian forests, pollution, unscreened water diversions, and water demands exceeding availability; (5) potential genetic modification in hatchery stocks resulting from domestication selection; (6) incidental mortality from catch-and-release hooking; (7) climatic variation leading to drought, flooding, and variable ocean conditions; and (8) predation.

Conservation Actions: During 2008–2010, key conservation actions included:

- Worked to improve baseflows via upgrades to the water rights program, designate fully appropriated watersheds, develop passive diversion devices or offstream storage, eliminate illegal water diversions, and improve criteria for water drafting and dam operations.
- Worked with California Board of Forestry as they proposed new rules to protect salmonids and their habitats.
- Continued to implement the Fish Friendly Farming program, a multi-agency, third-party certification and technical assistance program for wine grape growers practicing best management practices for salmon. Over 10,000 acres of private property have been inspected and certified through this program.
- Collaborated proactively with counties on General Plan Updates, Grading Ordinances, and Riparian Ordinances.
- Worked to implement white papers and policies for instream flow, gravel mining, and summer dams.
- Encouraged FishNet 4C, a multi-county group dedicating resources to county restoration activities focused on salmon and steelhead restoration.
- Continued recovery hatchery improvements to coho salmon captive broodstock activities at Warm Springs Dam.
- Continued participation with PCSRF grant program.

Priority Recovery Actions Needed:

- Focus restoration on increasing survival in currently occupied watersheds.
- Conduct focused freshwater habitat restoration (e.g., erosion control, bank stabilization, riparian protection and restoration, and reintroduction of large woody debris).
- Research and monitor distribution, status, and trends of Chinook salmon.
- Consider freshwater fishing closures prior to January and low-flow closures thereafter.
- Improve estuarine habitat quantity and quality.
- Improve agricultural and forestry practices, in particular riparian protections, road construction, and road maintenance.
- Consider low-flow freshwater fishing closures.
- Improve county and city planning, regulations (e.g., riparian and grading ordinances), and county road maintenance programs.
- Remove/upgrade high-priority fish passage barriers (e.g., watercourse crossings and non-hydropower dams) and implement screening of all water diversion structures.

- Replace existing outdated septic systems and improve wastewater management.
- Identify and treat point and non-point source pollution of streams from wastewater, agricultural practices, and urban environments.
- Modify channel and flood control maintenance and eliminate artificial breeching of sandbars for improvements in channel and estuarine habitats.

Recovery Priority Number: 3

Ranking is based on a high degree of threat, a low to moderate recovery potential, and anticipated conflict with development projects or other economic activity. The high degree of threat is based on: (1) evidence that suggests populations have been extirpated in the southern part of the ESU, or are extremely low in abundance, and (2) loss of the CC Chinook salmon life history form. A low to moderate potential for recovery is possible for CC Chinook based on the extremely limited availability of data and the moderate likelihood that freshwater impacts can be substantially controlled or reduced through habitat protection, implementation of best management practices, and focused restoration. Imminent land use changes and encroaching urbanization into rural areas are anticipated to conflict with the conservation needs of CC Chinook. No change in the priority number is recommended in the pending updated status review.

Central California Coast Steelhead DPS (*Oncorhynchus mykiss*)

Date Listed: August 18, 1997 (62 FR 43937), reaffirmed January 5, 2006 (71 FR 834)

Legal Status: Threatened

Recovery Plan Status: The Recovery Outline was completed and signed May 31, 2007. A Draft Multi-Species (Northern California steelhead, CC Chinook, CCC steelhead) Recovery Plan is in development and is expected to be released for peer and co-manager review in 2011.


Photo credit: Josh Fuller, NMFS Santa Rosa

Species Status: The CCC steelhead DPS includes all naturally spawned populations of steelhead in coastal streams from the Russian River to Aptos Creek, and the drainages of San Francisco, San Pablo, and Suisun Bays eastward to Chipps Island at the confluence of the Sacramento and San Joaquin Rivers; and tributary streams to Suisun Marsh including Suisun Creek, Green Valley Creek, and an unnamed tributary to Cordelia Slough (commonly referred to as Red Top Creek), exclusive of the Sacramento–San Joaquin River Basin of the California Central Valley. Two artificial propagation programs are considered part of the DPS: the Don Clausen Fish Hatchery and the Kingfisher Flat Hatchery/Scott Creek (Monterey Bay Salmon and Trout Project).

Information on abundance and productivity trends for the naturally spawning component of the CCC steelhead DPS is extremely limited. There are no time series of population abundance for the naturally spawned adult component of the DPS; however, estimates of steelhead statewide show a reduction in number from 603,000 in the early 1960s to 240,000–275,000 in the 1980s, indicating a potential decline of at least 54 percent. Within the CCC steelhead DPS, estimates of run sizes in the largest river system, the Russian River, have gone from 65,000 in the 1960s to 1,750–7,000 in the 1990s, indicating a potential decline of at least 89 percent. Abundance in smaller streams within the DPS was assessed as stable but at low levels.

Short time series of juvenile abundance exist for a number of sites within the CCC steelhead DPS. An analysis of these data indicated a downward trend in fish populations at five locations where adequate information was available: San Lorenzo River, Scott Creek, Waddell Creek, Gazos Creek, and Redwood Creek in Marin County. Although an overall reduction in juvenile abundance is implied by this analysis, it is unclear how such a reduction ultimately affects numbers of returning adults.

In lieu of abundance data, information on available habitat can provide insight about population status. Although small populations of steelhead occur in watersheds throughout the DPS, impassible dams have cut off substantial portions of habitat in some basins, generating concern about the spatial structure of the naturally spawning component of the DPS. In the San Francisco Estuary, for example, approximately 58 percent of historically occupied streams no longer support anadromy. For the DPS as a whole, 22 percent of historical habitat is estimated to be behind recent (usually man-made) barriers.

The two artificial propagation programs that are part of the CCC steelhead DPS are thought to decrease risk of extinction to some degree by contributing to increased abundance. Additionally, changes to regulations concerning sport fishing likely reduce the extinction risk for the DPS. The previous status review concluded that steelhead in the CCC steelhead DPS are likely to become endangered in the foreseeable future.

The 2011 status review update is underway with the boundaries and status of both CCC steelhead and Northern California steelhead to be reviewed by a BRT in the near future. Thus, the status of the CCC steelhead DPS remains unchanged for this biennial review.

Threats and Impacts: The following limiting factors, and their level of threat to this DPS, were evaluated during the development of the Internal Draft Multi-Species Recovery Plan:

Degraded Habitat-Estuarine and Nearshore Marine: Moderate Threat
Degraded Habitat-Floodplain Connectivity and Function: Moderate to High Threat
Degraded Habitat-Channel Structure and Complexity: Moderate Threat
Degraded Habitat-Riparian Areas and Large Woody Debris Recruitment: Moderate Threat
Degraded Habitat-Stream Substrate: Moderate to High Threat
Degraded Habitat-Stream Flow: Moderate Threat
Degraded Habitat-Water Quality: High Threat
Degraded Habitat-Fish Passage: High Threat
Hatchery-related Adverse Effects: Low Threat
Harvest-related Adverse Effects: Moderate to High Threat
Predation/Competition/Disease: High Threat

Critical sources of threats to this DPS include: (1) lack of oversight on county grading activities that may affect steelhead; (2) changes to channel morphology and reduced floodplain connectivity due to levee construction, flood control structures, roads, erosion control structures, and urbanization; (3) urbanization and rural development leading to reduced riparian forests, pollution, unscreened water diversions, and water demands exceeding availability; (4) incidental mortality from catch-and-release hooking; (5) climatic variation leading to drought, flooding, and variable ocean conditions; (6) predation; and (7) loss of historical habitats due to dams and barriers.

Conservation Actions: During 2008–2010, key conservation actions included:

- Formation of a CCC steelhead DPS Statement of Agreements between NMFS and San Francisco Bay Area Water Agencies to exchange information for recovery planning.
- Conducted section 7 consultations with key water agencies to improve conservation (includes 2008 completed Russian River Biological Opinion for U.S. Army Corps and Sonoma County Water Agency operations).
- Collaborated proactively with counties on General Plan Updates, Grading Ordinances, and Riparian Ordinances.
- Worked to implement white papers and policies for instream flow, gravel mining, and summer dams.
- Encouraged FishNet 4C, a multi-county group, dedicating resources to county restoration activities focused on salmon and steelhead restoration.
- Continued participation with PCSRF Grant program.

Priority Recovery Actions Needed:

- Research and monitor distribution, status, and trends of steelhead.
- Improve baseflows via innovations to the water rights program, designate fully appropriated watersheds, develop passive diversion devices or offstream storage, eliminate illegal water diversions, and improve criteria for water drafting and dam operations.
- Promote operations of current recovery hatcheries and develop Hatchery and Genetics Management Plans to minimize negative influences of hatcheries.
- Facilitate fish passage in Alameda Creek.
- Work in urban environments to educate the public, cities, and counties to work toward fish-friendly solutions on water flow and fish passage, and on reducing pollution.
- Improve freshwater habitat quantity and quality.
- Protect and restore habitat complexity and connectivity from the upper watershed to the ocean.

- Conduct focused freshwater habitat restoration in anadromous salmonid streams (e.g., erosion control, bank stabilization, riparian protection and restoration, and reintroduction of large woody debris).
- Improve county/city planning, regulations (e.g., riparian and grading ordinances), and county road maintenance programs.
- Remove/upgrade high-priority man-made fish passage barriers (e.g., watercourse crossings and non-hydropower dams) and screen all water diversion structures.
- Replace existing outdated septic systems and improve wastewater management.
- Identify and treat point and non-point source pollution of streams from wastewater, agricultural practices, and urban environments.
- Modify channel and flood control maintenance and eliminate artificial breeching of sandbars for improvements in channel and estuarine habitats.

Recovery Priority: 3

Ranking for CCC steelhead is based on a high degree of threat, a low to moderate recovery potential, and anticipated conflict with development projects or other economic activity. A majority of the BRT that conducted the 2005 status review of steelhead populations in Washington, Oregon, and California concluded that natural populations of CCC steelhead are likely to become endangered. This determination was made based on the following factors: (1) the largest run for the DPS (Russian River) has been reduced in size and this decline continues, (2) populations in the southern part of the range have declined substantially, and (3) habitats are degraded. A low to moderate potential for recovery exists for CCC steelhead due to the large amount of urbanization within the range. Imminent land use changes and encroaching urbanization into rural areas are anticipated to conflict with the conservation needs of CCC steelhead.

South-Central California Steelhead (*Oncorhynchus mykiss*)

Date Listed: August 18, 1997 (62 FR 43937), reaffirmed January 5, 2006 (71 FR 834)

Legal Status: Threatened

Recovery Plan Status: A Recovery Outline was completed in September 2007. A Co-Manager Draft Recovery Plan was completed in 2010 and a Final is expected to be completed in 2011.

Species Status: The steelhead population within the South-Central California Steelhead DPS has declined dramatically, from estimated annual runs totaling 25,000 adults in the mid-1960s to less than 500 returning adult fish today. Of the 36 watersheds historically supporting steelhead runs, approximately 90 percent continue to support them, although run sizes have been sharply reduced in most watersheds. The four largest watersheds (Pajaro, Salinas, Nacimiento/Arroyo Seco, and Carmel Rivers) have experienced declines in run sizes of 90 percent or more. Present population trends within individual watersheds continuing to support runs is generally unknown, but may vary widely between watersheds. The Carmel River is the only major system within this DPS with ongoing annual monitoring of adults (Figure 7).

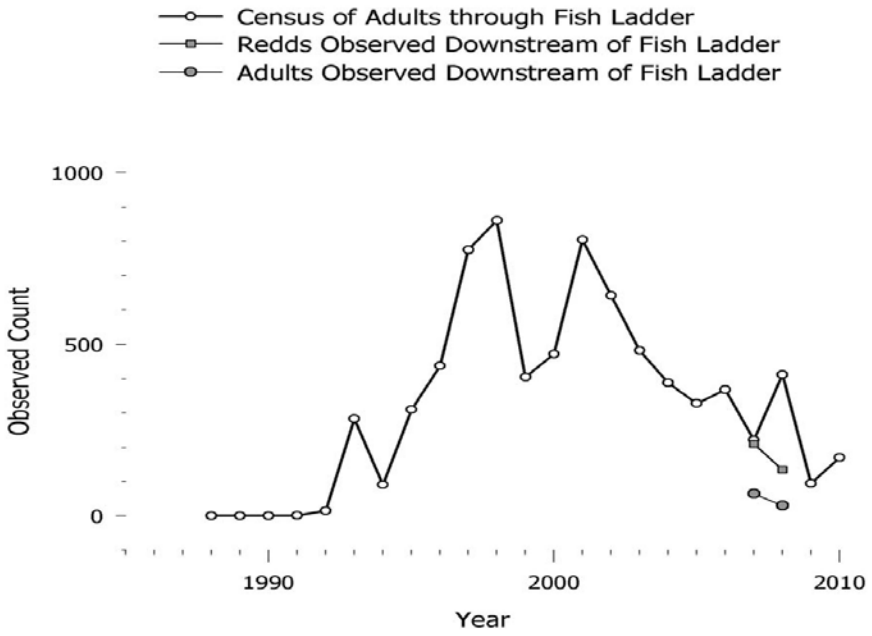


Figure 7. Recent steelhead runs at the San Clemente Dam fish ladder, at river mile 18.6 on the Carmel River**.** Numbers are incomplete counts, unadjusted for unobserved downstream fish and for observation probabilities.

The CDFG, in cooperation with NMFS, is developing a Coast-Wide Monitoring Plan for Pacific Coast Salmonids. Additionally, CDFG has initiated the first steps in deploying advance monitoring technology on several of the core watersheds identified in NMFS draft South-Central California Steelhead Recovery Plan.

Threats and Impacts: The South-Central California Steelhead DPS is near the southern limit of the steelhead's range. There has been extensive loss of populations in most of the major watersheds due to agricultural development, urbanization, dewatering, and modification of rivers and creeks. A significant portion of the spawning and rearing habitat has been rendered inaccessible as a result of dams and other instream structures that block or impede migration.

The principal threats to the viability of the South-Central California Steelhead DPS are associated with the four major river systems listed above. Each of these watersheds is heavily impacted by water facilities (both surface and subsurface) and development of the floodplain and associated riparian corridor (for agricultural, residential, and industrial uses, including sand and gravel extraction). Additionally, threats to several of the major watersheds in the southern portion of the DPS (Santa Rosa, San Simeon, San Luis Obispo, and Arroyo Grande Creeks) impact the viability of this DPS.

In many of the watersheds, water developments have physically blocked access or impeded migration of adult steelhead to headwater spawning and rearing tributaries, as well as restricted the emigration of juveniles to the ocean. Development of the floodplains has altered the natural fluvial processes that facilitate migration and in some cases sustain over-summering habitat for juvenile steelhead; associated flood control structures and activities have further disrupted the natural fluvial processes necessary to maintain these habitats (*e.g.*, Pajaro and Salinas Rivers, Santa Luis Obispo, Pismo, and Arroyo Grande Creeks). Legacy effects of limited timber harvesting and increased development of residential structures (and associated roads) on steep-sided erosive slopes have accelerated erosion and sedimentation of river and stream channels. The continued spread and propagation of invasive plants and aquatic species has further degraded habitats for steelhead, particularly rearing juveniles. The loss and degradation of remaining estuarine habitat as a result of both point and non-point sources of pollution and artificial breaching of sandbars has reduced the suitability of these habitats for rearing and acclimation. Finally, the introduction of exotic fish and the stocking of non-native steelhead fish stocks to support recreational fishing have also contributed to the decline of native steelhead and related resident trout populations in many coastal rivers and streams.

Conservation Actions: Fish passage facilities have been constructed on the Carmel River at the Los Padres Dam with funding from the Carmel River Steelheaders and the CalAm Water Agency. A number of impediments to fish passage caused by road crossings and other instream structures have been eliminated or substantially improved as a result of retrofitting such structures. Planning for the removal of San Clemente Dam in the Carmel River has advanced and completion is pending final design and permitting. Funding for this project has been provided by the CalAm Water Agency, California Department of Water Resources, and California Coastal Conservancy. Additionally, NMFS staff, in cooperation with the Santa Clara Valley Water District and CDFG, successfully negotiated a water release agreement for Uvas Creek, a major spawning and rearing tributary to the Pajaro River, one of the core watersheds identified in the Draft Recovery Plan.

Angling regulations for sport fishing for native steelhead have been changed to regulate recreational angling in virtually all coastal rivers and streams in this DPS that are accessible to adult steelhead migrating up from the ocean. This recreational fishery is limited to several days a week during the migratory season and is limited to catch-and-release. Additionally, CDFG has curtailed its stocking of hatchery-reared trout, limiting stockings to reservoirs or stream reaches above impassible barriers.

Finally, NMFS has conducted both formal and informal section 7 consultations with federal agencies throughout the range of this DPS that fund, carry out, or regulate projects such as flood protection, road construction, water diversion, and gravel mining. A recent consultation provides for bypass flows and monitoring on the Salinas River, the largest river system within the DPS and a core watershed identified in the Draft Recovery Plan.

Priority Recovery Actions Needed:

- Further investigate life-history of the species, including utilization of estuarine habitat, juvenile growth and smolting patterns, distribution of residualized populations above artificial impassable barriers, and the relationship between putative resident and migratory forms of steelhead to refine population viability and delisting criteria for this species.
- Re-establish access to upper watersheds in both small coastal streams and several of the larger river systems.
- Complete planning and permitting for the removal of San Clemente Dam on the Carmel River.

- Re-establish adequate flow regimes for the Salinas and Nacimiento Rivers.
- Further investigate potential recovery actions south of San Simeon.
- Establish a robust monitoring system to track population trends, the efficacy of recovery actions, and the attainment of viability and delisting criteria.

Recovery Priority Number: 3
Ranking is based on a moderate magnitude of threat, a high potential for recovery, and anticipated conflict with current and future development/habitat disturbance within the range of the DPS. The BRT that was formed to conduct an updated status review in 2005 concluded that the South-Central California Steelhead DPS was "currently not in danger of extinction but likely to become so in the foreseeable future." This determination was based in part on "dewatering from irrigation and urban water diversions and habitat degradation in the form of logging on steep erosive slopes, agricultural and urban development on floodplains and riparian areas, and artificial breaching of estuaries during periods when they are normally closed off to the ocean by a sandbar." An updated 5-year status review is underway, and will be completed pending the review of the most recent genetic and ecological information regarding the current boundaries between adjacent steelhead DPSs. NMFS believes there is a moderate magnitude of threat in smaller watersheds but a higher risk in the four major watersheds, with a high potential of recovery and continued conflict with land disturbance and water-associated impacts.

Southern California Coast Steelhead DPS (*Oncorhynchus mykiss*)

Date Listed: August 18, 1997 (62 FR 43937); and Southern Range Extension, May 1, 2002 (50 CFR Part 224) reaffirmed January 5, 2006 (71 FR 834)

Legal Status: Endangered

Recovery Plan Status: A Recovery Outline was completed in September 2007. A Draft Recovery Plan has undergone scientific peer review, co-manager review, and public review in 2010, and is being prepared for finalization in 2011.

Species Status: The steelhead populations within the Southern California Coast Steelhead DPS have declined dramatically, from estimated annual runs totaling 55,000 adults in the mid-1960s to mid-1990s (estimated from only four of the northernmost watersheds) to less than 500 returning adult fish. Populations from over half of the 46 watersheds historically supporting steelhead runs are believed to have been extirpated. All of the four largest watersheds in the northern portion of the DPS (Santa Maria, Santa Ynez, Ventura, and Santa Clara Rivers) have experienced declines in run sizes of 90 percent or more.

In the southern range extension (from Malibu to the U.S. Mexico border), adult steelhead have been documented in only three watersheds since the original listing of the DPS, although no systematic monitoring of steelhead runs has been conducted within these watersheds. Only three of the largest watersheds currently have ongoing monitoring programs, and these are relatively new and still under refinement (Figure 8). Present population trends within individual watersheds continuing to support runs are unknown but may vary widely between watersheds, and are likely fluctuating or declining in a majority of the watersheds within the DPS.

The CDFG, in cooperation with NMFS, is in the process of developing a Coast-Wide Monitoring Plan for Pacific Coast Salmonids. Additionally, the CDFG has initiated the first steps in deploying advance monitoring technology on several of the core watersheds identified in NMFS draft Southern California Steelhead Recovery Plan.

Threats and Impacts: The Southern California Coast Steelhead DPS is at the extreme southern limit of the steelhead range. The principal threats to the viability of the Southern California Steelhead DPS are common to all four of the major river systems in the northern portion of the DPS (listed above). Each of these watersheds is heavily impacted by water facilities (both surface and subsurface) and development of the floodplain and associated riparian corridor (for agricultural, residential, and some industrial uses, including sand and gravel extraction). There has been extensive loss of populations, especially south of Malibu Creek, due to urbanization, dewatering, and channelization of rivers and creeks. Threats to several of the major watersheds in the southern portion of the DPS (San Gabriel, Santa Ana, San Juan, Santa Margarita, San Luis Rey, and Sweetwater Rivers) also affect the viability of this DPS.

A large majority of the spawning and rearing habitat in the major river systems has been rendered inaccessible as a result of dams, debris basins, road crossings, and other instream structures. These structures block or impede migration of adult steelhead to prime historic headwater spawning and rearing tributaries, and restrict the emigration of juveniles to the ocean. Development on the floodplains has altered the natural fluvial processes that facilitate migration and in some cases sustain over-summering habitat for juvenile steelhead; associated flood control structures and activities have further disrupted the natural fluvial processes necessary

to maintain these habitats. Increased development of residential structures (and associated roads) on steep-sided erosive slopes has accelerated erosion and sedimentation of river and stream channels and of remaining estuarine habitat.

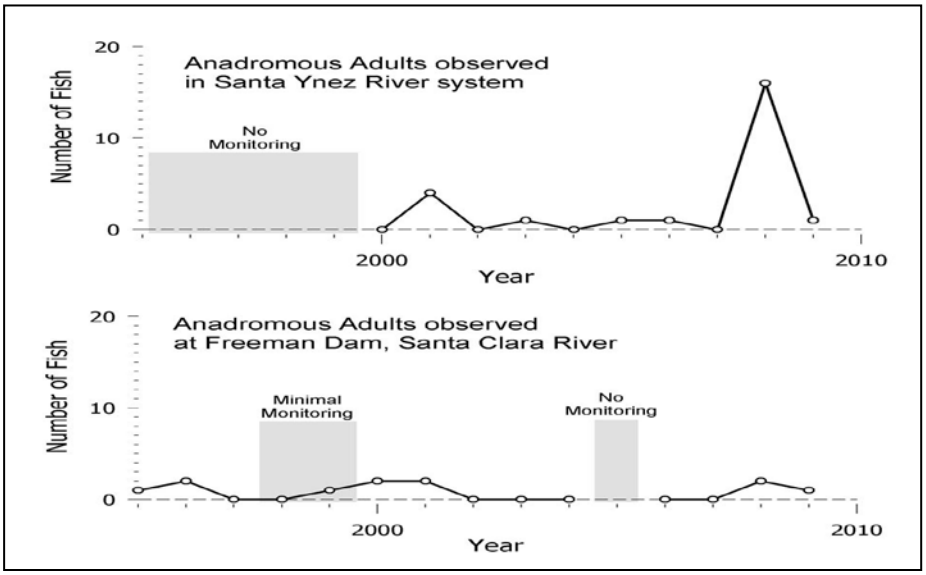


Figure 8. Anadromous O. mykiss observed in the Santa Ynez River system by the staff of the Cachuma Conservation and Release Board; and at the fish-passage facility on the Vern Freeman Diversion Dam on the Santa Clara River by the staff of the United Water Conservation District. Numbers are incomplete counts, unadjusted for observation probabilities.

The continued spread and propagation of invasive plants and aquatic species has further degraded habitats for steelhead, particularly rearing juveniles. Southern California has also lost approximately 90 percent of its pre-historic estuarine habitat through dredging and filling. The degradation of remaining estuarine habitat as a result of both point and non-point sources of pollution and artificial breaching of sandbars has reduced the suitability of these habitats for rearing and acclimation. Finally, the introduction of exotic fish, and the stocking of non-native steelhead fish stocks to support recreational fishing, have also contributed to the decline of native steelhead and related resident trout populations in many coastal rivers and streams (although the latter practice has declined and in some cases has been eliminated).

Conservation Actions: Inventories of impediments have been conducted on major watersheds (Santa Maria/Sisquoc, Santa Ynez, Santa Ynez Mountains complex, Ventura, Santa Clara, and Santa Monica Mountains complex, San Juan/Arroyo, San Luis Rey). Fish passage facilities have been constructed on Salsipuedes Creek (Santa Ynez River); San Ysidro Creek (Santa Ynez Mountains) and a number of smaller watersheds along the Conception Coast; Ventura River at the Robles Diversion Dam; Santa Paula Creek at the Harvey Dam; and Santa Paula Creek Flood Control Channel. Additional fish passage projects are in the planning stages along the Conception Coast, and the Santa Monica Mountains and within the southern range extension. A number of impediments to fish passage caused by road crossings and other instream structures have been eliminated or substantially improved as a result of retrofitting such structures (i.e., Horse Creek on the Sisquoc River). Planning for the removal of Matilija Dam in the Ventura River watershed has advanced substantially and planning has commenced on the removal of Rindge Dam on Malibu Creek. Funding for these two major dam removal projects has been provided by the U.S. Bureau of Reclamation, the U.S. Army Corps of Engineers, the U.S. Department of Justice, the California Coastal Conservancy, and the local dam owners, but is currently inadequate to complete the projects because of reduced federal funding.

Angling regulations for sport fishing for native steelhead have been changed to eliminate recreational angling in virtually all coastal rivers and streams in the DPS that are accessible to adult steelhead migrating from the

ocean. Additionally, the CDFG has curtailed its stocking of hatchery-reared trout, limiting stockings to reservoirs or stream reaches above impassible barriers, although private entities continue to stock reservoirs in anadromous watersheds with non-native fishes. In at least one case CDFG has begun stocking sterile (triploid) fish to prevent the interbreeding of hatchery-reared fish with native steelhead.

NMFS has issued two Biological Opinions regarding fish passage and migration flows: for Santa Felicia Dam on Piru Creek (a tributary to the Santa Clara River) and for the Vern Freeman Diversion on the Santa Clara River. Additionally, NMFS has participated in the Public Trust/Water Right hearings held by the California State Water Resources Control Board on the re-licensing of the Cachuma Dam project on the Santa Ynez River, and has re-initiated consultation of the Cachuma project to address new information on the effects of the project on listed species. NMFS has also conducted both formal and informal section 7 consultations with federal agencies throughout the DPS that fund, carry out, or regulate projects such as flood protection, road construction, water diversion, bridge replacements, and gravel mining operations.

A number of fishery investigations and habitat improvement planning projects have been initiated: these include a habitat and fish population survey of Topanga Creek, a preliminary estuarine restoration plan for the Santa Ynez River Estuary, and an instream flow study for the Santa Maria River.

Priority Recovery Actions Needed:

- Investigate life-history of the species, including use of estuarine habitat, juvenile growth and smolting patterns, distribution of residualized populations above artificial impassable barriers, and the relationship between putative resident and migratory forms of steelhead to refine population viability and delisting criteria for this species.
- Re-establish access to upper watersheds in both small coastal streams and several of the larger river systems within each biogeographic region.
- Complete planning for the removal of Matilija Dam on the Ventura River and Rindge Dam on Malibu Creek.
- Re-establish adequate flow regimes (and in some instances fish passage facilities) for the Santa Maria, Santa Ynez, Ventura, Santa Clara, Santa Margarita, and San Luis Rey Rivers.
- Further investigate potential recovery actions south of Malibu Creek (within the southern range extension), including watershed barrier inventories, habitat suitability assessments, and metapopulation dynamics between the larger river systems and short-run coastal streams.
- Establish a robust monitoring system to track population trends, the efficacy of recovery actions, and the attainment of viability and delisting criteria.

Recovery Priority Number: 3

Ranking is based on a high magnitude of threat, a moderate potential for recovery, and anticipated conflict with current and future development/disturbance within the range of the DPS. The BRT that was formed to conduct an updated status review in 2005 reiterated the conclusions reached in the previous status review: that the Southern California Steelhead DPS "was in danger of extinction." This determination was based in part on the extirpation of populations through much of their historical range, and the blockage and degradation of freshwater habitats. NMFS believes there is a moderate magnitude of threat in smaller watersheds but a higher risk in the major watersheds, with a high potential of recovery and continued conflict with land disturbance and water-associated impacts. An updated 5-year status review is underway, and will be completed pending the review of the most recent genetic and ecological information regarding the current boundaries between adjacent steelhead DPSs. NMFS believes there is a moderate magnitude of threat in smaller watersheds but a higher risk in the four major watersheds, with a high potential of recovery and continued conflict with land disturbance and water-associated impacts.

Sacramento River Winter-run Chinook Salmon ESU (*Oncorhynchus tshawytscha*)

Date Listed: November 5, 1990 (55 FR 46515); reclassified January 4, 1994 (59 FR 440); classification reaffirmed June 28, 2005 (70 FR 37160)

Legal Status: Endangered (reclassified from original threatened listing)

Recovery Plan Status: A draft multi-species recovery plan for steelhead, winter-run Chinook salmon, and spring-run Chinook salmon was released for public review in October 2009, and a final recovery plan is expected by the fall of 2011.

Species Status: The Central Valley TRT delineated four historical independent populations of Sacramento River winter-run Chinook salmon. The spawning areas of three of these historical populations are upstream of the impassable Keswick and Shasta Dams, while Battle Creek (location of the fourth population) is presently unsuitable for winter-run Chinook salmon due to high summer water temperatures. The Sacramento River winter-run Chinook salmon ESU is composed of one population spawning in the mainstem Sacramento River downstream of Keswick Dam. This population is supplemented with fish from the Livingston Stone National Fish Hatchery.

The TRT applied winter-run Chinook salmon data through 2004 to viability criteria developed for Central Valley salmonids and found that the mainstem Sacramento River population was at low risk of extinction. The ESU as a whole, however, is at high risk of extinction because there is only one naturally spawning population, and it is not within its historical range. An emerging concern was rising levels of hatchery-origin fish spawning in natural areas, although the duration and extent of this introgression was still consistent with a low extinction risk as of 2004.

The status of Sacramento River winter-run Chinook salmon is little changed since 2004, and new information does not appear to suggest a change in extinction risk. The Sacramento River population did increase in abundance in the first half of the decade, but these increases have reversed during the more recent period of unfavorable ocean conditions (2005–2006) and drought (2007–2009) (Figure 9).

Threats and Impacts: The greatest ongoing threat and impact to this ESU is the presence of Keswick and Shasta Dams, which block winter-run Chinook salmon from reaching three of the four tributaries that historically supported the ESU (Little Sacramento, McCloud, and Pit Rivers). Battle Creek no longer supports winter-run Chinook salmon due to hydropower dams, diversions, and warm water temperatures. In addition to the threats posed by dams on the Sacramento River and Battle Creek, other major threats to the Sacramento River winter-run Chinook salmon ESU include: (1) the ESU has only one naturally spawning population, which makes the species vulnerable to drought or other catastrophic events; (2) habitat loss and degradation caused by agricultural, urban, and industrial land use practices; (3) poor ocean conditions; (4) bycatch in the ocean salmon fishery; (5) predation; and (6) climate change. Of particular note is the poor survival of juvenile Chinook salmon as they rear in and migrate through the Sacramento River and Delta. Factors contributing to this poor survival include altered flow patterns and timing, inadequately screened or unscreened water diversions, lack of floodplain and riparian habitat, lack of habitat complexity, water pollution, and predation by striped bass.

Winter-run Chinook salmon that survive to reach adult size despite the plethora of adverse factors facing them as juveniles are then exposed to an ocean salmon fishery targeting fall-run Chinook salmon that, when open, typically harvests approximately 20 percent of the winter-run Chinook salmon adults as bycatch. However, the ocean salmon fishery has not been typical recently and has had little to no impact on winter-run

Chinook salmon from 2008–2010, as the fishery has been closed (2008 and 2009) or severely restricted (2010) during that time due to a collapse in the abundance of fall-run Chinook salmon.

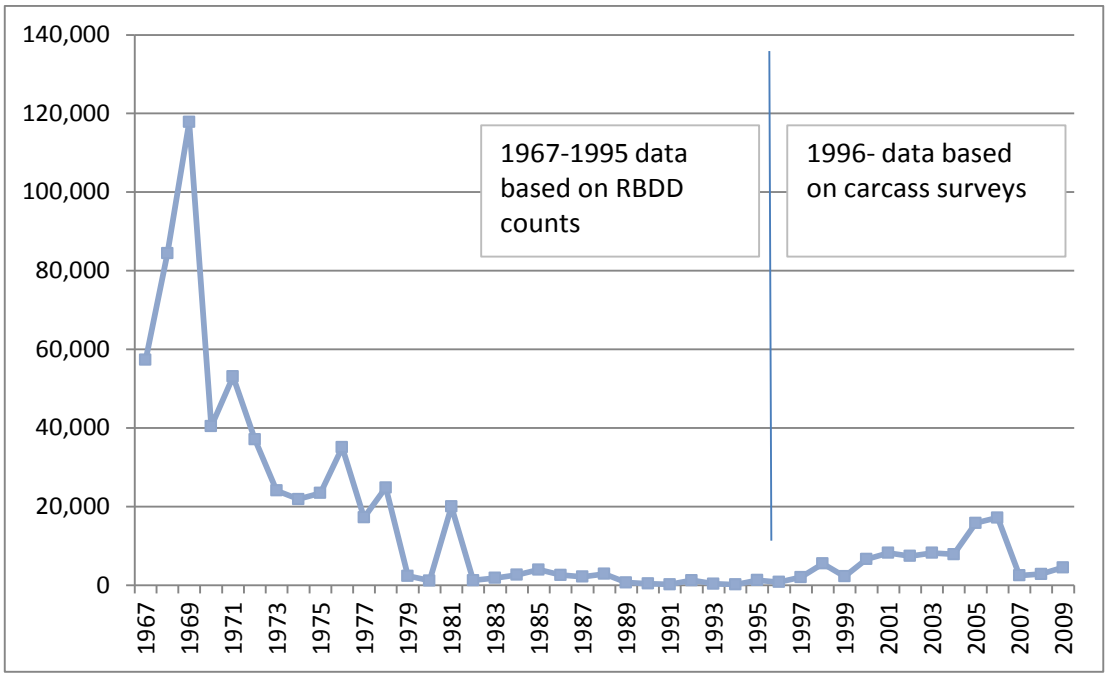


Figure 9. Estimated abundance of adult winter-run Chinook salmon returning to spawn in the Sacramento River. RBDD = Red Bluff Diversion Dam.

Conservation Actions: During 2008–2010, progress was made toward addressing some of the limiting factors and threats to the Sacramento River winter-run Chinook salmon ESU, largely through ESA consultations and other ESA-related conservation efforts in the Central Valley, including the Ecosystem Restoration Program and the Central Valley Project Improvement Act's Anadromous Fish Restoration Program (AFRP) (see Box 1 on page 129).

Actions required by the Biological Opinion on the long-term operations of the Central Valley Project and State Water Project: In June 2009, NMFS issued a biological opinion containing mandatory actions intended to avoid jeopardy to anadromous fish and to avoid destruction of critical habitat resulting from the long-term operations of the Central Valley Project (CVP) and State Water Project (SWP). Actions in the CVP/SWP biological opinion intended to improve conditions for winter-run Chinook salmon include:

- Modifying gate operations at Red Bluff Diversion Dam so the gates are out from September 1 through June 14; this action should improve passage for adults migrating to their spawning grounds as well as the survival of juveniles moving downstream [underway]. By May 2012, the dam must be operated with the gates out year-round.
- Implementing Keswick Dam release schedules and procedures designed to provide more suitable water temperatures for holding and spawning [underway].
- Providing significantly increased acreage of seasonally inundated floodplain habitat to improve juvenile rearing in the lower Sacramento River basin[underway].
- Providing funding to help complete the Battle Creek Salmon and Steelhead Restoration Project (project is briefly describe below) [underway].
- Providing funding to support the Central Valley Project Improvement Act (CVPIA) Anadromous Fish Screen Program [underway].
- Implementing multiple actions to improve flow and habitat conditions in the Delta [underway].

In addition to the above-listed habitat improvement actions, the CVP/SWP biological opinion includes a phased fish passage program intended to expand habitat for winter-run Chinook salmon to areas upstream of Shasta Dam on the Sacramento River. In 2010, a fish passage steering committee initiated planning efforts and habitat evaluations were conducted.

Battle Creek Salmon and Steelhead Restoration Project: The Battle Creek Salmon and Steelhead Restoration Project will eventually remove five dams on Battle Creek, install fish screens and ladders on three dams, and end the diversion of water from the North Fork to the South Fork. When the project is completed, a total of 42 miles of mainstem habitat and six miles of tributary habitat will be opened up to anadromous salmonids.

Bay-Delta Conservation Plan: The purpose of the Bay-Delta Conservation Plan (BDCP) is to help recover endangered and sensitive species and their habitats in the Delta in a way that also will provide for a reliable water supply. A proposed BDCP water conveyance system would include new points of diversion in the north Delta in concert with improvements to the current through-Delta water export system in the south Delta. Actions under discussion include operation of a dual conveyance system, habitat restoration, and measures to reduce other stressors to the Delta ecosystem and covered species. The BDCP is in a developmental stage, its implementation is uncertain, and any new benefits or threats to winter-run Chinook salmon resulting from the plan would not occur for many years. If successful in meeting its purposes, the BDCP could be a significant conservation action for Central Valley salmon and steelhead.

Other ongoing conservation actions: As previously mentioned, the sport and commercial salmon fisheries in the ocean were closed in 2008 and 2009 and severely restricted in 2010. In addition, the State's inland sport fishery regulations continue to be protective of winter-run Chinook salmon.

Priority Recovery Actions Needed:

- Establish additional populations through habitat expansion and restoration in Battle Creek and the McCloud River.
- Develop alternative water operations and conveyance systems, and restore Bay-Delta habitat and ecological flow characteristics to provide multiple and suitable salmonid rearing and migratory habitats for all Central Valley salmonids.
- Implement the Battle Creek Salmon and Steelhead Restoration Project.
- Reduce state-wide urban water use by 20 percent per capita by 2020, to help provide ecologically based flows in the Sacramento River and Bay-Delta.
- Restore the ecological health of the Sacramento–San Joaquin River Delta and lower Sacramento River through significant changes in water, levee, and floodplain management, and by reducing the abundance of non-native predatory fish.
- Continue to fund and implement the Ecosystem Restoration Program and the Anadromous Fish Restoration Program to continue habitat restoration efforts, screening of diversions, flow and temperature monitoring, status and trends research monitoring, modification of structures to improve fish passage, and overall water quality improvements.
- Reduce the amount of winter-run Chinook salmon harvested in the commercial and recreational ocean salmon fishery.

Recovery Priority Number: 3

The recovery priority number for the Sacramento River winter-run Chinook salmon ESU is based on a high magnitude of threat due to a single extant population vulnerable to loss of genetic diversity, low abundance, unscreened diversions, high water temperatures, and effects of drought. The recovery potential is low to moderate due to the lack of additional populations, lack of available/suitable habitat (cold water), unscreened diversions/passage problems, and inadequate instream flow. Conflict was determined to be present due to anticipated future development, habitat degradation issues, and increasing demands for Central Valley water supplies.

Central Valley Spring-run Chinook Salmon ESU (*Oncorhynchus tshawytscha*)

Date Listed: September 16, 1999 (64 FR 50394), classification reaffirmed June 28, 2005 (70 FR 37160)

Legal Status: Threatened

Recovery Plan Status: A draft multi-species recovery plan for steelhead, winter-run Chinook salmon, and spring-run Chinook salmon was released for public review in October 2009, and a final recovery plan is expected by the fall of 2011.

Photo credit: Ralph Cutter

Species Status: The Central Valley TRT delineated 18 or 19 independent populations of spring-run Chinook salmon, along with a number of smaller dependent populations and four diversity groups. Of these 18 or 19 populations, only three are extant (Mill, Deer, and Butte Creeks) and they represent only the Northern Sierra Nevada diversity group. The three extant populations passed through prolonged periods of low abundance before increasing in abundance moderately (Mill, Deer Creek) or robustly (Butte Creek) in the 1990s (Figure 10). In addition to Mill, Deer, and Butte Creeks, dependent populations of spring-run Chinook salmon continue to occur in Antelope, Battle, Big Chico, Clear, Cottonwood (Beegum), and Thomes Creeks, and in the mainstem Sacramento River, the Feather River, and the Yuba River.

The status of the Central Valley spring-run Chinook salmon ESU has probably deteriorated since 2005, when the last status review was conducted. Improvements, evident in the status of two populations (Battle and Clear Creeks), are not enough to warrant a downgrading of the ESU extinction risk. The degradation in status of the three formerly low- or moderate-risk independent populations (Mill, Deer, and Butte Creeks) is cause for concern. Overall, new information available since 2005 indicates an increased extinction risk for Central Valley spring-run Chinook salmon.

Threats and Impacts: The greatest ongoing threat and impact to this ESU is the presence of large dams, which block spring-run Chinook salmon from nearly all of their historic spawning habitat. In addition to habitat loss caused by dams, other major threats to the ESU include: (1) all three extant populations are in close proximity, which makes the species vulnerable to drought, fire, or other catastrophic events; (2) habitat loss and degradation caused by agricultural, urban, and industrial land use practices; (3) poor ocean conditions; (4) bycatch in the ocean salmon fishery; (5) adverse impacts to spring-run Chinook salmon genetics resulting from the Feather River Hatchery; (6) predation; and (7) climate change. Of particular note is the poor survival of juvenile Chinook salmon as they rear in and migrate through the Sacramento River and Delta. Factors contributing to this poor survival include altered flow patterns and timing, inadequately screened or unscreened water diversions, lack of floodplain and riparian habitat, lack of habitat complexity, water pollution, and predation by striped bass.

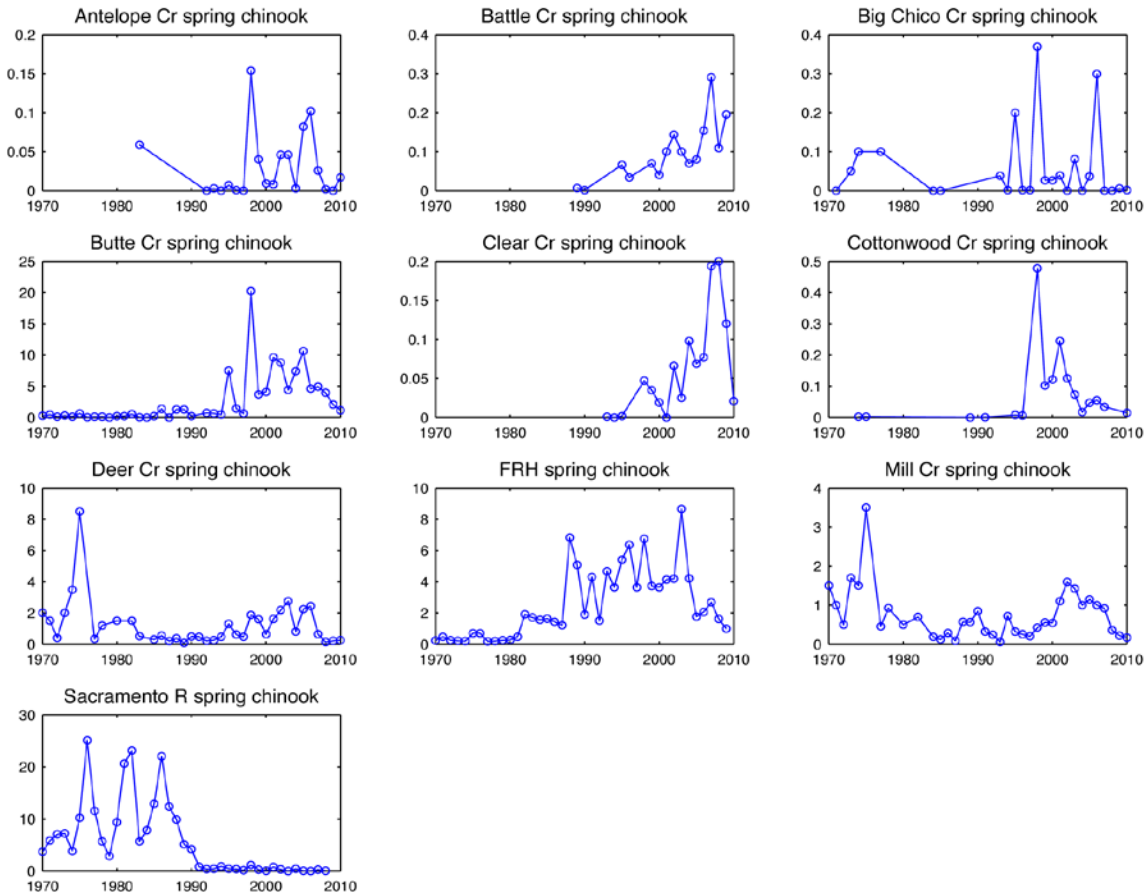


Figure 10. Time series of escapement for Central Valley spring-run Chinook salmon populations. Y axis is in thousands of fish.

Conservation Actions: Several conservation actions that help the Central Valley spring-run Chinook salmon ESU were taken from 2008–2010. Those actions were largely the result of ESA consultations and other ESA-related conservation efforts in the Central Valley, including the Ecosystem Restoration Program and the Central Valley Project Improvement Act's Anadromous Fish Restoration Program (AFRP) (see Box 1).

Actions required by the Biological Opinion on the long-term operations of the Central Valley Project and State Water Project: The CVP/SWP biological opinion contains mandatory actions intended to avoid jeopardy to anadromous fish and destruction of critical habitat resulting from the long-term operations of those projects. Actions in the CVP/SWP biological opinion intended to improve spring-run Chinook salmon habitat include:

- Implementing multiple actions on Clear Creek to provide more suitable flows and water temperatures, and increase the availability of spawning habitat through gravel additions [underway].
- Implementing Keswick Dam release schedules and procedures designed to provide more suitable water temperatures for holding and spawning [underway].
- Modifying gate operations at Red Bluff Diversion Dam so the gates are out from September 1 through June 14 to improve upstream migration for adults as well as downstream survival of juveniles [underway]; by May 2012 the dam must be operated with the gates out year-round.
- Providing funding to help complete the Battle Creek Restoration Project (project is briefly describe below) [underway].
- Providing funding to support the CVPIA Anadromous Fish Screen Program [underway].
- Providing significantly increased acreage of seasonally inundated floodplain habitat to improve juvenile rearing in the lower Sacramento River basin [underway].
- Implementing multiple actions to improve flow and habitat conditions in the Delta [underway].

In addition to the above-listed habitat improvement actions, the CVP/SWP biological opinion includes a phased fish passage program intended to expand habitat for spring-run Chinook salmon to areas upstream of Shasta Dam on the Sacramento River. In 2010, a fish passage steering committee initiated planning efforts and habitat evaluations were conducted.

Battle Creek Salmon and Steelhead Restoration Project: The Battle Creek Salmon and Steelhead Restoration Project will eventually remove five dams on Battle Creek, install fish screens and ladders on three dams, and end the diversion of water from the North Fork to the South Fork. When the project is completed, a total of 42 miles of mainstem habitat and 6 miles of tributary habitat will be opened up to anadromous salmonids.

San Joaquin River Restoration Program (SJRRP): The SJRRP calls for a combination of channel and structural modifications along the San Joaquin River below Friant Dam, releases of water from Friant Dam to the confluence of the Merced River, and the reintroduction of spring-run Chinook salmon. The first flow releases from Friant Dam in support of the SJRRP occurred in October 2009.

Box 1. Central Valley Conservation Programs

Two large, ongoing conservation programs in the Central Valley provide a wide range of ecosystem and species-specific protective efforts benefiting anadromous fish; the Ecosystem Restoration Program, and the CVPIA AFRP. The Ecosystem Restoration Program is designed to restore the ecological health of the Bay-Delta ecosystem, and supports the objective of improving water management for beneficial uses of the Bay-Delta system. From 2000-2010, the Ecosystem Restoration Program has contributed $708 million to projects involving habitat restoration, floodplain restoration and protection, instream and riparian habitat restoration and protection, fish screening and passage, research on non-native species and contaminants, research and monitoring of fishery resources, and watershed stewardship and outreach.

The CVPIA's AFRP balances the priorities of fish and wildlife protection, restoration, and mitigation with irrigation, domestic water use, fish and wildlife enhancement, and power augmentation. Approximately $15 million of CVPIA funds are provided annually for the purpose of protecting, restoring, and enhancing special-status species and their habitats in areas directly or indirectly affected by the Central Valley Project. The Bureau of Reclamation and FWS have conducted studies and implemented hundreds of actions, including modifications of Central Valley Project operations, management and acquisition of water for fish and wildlife needs, flow management for fish migration and passage, increased water flows, replenishment of spawning gravels, restoration of riparian habitats, and screening of water diversions. Actions in the Sacramento River tributaries have focused on riparian and shaded riverine aquatic habitat restoration, improved access to available upstream habitat, improved instream flows, and reduced loss of juveniles at diversions.

Bay-Delta Conservation Plan: The purpose of the BDCP is to help recover endangered and sensitive species and their habitats in the Delta in a way that also will provide for a reliable water supply. The BDCP is in a developmental stage, its implementation is uncertain, and any new benefits or threats to spring-run Chinook salmon resulting from the plan would not occur for many years. Although implementation of the BDCP is uncertain, the plan is mentioned in this biennial report because, in recent years, a substantial amount of effort from management agencies and water user groups has been directed towards its development. If successful in meeting its purposes, the BDCP could be a significant conservation action for Central Valley salmon and steelhead.

Priority Recovery Actions Needed:

- Conduct a Central Valley-wide assessment of keystone dams and passage opportunities and implement programs to restore access to high elevation habitat that spring-run Chinook salmon historically depended on for their persistence. Priority areas for reintroductions include the McCloud River, Battle Creek, the Yuba River upstream of Englebright Dam, and the San Joaquin River.
- Develop alternative water operations and conveyance systems, and restore Bay-Delta habitat and ecological flow characteristics to provide multiple and suitable salmonid rearing and migratory habitats for all Central Valley salmonids.
- Modify diversion structures and utilize groundwater in Antelope, Butte, Deer, and Mill Creeks to allow unimpeded upstream and downstream fish passage and to provide increased instream flows.
- Implement the Battle Creek Salmon and Steelhead Restoration Project.
- Continue implementation of the San Joaquin River Restoration Program.

- Reduce state-wide urban water use by 20 percent per capita by 2020, to help provide ecologically based flows in the Sacramento River and Bay-Delta.
- Restore the ecological health of the Sacramento–San Joaquin River Delta and lower Sacramento River through significant changes in water, levee, and floodplain management, and by reducing the abundance of non-native predatory fish.
- Reduce the amount of spring-run Chinook salmon harvested in the commercial and recreational ocean salmon fishery.
- Finalize and implement the genetics management plan for the Feather River Hatchery; and implement the Feather River Oroville Hydroelectric Facility's Fish Habitat Management Plan to reduce the interaction between hatchery and wild fish and between spring-run Chinook salmon and fall-run Chinook salmon in the Feather River.

Recovery Priority Number: 7

The recovery priority number for the Central Valley spring-run Chinook salmon ESU was based on a moderate magnitude of threat, due to only three remaining extant natural populations with consistent spawning that are in close geographic proximity; the lack of cool water habitat below impassable dams; and the threat to genetic integrity from the Feather River Hatchery. The recovery potential is low to moderate due to lack of suitable habitat (cold water, high elevation) below impassable barriers, and the low number (three) of extant natural populations. Conflict was determined to exist due to anticipated future development, habitat degradation issues, and increasing demands for Central Valley water supplies.

California Central Valley Steelhead DPS (*Oncorhynchus mykiss*)

Date Listed: March 19, 1998 (63 FR 13347), reaffirmed January 5, 2006 (71 FR 834)

Legal Status: Threatened

Recovery Plan Status: A draft multi-species recovery plan for steelhead, winter-run Chinook salmon, and spring-run Chinook salmon was released for public review in October 2009, and a final recovery plan is expected by the fall of 2011.

Species Status: The Central Valley TRT identified 81 independent populations of steelhead in the Central Valley. It is estimated that more than 95 percent of historical spawning habitat is now inaccessible to this DPS because of the presence of dams on most river systems in the Central Valley. As a result of this lost habitat, most of the 81 independent populations have been extirpated.

The abundance of adult steelhead migrating up the Sacramento River declined dramatically from the late 1960s through the early 1990s, as indicated by direct counts of steelhead passing the Red Bluff Diversion Dam. It is estimated that an average of 20,540 adult steelhead occurred in the Sacramento River, upstream of the Feather River through the 1960s. Steelhead declined from an average of about 8,000 fish for the period 1967–1977, to an average of approximately 2,000 through the early 1990s, with an estimated total annual run size for the entire Sacramento–San Joaquin system to be no more than 10,000 adults. These estimates of steelhead abundance ended in 1993 due to changes in operations at the Red Bluff Diversion Dam that affected the counting facilities. More recently, steelhead smolt catches in trawls at Chipps Island are used as an indicator of steelhead abundance.

The Chipps Island midwater trawl dataset of the FWS provides information on the trend in abundance for the Central Valley steelhead DPS as a whole. Updated through 2010, the trawl data indicate that the decline in natural production of steelhead has continued unabated since the mid-1990s.

The status of Central Valley steelhead appears to have worsened since a 2005 status review was conducted, when the BRT concluded the DPS was in danger of extinction. New information available since the 2005 status review indicates that the Central Valley steelhead DPS is at an increased extinction risk.

Threats and Impacts: Many stressors and threats are contributing to the decline of Central Valley steelhead, including dams, water diversions, levee construction and management, water quality, predation by non-native fish, and hatchery management. The primary limiting factor to the Central Valley steelhead DPS is the inaccessibility of more than 95 percent of its historic spawning and initial rearing habitat. A lack of adequate information on the distribution and abundance of Central Valley steelhead limits our understanding of the viability of this DPS. Equally important is the need to better understand the relationship of resident and anadromous forms of *O. mykiss*, and how that relationship impacts the persistence of anadromous *O. mykiss*.

Conservation Actions: During 2008–2010, progress was made toward addressing some of the limiting factors and threats to this DPS, largely through ESA consultations and other ESA-related conservation efforts in the Central Valley, including the Ecosystem Restoration Program and the Central Valley Project Improvement Act's Anadromous Fish Restoration Program (AFRP) (Box 1 on page 129).

Actions required by the Biological Opinion on the long-term operations of the Central Valley Project and State Water Project: In June 2009, NMFS issued a biological opinion containing mandatory actions that are intended to avoid jeopardy to listed anadromous fish, and avoid destruction of critical habitat, resulting from the long-term operations of the CVP and SWP. Actions in the CVP/SWP biological opinion intended to improve conditions for steelhead include:

- Implementing multiple actions on Clear Creek to provide more suitable flows and water temperatures, and to increase the availability of spawning habitat through gravel additions [underway].
- Modifying gate operations at Red Bluff Diversion Dam so that the gates are out from September 1 through June 14; this action should improve downstream survival of steelhead smolts [underway]. By May 2012, the dam must be operated with the gates out year-round.
- Providing funding to help complete the Battle Creek Salmon and Steelhead Restoration Project (project is briefly describe below) [underway].
- Providing funding to support the CVPIA Anadromous Fish Screen Program [underway].
- Implementing multiple actions to improve flow and habitat conditions for steelhead in the American River, Stanislaus River, and Delta, including actions to protect smolts from the San Joaquin River [underway].
- Completing a hatchery genetics management plan for the Nimbus Hatchery steelhead program.
- Participating in the design, implementation, and funding of the comprehensive Central Valley steelhead monitoring plan (see ongoing measures below for more detail).

In addition to the above-listed habitat improvement actions, the CVP/SWP biological opinion includes a phased fish passage program intended to expand habitat for steelhead to areas upstream of Shasta Dam on the Sacramento River and Folsom Dam on the American River. The fish passage program also calls for evaluations of fish passage upstream of New Melones Dam on the Stanislaus River. In 2010, a fish passage steering committee initiated planning efforts and habitat evaluations were conducted.

Battle Creek Salmon and Steelhead Restoration Project: The Battle Creek Salmon and Steelhead Restoration Project will eventually remove five dams on Battle Creek, install fish screens and ladders on three dams, and end the diversion of water from the North Fork to the South Fork. When the project is completed, a total of 42 miles of mainstem habitat and six miles of tributary habitat will be opened up to anadromous salmonids.

Bay-Delta Conservation Plan: The purpose of the BDCP is to help recover endangered and sensitive species and their habitats in the Delta in a way that also will provide for a reliable water supply. The BDCP is in a developmental stage, its implementation is uncertain, and any new benefits or threats to steelhead resulting from the plan would not occur for many years. If successful in meeting its purposes, the BDCP could be a significant conservation action for Central Valley salmon and steelhead.

Other ongoing conservation actions: Ongoing measures to protect steelhead in California include 100 percent marking of all hatchery steelhead, zero bag limits for unmarked steelhead, gear restrictions, closures, and size limits designed to protect smolts.

CDFG—with the technical and scientific support of the Pacific States Marine Fisheries Commission, NMFS, and FWS—is preparing a comprehensive Central Valley Steelhead Monitoring Plan. The goal of this project is to develop a comprehensive monitoring plan for Central Valley steelhead, that, when implemented, will provide fishery managers the data necessary to assess steelhead population abundance and distribution. This information is necessary as part of an overall strategy to ensure steelhead conservation and is critical to moving forward on numerous management and recovery efforts.

Priority Recovery Actions Needed:

- Develop alternative water operations and conveyance systems, and restore Bay-Delta habitat and ecological flow characteristics to provide multiple and suitable salmonid rearing and migratory habitats for all Central Valley salmonids.
- Conduct a Central Valley–wide assessment of keystone dams and passage opportunities and implement programs to restore access to high-elevation habitat that steelhead historically depended on for their persistence. Priority areas for steelhead re-introductions include the McCloud River,

Battle Creek, the Yuba River upstream of Englebright Dam, the American River upstream of Folsom Dam, and the San Joaquin River.

- Implement the Battle Creek Salmon and Steelhead Restoration Project.
- Restore the ecological health of the Sacramento–San Joaquin River Delta and lower Sacramento River through significant changes in water, levee, and floodplain management, and by reducing the abundance of non-native predatory fish.
- Implement the comprehensive Central Valley Steelhead Monitoring Plan.
- Reduce state-wide urban water use by 20 percent per capita by 2020, to help provide ecologically based flows in the Sacramento and San Joaquin basins and Bay-Delta.
- Conduct a science-based review of Central Valley steelhead hatcheries and implement actions identified in that review that would benefit wild steelhead or at least minimize adverse hatchery impacts.
- Continue to fund and implement the Ecosystem Restoration Program and the Anadromous Fish Restoration Program to continue habitat restoration efforts, screening of diversions, flow and temperature monitoring, status and trends research monitoring, modification of structures to improve fish passage, and overall water quality improvements.

Recovery Priority Number: 7

The recovery priority number for the Central Valley steelhead DPS was derived from a moderate magnitude of threat, because more than 95 percent of historic spawning habitat is inaccessible due to impassable dams. The recovery potential was determined to be low to moderate due to a lack of suitable habitat below impassable barriers, inadequate abundance and distribution data to assess DPS viability, and the widespread stocking of hatchery fish (which could negatively impact wild steelhead populations). The potential for conflict exists because of anticipated future development and habitat degradation issues, as well as increasing demands for Central Valley water supplies and climate change impacts.

ATLANTIC SALMON RECOVERY

Atlantic Salmon (*Salmo salar*) – Gulf of Maine DPS

Date Listed: November 17, 2000 and revised on June 19, 2009; listed jointly by NMFS and FWS

Legal Status: Endangered

Recovery Plan Status: The Final Recovery Plan published in November 2005 by NMFS and FWS is not inclusive of all populations and is being updated. In 2009, the FWS took the lead in developing a new recovery plan to accommodate the 2009 listing revision and critical habitat designation. A draft of the plan will be reviewed internally with an anticipated goal of publishing a draft in the *Federal Register* in 2011 followed by a 90-day public comment period. A final recovery plan for the Gulf of Maine DPS (GOM DPS) of Atlantic salmon is expected to be completed 1 year after the publication of the draft.

Species Status: A final rule published on June 19, 2009 (74 FR 29344) expanded an endangered status under the ESA to all anadromous Atlantic salmon whose freshwater range occurs in the watersheds from the Androscoggin River northward along the Maine coast to the Dennys River, an area that includes the Penobscot and Kennebec Rivers. The protections of the ESA also apply wherever these fish occur, whether in rivers, estuaries, or the marine environment. Hatchery fish used to supplement these natural populations are also included under this listing. As an endangered species, the GOM DPS of Atlantic salmon receives the full protection of the ESA, including a prohibition against take (*take* is defined to include harass, harm, pursue, wound, kill, trap, capture, or collect). Abundance levels of the GOM DPS of Atlantic salmon are at very low levels. Based on data from adult returns at salmon traps on the Androscoggin, Kennebec, Penobscot, Narraguagus, and Dennys Rivers, and counts of spawning salmon, adult returns in 2009 were estimated at 1,918 hatchery-origin salmon, and 251 natural origin (USASC 2010).

Threats and Impacts: The three most influential stressors negatively affecting the persistence GOM DPS of Atlantic salmon identified in the proposed listing rule (73 CFR 51747–51781) are: (1) dams and their inter-related effects on freshwater salmon habitat, (2) the inadequacy of existing regulatory mechanisms for dams, and (3) low marine survival. Dams result in the following impacts to Atlantic salmon: (1) directly limit access to otherwise suitable habitat; (2) directly kill and injure a significant number of salmon during both upstream and downstream migration; and (3) degrade the productive capacity of habitats upstream by inundating formerly free-flowing rivers, reducing water quality, and changing fish communities. Dams affect multiple life stages in multiple ways, particularly by preventing or impeding access to spawning habitat for returning adult salmon; impacts at this late life stage have the greatest demographic effect.

Marine survival has also been implicated as a significant factor threatening the continued survival and recovery of Atlantic salmon. From a demographic viewpoint, incremental increases in marine survival have a much greater impact on the population than do increases in freshwater survival, although increases in marine survival may be more difficult to achieve. It is important to note that marine survival is calculated from the

last time smolts are counted in a river until adults return to spawn. Thus, marine survival estimates may include some portion of freshwater, estuarine, and nearshore mortality in addition to open ocean mortality. The historical range of freshwater survival for U.S. populations is estimated to be approximately 0.13 to 6.09 percent (Legault 2005). These estimates are based on numerous studies on different life stages of the freshwater phase across a wide spatial and temporal scale. Current marine survival (smolt to adult) for U.S. populations is estimated to range from 0.09 to 1.02 percent based on total smolt cohort return rates for the Penobscot (hatchery smolt returns, 1995 to 2004) and Narraguagus Rivers (naturally reared smolt returns, 1997 to 2004; ICES 2008). For the reasons mentioned above, marine survival estimates of hatchery smolts in the Penobscot also include dam-related mortality. Improvements in these survival rates are necessary to reach the point where each fish is replacing itself and to eventually result in population growth toward recovery. Increases in freshwater survival will enhance the probability of recovery; however, improvements in marine survival are necessary to achieve stability and growth.

Conservation Actions: During 2008–2010, NMFS—in cooperation with the Maine Department of Marine Resources (MDMR), FWS, and other partners—pursued a range of management and research activities intended to mitigate and reduce the most severe threats to Atlantic salmon and to improve our understanding of salmon abundance and population health. Recovery actions and activities implemented during 2008–2010 included the following:

- Policy/regulatory related actions/activities
  - — Revised the listed range of the endangered GOM DPS Atlantic Salmon on June 19, 2009, based on further scientific information.
  - — Designated Critical Habitat for the continued existence and recovery of the GOM DPS Atlantic salmon on June 19, 2009. Three salmon habitat recovery units were identified (Penobscot, Merrymeeting Bay, and Downeast Coastal) to help guide management and recovery of the species.
  - — Developed interim recovery goals to inform the designation of critical habitat and to help guide recovery actions.
  - — Developed a conceptual Atlantic salmon recovery framework that clearly articulates specific goals and objectives for salmon recovery, identifies key limiting factors, and incorporates an adaptive management approach to address limiting factors.
  - — Initiated the development of a General Conservation Plan to provide a standardized set of operating conditions that will be necessary for owners of non-power generating dams to receive incidental take permits for a dam's continued operation. This will save dam owners time and money that would otherwise be required for each project owner to develop individual, site specific HCPs.
  - — Consulted with federal partners to ensure that federal actions minimize harm to Atlantic salmon to the maximum extent practical.
- International coordination, collaboration, and research
  - — Participated in international management of Atlantic salmon through the North Atlantic Salmon Conservation Organization, which has led to the development of multiyear regulatory measures for high seas Atlantic salmon fisheries, international guidelines for salmon stocking and mitigation of threats from aquaculture practices, and country-specific Action Plans that outline the implementation of all the Organization's guidelines.
  - — Conducted annual sampling of the Atlantic salmon fishery in West Greenland. From this sampling, biological information related to the Greenlandic local-use catch was used in support of international Atlantic salmon stock assessments and to determine salmon continent-of-origin.

- Restoration of ecosystem function
  - The Penobscot Trust and partners reached significant milestones in late 2007 by raising the $25 million needed to purchase the Veazie, Great Works, and Howland Dams as part of the Penobscot River Restoration Project. In 2009, the Trust was awarded $4.8 million for the removal of Great Works Dam and $1.3 million for pre-dam removal monitoring studies. In anticipation of the restoration potential of the Project, MDMR—in conjunction with Maine Inland Fisheries and Wildlife—has completed a strategic management plan (2008) and a technical Operational Plan (2009) for diadromous fish in the Penobscot.
  - In 2009 and 2010, over 70 stream-road related habitat connectivity projects were completed in Downeast rivers using American Recovery and Reinvestment Act funds. These projects have supported a campaign to help inform landowners of the economic and ecological benefit of "fish friendly" stream crossings. Storm events in 2010 revealed that these newly installed arch culverts were highly resistant to significant flooding, while many nearby culverts constructed to traditional standards failed, destroying roads, property, and stream habitat.
  - In 2008, the Fort Halifax dam within the Merrymeeting Bay salmon habitat recovery unit was removed, resulting in restored sea-run fish access to the Sebasticook River.
  - From 2008–2010, three small dam removals and one fish passage improvement project occurred in the Penobscot River watershed, restoring access to historic salmon, river herring, and sea lamprey habitat.
  - Worked with stakeholders on a variety of habitat restoration and protection projects.
  - Funded a Fish Passage Restoration Specialist position with the Penobscot Indian Nation through the Species Recovery Grants to Tribes Program.
- Annual assessment and monitoring
  - Continued to monitor and assess the status of wild salmon populations. Electrofishing surveys were conducted on most of the rivers in Maine with wild or stocked populations of Atlantic salmon to estimate density or relative abundance of juvenile salmon, and rotary screw trapping was used to estimate smolt populations, sample smolts, and determine age and origin of emigrating smolts. In addition, telemetry studies were conducted on several rivers during this period to assess smolt survivorship and behavior by monitoring their movement.
  - Provided significant grant funding to the MDMR for assessment and management activities.
  - Initiated a long-term fish community study in the Penobscot River estuary with the following aims: (1) provide a fishery-independent dataset for individual diadromous species without fishway efficiency bias, (2) provide a long-term abundance dataset to test hypotheses about the effects of climate change on community structure, (3) provide a quantitative description of the predator and prey field in order to test the salmon-river herring prey buffer hypothesis, and (4) evaluate ecosystem services through analysis of population biometrics.

Priority Recovery Actions Needed: As described in the Recovery Plan, 2006 Status Review Report, 2008 proposed listing rule, and the 2009 final listing rule, the actions needed in the next several years for the Gulf of Maine Atlantic salmon DPS fall into several broad categories:

- Restore ecosystem function in freshwater and estuarine habitat (i.e., dam removal, predation, competition, restoration, water quality/ quantity).
- Minimize potential for take in freshwater, estuarine, and marine fisheries.
- Increase our understanding of the factors affecting estuarine, coastal, and marine survival.
- Maintain conservation hatchery program and conserve the genetic integrity of the DPS.
- Assess stock status of key life stages.
- Promote salmon recovery through increased public and government awareness.
- Assess effectiveness of recovery actions and revise as appropriate.

Recovery Priority Number: 1
This ranking is based on several factors, including a high degree of threat, a high potential for recovery, and the presence of conflict. The degree of threat is considered high due to continued low population numbers and/or threat to Atlantic salmon habitat, and the very low numbers of adult Atlantic salmon returns to the DPS. There is a high potential for recovery, and there is conflict between salmon recovery and construction or other development projects or forms of economic activity. Taken together, these rankings correspond to a recovery priority number of 1.

NON-SALMONID FISH RECOVERY

Bocaccio (*Sebastes paucispinis*) – Puget Sound/Georgia Basin DPS

Date Listed: April 28, 2010
(75 FR 22276)

Legal Status: Endangered

Recovery Plan Status:
No recovery plan has been developed for the Puget Sound/Georgia Basin DPS of bocaccio. Recovery planning is expected to begin in 2011.


Photo credit: M. Yoklavich, NMFS

Species Status: The Puget Sound/Georgia Basin DPS includes all bocaccio found in waters of the Puget Sound, the Strait of Georgia, and the Strait of Juan de Fuca east of the Victoria sill. There are no historic or contemporary abundance estimates for bocaccio within the Puget Sound/Georgia Basin, yet there is clear evidence that their abundance has declined dramatically. The total rockfish population in the Puget Sound region is estimated to have declined around 3 percent per year for the past several decades, which corresponds to an approximate 70 percent decline from 1965 to 2007. Fisheries catch data show that bocaccio have declined at a greater rate than the overall rockfish populations. Past fisheries have disproportionately removed larger and older adults, leaving reproduction to smaller and younger fish. Smaller and younger females produce fewer and less fit larvae compared to older fish.

Threats and Impacts: Bocaccio are incidentally taken in some commercial and recreational fisheries. Even though most fish are released, many die due to rapid pressure changes when they are removed from deep waters. New and existing derelict fishing gear such as lost fishing nets and crab and shrimp pots kill bocaccio and their various prey. Actively fished shrimp pots (and possibly crab pots) also result in bycatch of juvenile bocaccio. Excess nutrients entering Puget Sound impact the suitability of habitat, such as Hood Canal, by creating low dissolved oxygen levels. Some contaminants bioaccumulate within rockfish, possibly resulting in reproductive impairment. Nearly one-third of the nearshore of Puget Sound has been developed. This development impairs the productivity of food sources of rockfish, and alters the quality of nearshore rearing habitats for juvenile bocaccio. Climate change could result in temperature regime and circulation changes that impact food sources of bocaccio and affect reproductive success. Increasing levels of carbon dioxide in the ocean changes pH levels (ocean acidification), and can alter the physiology, metabolism, and reproductive biology of fish. Ocean acidification could also impact the food web, resulting in unknown changes in food availability to upper-level predators such as rockfish. As with nearly all marine species of Puget Sound, large oil spills represent a significant risk to bocaccio and their prey.

Conservation Actions: Major conservation actions conducted in 2008–2010 to advance recovery of bocaccio include the following:

- Funding from the American Recovery and Reinvestment Act enabled the removal of thousands of derelict fishing nets from waters shallower than 100 feet within the past several years, restoring many acres of Puget Sound.
- The State of Washington has prohibited recreational fishing for bottomfish in waters deeper than 120 feet deep, and prohibited the retention of any rockfish species in Puget Sound, each reducing

bycatch risks for bocaccio. The State has also closed several active and inactive commercial fisheries that targeted rockfish, or resulted in bycatch of rockfish.
- The State of Washington has conducted Remotely Operated Vehicle surveys of rockfish habitats near the San Juan Islands, which enabled an estimate of the abundance of bocaccio in this region.
- NMFS funded surveys for derelict fishing gear in waters deeper than 100 feet, resulting in the documentation of over 50 nets.
- NMFS initiated research of ocean acidification effects on rockfish larvae in 2010.

Priority Recovery Actions Needed: The priority recovery actions for bocaccio include methods to address the primary threats and impacts and include the following:

- Support Washington State's goal of developing a science-based system of marine reserves/rockfish conservation areas within each of the major basins of Puget Sound to protect significant numbers of rockfish stocks, their habitats, and ecosystem. These reserves should be established with the input of scientists, tribes, recreational and commercial fishermen, and interested parties to enable the development of goals and objectives that facilitate recovery of bocaccio. The establishment of reserves would be aided by benthic habitat and fish abundance surveys, research/modeling of adult and larval dispersal and recruitment, and research on adult bocaccio movement and migratory patterns.
- Only a portion of the waters less than 100 feet in depth has been surveyed for derelict nets and only a fraction of the deeper water areas of Puget Sound have been surveyed. The continued survey and removal of derelict fishing gear, including gear located in waters deeper than 100 feet (where most adult bocaccio live), would improve habitat suitability and ecosystem function.
- The prevention of new derelict fishing gear should occur by evaluating technologies and practices that could be used by commercial fishermen. In addition, systems to track nets upon their loss should be investigated to better aid their retrieval, as well as other measures necessary to prevent and track lost gear.
- Research and develop recreational fishing methods that reduce bycatch of rockfish, and methods to improve the survival of unintentionally caught bocaccio including actions such as identifying the best handling practices and rapid submergence techniques and educating fishermen about these techniques.
- Work with the Government of Canada to provide mutual benefits regarding rockfish research, management, and complementary recovery planning across transboundary waters.
- Work with fishing groups regarding rockfish species identification and understanding of rockfish life-history and recovery options.
- Support regional efforts to reduce nutrient and chemical contaminant inputs, cleaning up legacy contaminants, and spill response capability.
- Research the effects of anthropogenic stressors to kelp, which are rearing habitats of juvenile bocaccio. Assess the historical and current kelp abundance and distribution by compiling historical data sets, collecting new data on current conditions, and comparing similar small-scale data sets to detect trends over time. Develop protection, conservation, and restoration approaches for kelp with special reference to rockfish habitat.

Recovery Priority Number: 3

This recovery priority number is based on a high magnitude of threat due to low abundance and low productivity of bocaccio and continuing threats to recovery. It is also based on a moderate recovery potential, and presence of conflict, because regulatory actions taken could involve restrictions on recreational and commercial fishing, and other actions that may harm bocaccio habitat.

Canary rockfish (*Sebastes pinniger*) – Puget Sound/Georgia Basin

Date Listed: April 28, 2010
(75 FR 22276)

Legal Status: Threatened

Recovery Plan Status: No recovery plan has been developed for the Puget Sound/Georgia Basin DPS of canary rockfish. Recovery planning is expected to begin in 2011.


Photo credit: Stan Shebs

Species Status: The Puget Sound/Georgia Basin DPS includes all canary rockfish found in waters of the Puget Sound, the Strait of Georgia, and the Strait of Juan de Fuca east of the Victoria sill. There are no historic or contemporary abundance estimates for canary rockfish within the Puget Sound/Georgia Basin, yet there is clear evidence their abundance has declined dramatically. The total rockfish population in the Puget Sound region is estimated to have declined around 3 percent per year for the past several decades, which corresponds to an approximate 70 percent decline from 1965 to 2007. Fisheries catch data show that canary rockfish have declined at a greater rate than the overall rockfish populations. Past fisheries have disproportionately removed larger and older adults, leaving reproduction to smaller and younger fish. Smaller and younger females produce fewer and less fit larvae compared to older fish.

Threats and Impacts: Canary rockfish continue to be incidentally taken in some commercial and recreational fisheries. Even though most fish are released, many die due to rapid pressure changes when they are removed from deep waters. Derelict fishing gear, such as lost fishing nets and crab and shrimp pots, likely kill canary rockfish and their various prey. Actively fished shrimp pots (and possibly crab pots) also result in bycatch of juvenile canary rockfish. Excess nutrients entering Puget Sound impact habitat suitability in some areas, such as Hood Canal, by creating low dissolved oxygen levels. Some contaminants within Puget Sound bioaccumulate possibly resulting in reproductive impairment of rockfish. Nearly one-third of the nearshore of Puget Sound has been developed. This development impairs the productivity of food sources of rockfish, and alters the quality of rearing habitats for juvenile canary rockfish. Climate change could result in temperature regime and circulation changes that impact food sources of canary rockfish and affect reproductive success. Increasing levels of carbon dioxide in the ocean changes pH levels (ocean acidification) and can alter the physiology, metabolism, and reproductive biology of fish. Ocean acidification could also impact the food web, resulting in unknown changes in food availability to upper-level predators such as rockfish. As with nearly all marine species of Puget Sound, large oil spills represent a significant risk to canary rockfish and their prey.

Conservation Actions: Major conservation actions conducted in 2008–2010 to advance recovery of canary rockfish include the following:

- Funding from the American Recovery and Reinvestment Act enabled the removal of thousands of derelict fishing nets from waters shallower than 100 feet within the past several years, restoring many acres of the Puget Sound.
- The State of Washington has prohibited recreational fishing for bottomfish in waters deeper than 120 feet deep, and prohibited the retention of any rockfish species in the Puget Sound, each reducing bycatch risks for canary rockfish. The State has also closed several active and inactive commercial fisheries that targeted rockfish, or resulted in bycatch of rockfish.

- The State of Washington has conducted Remotely Operated Vehicle surveys of rockfish habitats near the San Juan Islands, which enabled an estimate of the abundance of canary rockfish in this region.
- NMFS funded surveys for derelict fishing gear in waters deeper than 100 feet, resulting in the documentation of over 50 nets.
- NMFS initiated research of ocean acidification affects on rockfish larvae in 2010.

Priority Recovery Actions Needed: The priority recovery actions for canary rockfish include methods to address the primary threats and impacts, and include the following:

- Support Washington State's goal of developing a science-based system of marine reserves/rockfish conservation areas within each of the major basins of Puget Sound to protect significant numbers of rockfish stocks, their habitats and ecosystem. These reserves should be established with the input of scientists, tribes, recreational and commercial fishermen, and interested parties to enable the development of goals and objectives that facilitate recovery of canary rockfish. The establishment of reserves would be aided by benthic habitat and fish abundance surveys, research/modeling of adult and larval dispersal and recruitment, and research on adult canary rockfish movement and migratory patterns.
- Only a portion of the waters less than 100 feet in depth has been surveyed for derelict nets and only a fraction of the deeper water areas of Puget Sound have been surveyed. The continued survey and removal of derelict fishing gear, including gear located in waters deeper than 100 feet (where most adult canary rockfish live), would improve habitat suitability and ecosystem function.
- The prevention of new derelict fishing gear should occur by evaluating technologies and practices that could be used by commercial fishermen. In addition, systems to track nets upon their loss should be investigated to better aid their retrieval, as well as other measures necessary to prevent and track lost gear.
- Research and develop recreational fishing methods that reduce bycatch of rockfish, and improve the survival of unintentionally caught canary rockfish through actions such as identifying the best handling practices and rapid submergence techniques and educating fishermen about these techniques.
- Work with the Government of Canada to provide mutual benefits regarding rockfish research, management, and complementary recovery planning across transboundary waters.
- Work with fishing groups regarding rockfish species identification and understanding of rockfish life-history and recovery options.
- Support regional efforts to reduce nutrient and chemical contaminant inputs, cleaning up legacy contaminants, and spill response capability.
- Research the effects of anthropogenic stressors to kelp, which are rearing habitats of juvenile canary rockfish. Assess the historical and current kelp abundance and distribution by compiling historical data sets, collecting new data on current conditions, and comparing similar small-scale data sets to detect trends over time**.** Develop protection, conservation, and restoration approaches for kelp with special reference to rockfish habitat.

Recovery Priority Number: 7

This recovery priority number is based on a moderate magnitude of threat due to low abundance and low productivity of canary rockfish and continuing threats to recovery. It is also based on a moderate recovery potential, and presence of conflict from potential future regulatory actions that could involve restrictions on recreational and commercial fishing, and other actions that may harm canary rockfish habitat.

Eulachon (*Thaleichthys pacificus*) – Southern DPS


Photo credit: NOAA

Date Listed: March 18, 2010 (75 FR 13012)

Legal Status: Threatened

Recovery Plan Status: No recovery plan has been completed for the Southern DPS of eulachon. A Recovery Outline is under development and a Recovery Team is currently being formed. A proposed critical habitat designation was published in January 2011 (76 FR 515) and is expected to be finalized by July 2011.

Species Status: Eulachon spawning in Washington, Oregon, and California rivers are part of the Southern DPS that extends beyond the conterminous United States and includes all populations spawning in rivers south of the Nass River in British Columbia, Canada, to and including the Mad River in California. Eulachon spawning in the Nass River and further north consist of at least one additional (northern) DPS.

Although eulachon are a relatively poorly monitored species, the weight of the available information indicates that the southern DPS of eulachon experienced an abrupt decline in abundance throughout its range, most likely prior to the mid-1990s. The current abundance of eulachon is low and declining in all surveyed populations throughout the DPS. Eulachon populations spawning in the Klamath River, lower Columbia River Basin, and Fraser River have declined substantially and the southern DPS will likely become endangered in the foreseeable future if ongoing threats are not addressed.

Past and ongoing federal, state, and local protective efforts (many of them habitat-based) have contributed to the conservation of the southern DPS, but these efforts alone do not sufficiently reduce the extinction risks faced by the southern DPS.

Threats and Impacts: The primary factors responsible for the decline of the southern DPS of eulachon are changes in ocean conditions due to climate change, climate-induced change to freshwater habitats, dams and water diversions (particularly in the Columbia and Klamath Rivers where hydropower generation and flood control are major activities), and bycatch of eulachon in commercial fisheries.

Conservation Actions: During 2008–2010, key conservation actions included:

- The states of Oregon and Washington, in consultation with NMFS, have closed all commercial and recreational fisheries for eulachon.
- NMFS is funding research and monitoring projects (through Species Recovery Grants to States (ESA section 6) and Tribes) to increase existing knowledge of eulachon distribution, abundance, and habitat quality in Oregon, Washington, California. This includes separately funded projects to the states of Oregon and Washington, the Cowlitz Indian Tribe, and the Yurok Tribe.
- The Oregon Fish and Wildlife Commission has changed the administrative rules governing the use of bycatch reduction devices in the pink shrimp fishery to reduce the bycatch of eulachon. The new rules require the use of rigid-grate bycatch reduction devices with bar spacing no more than 1.0 inch starting in 2011, and 0.75 inch beginning in 2012. Initial reports are that most fishermen have already converted to rigid-grate bycatch reduction devices with 0.75-inch bar spacing.
- Seasonal in-water work periods are being adjusted as needed to assist in reducing incidental take. When possible, in-water work occurs when the species is absent from the project area to avoid take.

Priority Recovery Actions Needed:

- Develop and implement a fishery-independent measure of adult eulachon spawning stock abundance in order to track trends in local populations.
- Identify the current eulachon spawning distribution within the range of the southern DPS.
- Conduct egg and larvae surveys of known and potential spawning areas in order identify current eulachon spawning distribution.
- Determine bycatch rates of eulachon in trawl fishery operations that are not currently covered by on-board observers.
- Reduce the incidental catch of eulachon in commercial shrimp trawl fisheries.

Recovery Priority Number: 7

The risk of extinction is believed to be moderate because, although threats due to habitat alterations are thought to be high and indirect evidence suggests a decline in abundance, there is much uncertainty regarding the scope of threats and the validity of population abundance indices. The recovery potential for this species is considered low to moderate because the limiting factors and threats to the species existence are poorly understood, and the probability of success of management actions is not known. At present there is a conflict between the recovery of the Southern DPS and economic interests. Commercial and recreational eulachon fishing and commercial shrimp trawling are among the industries that will be affected by efforts to recover the Southern DPS.

Green Sturgeon (*Acipenser medirostris*) – Southern DPS

Date Listed: April 7, 2006 (71 FR 17757)

Legal Status: Threatened

Recovery Plan Status: A Recovery Plan is currently being developed for this species and a draft Recovery Outline was signed in January 2011. Critical habitat was designated on November 9, 2009 (74 FR 52300). ESA take prohibitions were published on July 2, 2010 (75 FR 30714).

Species Status: The upper mainstem Sacramento River contains the only known spawning population of southern DPS (sDPS) green sturgeon. Spawning habitat may have extended into the three major branches of the Sacramento River—the Little Sacramento River, the Pit River system, and the McCloud River. However, currently Keswick and Shasta Dams on the mainstem of the Sacramento River block passage to the upper river, while the Red Bluff Diversion Dam, located downstream of Keswick Dam, blocks passage to a portion of the spawning grounds on a seasonal basis after June 15. This restriction to a relatively small area for spawning results in the spawning population being especially vulnerable to threats such as poaching or stochastic events such as chemical spills.

Acoustic tagging studies investigating oceanic migration and behavior patterns suggest that sDPS green sturgeon migrate extensively off the west coast of North America, from southern California to southeast Alaska.

There are no data yet available to determine whether the population is increasing or decreasing since the listing in 2006. Studies are currently being conducted to determine annual abundance of spawning adults in the upper Sacramento River. Fishing regulations that prohibited retention of green sturgeon in the commercial and recreational fisheries along the West Coast starting in 2006 will likely contribute to an improvement in population demographics. However, green sturgeon is a long-lived species that matures late (~15 years of age) and therefore recovery based on improvement to population demographics could take several decades, once threats have been adequately addressed.

Threats and Impacts: The primary threat to sDPS green sturgeon is the limitation of spawning, due to dams and other migration barriers, to a relatively short stretch of the upper Sacramento River. Adequate water flow and temperature are issues of concern. Water diversions pose an unknown but potentially serious threat within the Sacramento and Feather Rivers and the Delta. Poaching also poses an unknown but potentially serious threat because of high demand for sturgeon caviar. The effects of contaminants and non-native species are also unknown but potentially serious threats. As mentioned above, retention of green sturgeon in both recreational and commercial fisheries is now prohibited within the western states, but the effect of capture/release in these fisheries is unknown. There is evidence of fish being retained illegally, although the magnitude of this activity is likely small.

Conservation Actions: During 2008–2010, key conservation actions included:

- Designation of critical habitat and promulgation of take prohibitions under ESA section 4(d). These actions should help conserve both the species and its habitat.
- The California Fish and Game Commission approved regulations for recreational fisheries, effective March 1, 2010, to prohibit fishing for sturgeon in the upper Sacramento River where green sturgeon spawn and remain for several months.
- Ongoing salvage of green sturgeon at the Tracy Fish Collection Facility and the Skinner Delta Fish Protective Facility in the South Delta.
- Ongoing green sturgeon focused research, including studies on fish passage, genetics, and acoustic tagging and tracking to better understand the distribution and migration of green sturgeon. Acoustic

tagging in Washington and Oregon has recently been funded through a NMFS Species Recovery Grant (ESA section 6).

- Activities and projects were conducted under the Central Valley Project Improvement Act and the BDCP for the conservation of sDPS green sturgeon and other anadromous fish species and their habitats. These activities and projects include: floodplain and river restoration, riparian habitat protection, fish screening and passage projects, environmental water acquisitions, and contaminant studies.

Priority Recovery Actions Needed:

- Direct assessment and monitoring of sDPS green sturgeon population in the Sacramento and Feather Rivers; the Delta; the San Francisco, Suisun, and San Pablo Bays; and coastal areas within the 110-meter bathymetric contour along the western coast of the continental United States and Alaska through trapping and tagging programs.
- Continue genetic analyses to better understand population structure of sDPS green sturgeon.
- Continue acoustic tagging studies to help elucidate migratory and behavior patterns in coastal areas within the 110-meter bathymetric contour along the western coast of the continental United States, Canada, and Alaska.
- Continue development of habitat models that attempt to predict how much spawning habitat may have been lost in California's Central Valley as a result of the construction of impassable dams in the Sacramento and Feather Rivers.
- Evaluate fisheries impacts in Canadian fisheries, especially trawl fisheries on the west coast of Vancouver Island and in Hecate Strait.
- Educate fishermen along the West Coast to help them properly identify green sturgeon.

Recovery Priority Number: 5

The recovery priority number for sDPS green sturgeon is 5. The risk of extinction is believed to be moderate because, although threats due to habitat alterations are thought to be high and indirect evidence suggests a decline in abundance, there is much uncertainty regarding the scope of threats and the validity of population abundance indices. The recovery potential for this species is likely high if recreational and commercial fisheries remain closed and if activities that decrease habitat quality and quantity, particularly in spawning and rearing habitat, are limited and adequately monitored. There is conflict between the recovery of sDPS green sturgeon and economic interests. Central Valley agriculture, other sources of water resource use, and commercial and recreational fishing are among the industries that will be affected by efforts to recover sDPS green sturgeon.

Gulf Sturgeon (*Acipenser oxyrinchus desotoi*)

Date Listed: September 30, 1991, listed jointly by NMFS and FWS (56 FR 49653)

Legal Status: Threatened

Recovery Plan Status: The Final Recovery Plan for the Gulf sturgeon was published in September 1995. NMFS and FWS are working on an update to the Recovery Plan and hope to present it to researchers for their review in the fall of 2011.

Species Status: The Gulf sturgeon is an anadromous fish occurring from the Lake Pontchartrain/Pearl River system in Louisiana east to the Suwannee River in Florida and in the Gulf of Mexico. Adults spawn in large coastal rivers in the summer; they migrate downstream in the fall and winter cued by water temperature into adjacent bays, nearshore coastal waters, and the Gulf of Mexico to forage and grow. Juveniles and sub-adults inhabit the rivers year-round. No estimate of the historical population size of Gulf sturgeon is available. The overall status of the Gulf sturgeon is mostly stable but likely to vary across the range; generally populations in the eastern rivers are more numerous than those to the west. The status of the western-most populations of Gulf sturgeon may be at increased risk due to lack of a recent survey coupled with the recent environmental stress (e.g., hurricanes and the 2010 BP/Deepwater Horizon oil spill).

A 5-year review of the status of the Gulf sturgeon was finalized in September 2009 jointly by NMFS and FWS. Concurrently NMFS funded a data assessment review in order to construct population trends and ultimately provide guidance on conservation targets. Two estimates were calculated:

1. Commercial landings were used to reconstruct historical population biomass prior to the onset of commercial fishing. Results suggest that population biomass for this species in Florida was severely reduced—by about 90 percent during a short but intense period of commercial harvest. After large-scale fishing was abandoned, a small (exploitation less than 5 percent annually) but sustainable fishery persisted until the fishery was closed in 1984. Understanding the historic population assists in determining a recovered population.
2. Using previously collected data from two rivers that likely supported the largest fisheries (Apalachicola and Suwannee) and age-structured mark-recapture NMFS estimated abundance, recruitment, and mortality of Gulf sturgeon. Models found increasing trends in population size during the 1980s; however, results for more recent periods diverged as some results showed sharp population declines and others population increases. These differences are likely due to low recapture rates, sparse data, and poor model fit.

The data assessment highlighted the importance of standardized data collection. As a result, NMFS and FWS co-hosted three workshops in 2010 to identify a range-wide monitoring program, standardize survey techniques and equipment, and teach surgery methods required for internal placement of acoustic tags. Funds were secured to provide the researchers with the equipment and supplies needed to conduct the range-wide monitoring program. This program is scheduled to take place over the next 5 years.

Threats and Impacts: Population-limiting factors for the Gulf sturgeon include habitat degradation and loss that is being exacerbated by water allocation, drought conditions, and development; poor water quality (including temperature, dissolved oxygen, and contaminants); and barriers (i.e., dams and sills) that impede

access to historical spawning areas. Impacts from the 2010 BP/Deepwater Horizon oil spill are unknown at this time but are expected to exacerbate ongoing habitat degradation; although the Gulf sturgeon were upriver during the time of the spill, their prey are found solely in the estuaries, bays, and marine environment. Ongoing assessments of both the benthic community and the Gulf sturgeon health through blood assays should help to identify impacts of the oil spill to both the fish and its prey.

Conservation Actions: During 2008–2010, key conservation actions included:

- Completion of the 5-year review of the status of the Gulf sturgeon.
- Data assessment that led to standardized survey methodology and data collection.
- Cooperation with FWS and the states:
  - All six states with Gulf sturgeon have active ESA section 6 Cooperative Agreements, making funds through the Species Recovery Grant Program available. Mississippi has secured funding through this competitive program for a 3-year project to identify feeding habitat for and movement of the juvenile/sub-adult cohort.
  - Together with FWS, NMFS initiated a range-wide monitoring program in 2010 to improve data availability for estimating abundance, recruitment, and mortality of Gulf sturgeon. This program has regional support as it requires NMFS and FWS to provide equipment and supplies over the next 5 years; NFMS currently relies on in-house budgets to support this program and continue to seek additional funds.
  - Annual Gulf sturgeon meetings continue to bring researchers and managers together each fall to exchange information and brainstorm ideas for the recovery and conservation actions.
- NMFS continues to fund a number of research projects to increase existing knowledge of the Gulf sturgeon, their prey, and their habitat utilization. Listed below are a few of these ongoing efforts:
  - Genetic tissue analysis to investigate population structure.
  - Monitoring program to improve estimates of natural mortality across range and realize inter-riverine movements.
  - Quantify and compare habitat utilization of Gulf sturgeon to determine changes in residency and activity areas to realize effects of substrate, prey, and environmental changes.
- A Natural Resource Data Assessment is ongoing in the Gulf of Mexico to determine effects of the 2010 BP/Deepwater Horizon oil spill on the Gulf sturgeon and its critical habitat, along with an assessment of Gulf sturgeon prey and habitat.

Priority Recovery Actions Needed:

- Update the 1995 Recovery Plan and Recovery Criteria.
- Determine whether Gulf sturgeon are composed of a single or multiple populations.
- Continue to secure funds to support the 5-year Monitoring Program.
- Continue to work on a web-based database for entry and analysis.
- Investigate population demographics to better understand vulnerable life stages.
- Continue cooperation between NMFS and FWS for joint management and coordinated research.
- Nurture partnerships with states and researchers.

Recovery Priority Number: 8

This ranking corresponds to a moderate degree of threat, low to moderate potential for recovery, and the absence of conflict with economic activities. In accordance with the FWS Recovery Priority Guidelines, the FWS has assigned the Gulf sturgeon a priority number of 12. The difference in numerical value between NMFS and the FWS reflects the consideration of taxonomic classifications, which are used by FWS but not by NMFS in designating recovery priority numbers.

Shortnose Sturgeon (*Acipenser brevirostrum*)

Date Listed: March 11, 1967[8]

Legal Status: Endangered

Recovery Plan Status: The final recovery plan for shortnose sturgeon was published in December 1998.

Species Status: The shortnose sturgeon is an anadromous fish inhabiting large coastal rivers along the eastern seaboard of North America from the Saint John River in New Brunswick, Canada, south to the St. Johns River in Florida. Its life history includes fidelity to the natal river, resulting in a substantial amount of reproductive isolation and genetic distinctiveness between most populations. Because of the substantial reproductive isolation of shortnose sturgeon between rivers and river systems, NMFS recognized 19 separate populations in the final recovery plan. To date, NMFS has not formally listed DPSs of shortnose sturgeon under the ESA, and shortnose sturgeon are listed range-wide as endangered.

NMFS initiated a status review of shortnose sturgeon in 2007; the draft is currently being finalized. To aid in the status review, NMFS assembled a status review team consisting of nine federal and state biologists to compile and review the best available commercial and scientific information on shortnose sturgeon. As part of the review, the status review team examined recent genetics data as well as other information to re-evaluate the population structure of shortnose sturgeon range-wide.

While historical population estimates for shortnose sturgeon are not available, fishery accounts indicate sturgeon were previously abundant in many river systems along the U.S. East Coast. The current status of the species is mixed, as trends in abundance and population demographics vary for the different river systems across their range. While there are new population estimates for some river systems, particularly in the northeast, and several of these are showing positive increases in abundance, population estimates for many of the riverine populations of shortnose sturgeon remain undetermined or dated. As limited resources allow, NMFS continues to support surveys of river systems where shortnose are present or are suspected, to help improve our understanding of the status of the various populations.

Threats and Impacts: Threats to shortnose sturgeon also vary by river system (Table 5). Many threats to the species are range-wide, while others are specific to populations in the southeast. As threats have been reduced in some rivers, shortnose sturgeon populations have apparently grown or stabilized. In other rivers, particularly in the southeast, sturgeon population size remains low or the status is unknown.

Across the species' range, dam construction and pollution associated with industrial growth in the late 1800s and early 1900s has resulted in substantial loss of suitable habitat. In addition, habitat alterations from discharges, dredging and/or disposal, or related development activities involving estuaries/riverine mudflats and marshes remain constant threats to the sturgeon and its habitat. In addition, bycatch mortality, predominantly in shad gillnet fisheries, likely adversely impact the recovery of some shortnose sturgeon populations, although the extent of this bycatch mortality is mostly unknown.

Large-scale factors impacting riverine water quality and quantity that likely exacerbate habitat threats to shortnose sturgeon include drought, intra- and interstate water allocation, and climate change. The southeastern United States has been experiencing several years of ongoing drought, and it is predicted that these conditions will persist, exacerbating the existing impacts from dams. Water allocation issues are increasing with human population growth. Abnormally low stream flow can restrict access to habitat areas, reduce thermal refugia, and exacerbate water quality issues such as high temperature, low dissolved oxygen,

[8] Shortnose sturgeon was first listed March 11, 1967, under the Endangered Species Preservation Act; the species remained on the endangered species list when the ESA was enacted in 1973.

and elevated nutrient and contaminant levels. Further reduction in flow would likely disrupt spawning cues and upstream migration may occur earlier; a disparity between prey availability and demand by larvae could ensue. Data from gauging stations indicate that periods when river flows are inadequate to protect the riverine environment are becoming more frequent. Human-induced modifications to free-flowing rivers also influence coastal and marine systems, often reducing the ability of the system to adapt to natural variability and change.

Table 5. Major shortnose sturgeon threats by river system.

River System	Dams	Dredging	Water Quality/Quantity	Commercial Bycatch
Penobscot	✓		✓	
Kennebec Complex		✓	✓	
Merrimack	✓		✓	
Connecticut,	✓	✓	✓	
Housatonic	✓		✓	
Hudson		✓	✓	
Delaware		✓	✓	
"Chesapeake" & C&D		✓	✓	✓
Susquehanna	✓		✓	
Potomac		✓	✓	✓
Roanoke	✓		✓	✓
Chowan			✓	✓
Tar/Pamlico			✓	✓
Neuse	✓		✓	✓
New				✓
Cape Fear	✓	✓	✓	✓
Winyah Bay Complex	✓	✓	✓	✓
Lower Santee	✓		✓	✓
Cooper	✓		✓	
Santee Cooper Reservoir System	✓		✓	
ACE Basin				
Savannah	✓	✓	✓	✓
Ogeechee			✓	✓
Altamaha				✓
Satilla			✓	
St. Mary's			✓	
St. John's	✓		✓	

Note: This table does not include all threats, and the absence of a river does not indicate shortnose sturgeon do not exist, or have not previously been present, in that system.

Conservation Actions: During 2008–2010, key conservation actions included:

- *Status review*: The status review team worked on completing the status review report during the 2008–2010 timeframe. In 2011, the final status review will be released for public dissemination along with the NMFS determination on whether the listing remains appropriate. If a listing revision is proposed, associated rulemaking activities will be initiated.
- *Reducing incidental take*: Incidental capture of sturgeon is being reduced by seasonal in-water work windows, relocation trawling and addressing bycatch in various fisheries. In-water work windows are utilized throughout the range in order to reduce the likelihood of encountering a sturgeon; in-water work is primarily limited to periods when sturgeon are not in the area. Relocation trawling is utilized in the southeast to minimize incidental take of shortnose sturgeon in dredge operations. This method was first used to relocate Gulf sturgeon, wherein shrimp trawlers sweep benthos in the path of the oncoming dredge. Both in-water work windows and relocation trawling can be included as a term and condition in section 7 consultations as conservation measures. Permitting bycatch (e.g., shad

gillnet fishery) will reduce incidental take as required through ESA section 10, as steps to minimize and mitigate take are required.

- *Education and outreach*: A sturgeon carcass collection permit was issued to allow researchers along the eastern seaboard to obtain tissue samples for research and diagnostic analyses from shortnose sturgeon found dead in the wild or from captive facilities. The same permit also allows parts and whole specimens to be held by educators, allowing sturgeon mounts and preserved specimens to assist in outreach and education. This permit was instrumental in allowing the collection of tissues from an unusual mortality event that occurred in the Kennebec River, Maine, in 2009. Tissue analyses provided some evidence that the mortality event may have been due to a severe red tide event.
- *Surveys and research*: NMFS continues to financially support research in many areas including population structure (genetic analysis), movement, diet, health assessments, life history, habitat use, behavior, age and growth, spawning success, sampling techniques, and effects of altered environmental parameters (dissolved oxygen and temperature) and contaminants. Much of this work is funded through the Species Recovery Grant (ESA section 6) Program. In addition, through section 7 consultations, NMFS can identify information required to assist in the relicensing of hydropower plants and/or bridge construction.

Priority Recovery Actions Needed: The shortnose sturgeon recovery plan is dated; it was finalized in 1998. Since then, we gathered much information on population structure, movement and migration, and distribution; this information is included in the revised shortnose sturgeon status review that is currently being finalized. We intend to update the recovery plan by addressing threats on a riverine scale to identify conservation actions.

Recovery Priority Number: 5

This number is based on the following rationale: the magnitude of threat for shortnose sturgeon is moderate, particularly given the extremely low numbers of shortnose sturgeon in the southern portion of the species' range and considering the more abundant populations in other rivers; the recovery potential for this species is high, as many of the needed management actions are identified in the recovery plan; and this species is in conflict with construction or other development projects (e.g., bridge construction/demolition, dredging, blasting, and power plant operations) in most, if not all, of the species' range. Taken together, these rankings correspond to a recovery priority number of 5.

Smalltooth Sawfish *(Pristis pectinata)* – U.S. DPS

Date Listed: April 1, 2003 (68 FR 15674)

Legal Status: Endangered

Recovery Plan Status: The Smalltooth Sawfish Recovery Plan published on January 21, 2009.

Photo credit: NOAA

Species Status: Smalltooth sawfish were once prevalent throughout Florida and were commonly encountered from Texas to North Carolina. Currently, smalltooth sawfish can only be found with any regularity in southwest Florida between Charlotte Harbor and the Everglades National Park. Based on the contraction in range and anecdotal data, it is likely that the population is currently at a level less than 5 percent of its size at the time of European settlement. On September 2, 2009, NMFS designated critical habitat for the species. The critical habitat consists of two units: the Charlotte Harbor Estuary Unit, which comprises approximately 221,459 acres of coastal habitat; and the Ten Thousand Islands/Everglades Unit, which comprises approximately 619,013 acres of coastal habitat. The two units are located along the southwestern coast of Florida between Charlotte Harbor and Florida Bay. The function of the critical habitat is to facilitate recruitment of juveniles into the population. In October 2010, NMFS also published a 5-year review of the species' status. The review concluded that the U.S. DPS of smalltooth sawfish remains vulnerable to extinction and the species still meets the definition of endangered under the ESA, because the species is in danger of extinction throughout its range.

There has been no significant change in the range limits of the species since its listing in 2003. The population continues to be found predominantly in southwest Florida, centered in the protected areas of the Everglades National Park and the Ten Thousand Islands. Continued long-term collection of public sawfish encounter reports for the National Sawfish Encounter Database will be an excellent source of information regarding the distribution of the species.

Presently, the population appears stable. Long-term monitoring and relative abundance field studies are necessary to continue to gather biological data on the species and to ensure the goals of the recovery plan are being met. These actions need to continue into the future to determine abundance information on the species.

Public outreach and education are essential to protecting the species from mortality associated with recreational and commercial fisheries. Outreach funding is necessary to promote the recovery and conservation of the species. Sawfish Handling and Release Guidelines were developed for commercial and recreational fisheries in 2006, and were incorporated into the recovery plan.

Threats and Impacts: The overriding threats to the species are bycatch in commercial and recreational fisheries, and loss and degradation of habitat. Smalltooth sawfish are caught incidentally in various types of fishing gear, including gillnets, otter trawls, trammel nets, seines, and hand lines. The urbanization of the southeastern coastal states continues to modify and remove coastal habitats used by the smalltooth sawfish. Juvenile smalltooth sawfish use red mangroves, shallow water less than 3 feet in depth, and euryhaline systems to forage and to avoid predation.

Conservation Actions: During 2008–2010, key conservation actions included:

- Supported cooperative research and outreach (including many of the specific actions below) with the Florida Fish and Wildlife Conservation Commission through a Species Recovery Grant (ESA section 6).
- Directed-research on the short-term movements of adult and sub-adult smalltooth sawfish in their area of greatest abundance—Florida Bay and the upper Florida Keys.
- Juvenile satellite and tracking studies in south Florida and juvenile habitat usage studies in southwest Florida.
- Monitoring of smalltooth sawfish in the Indian River Lagoon.
- Support for the National Smalltooth Sawfish Encounter Database.
- Satellite tagging study of adult smalltooth sawfish in the shark bottom long-line fishery.
- Education and outreach efforts in Florida.
- Characterizing of past and present mangrove shorelines to aid conservation along the southwest coast of Florida.

Priority Recovery Actions Needed: Priority actions needed for recovery of the species include the following:

- Estimate the extent of native shoreline habitats at the time of listing compared to historic levels.
- Continue outreach efforts to support the distribution and implementation of the Safe Handling and Release Guidelines for smalltooth sawfish for recreational and commercial fisheries to minimize interactions, injury, and mortality.
- Continue juvenile and adult smalltooth sawfish distribution and abundance surveys in southwest Florida.
- Monitor water flow into, and salinity in, the critical habitat units.
- Conduct surveys to determine the relative abundance of smalltooth sawfish off the east and west coasts of Florida.
- Implement strategies to reduce bycatch, mortality, and injury in specific fisheries (e.g., shrimp, shark bottom long-line, and recreational) to ensure the species' viability.

Recovery Priority Number: **7**

Smalltooth sawfish has a recovery priority number of 7, based on a moderate magnitude of threat, a low to moderate recovery potential, and the potential for economic conflicts.

Yelloweye Rockfish (*Sebastes ruberrimus*) – Puget Sound/Georgia Basin

Date Listed: April 28, 2010 (75 FR 22276)

Legal Status: Threatened

Recovery Plan Status: No recovery plan has been developed for the Puget Sound/Georgia Basin DPS of yelloweye rockfish. Recovery planning is expected to begin in 2011.

Photo credit: V. O'Connell, NMFS

Species Status: The Puget Sound/Georgia Basin DPS includes all yelloweye rockfish found in waters of the Puget Sound, the Strait of Georgia, and the Strait of Juan de Fuca east of Victoria sill. There are no historic or contemporary abundance estimates for yelloweye rockfish within the Puget Sound/Georgia Basin, yet there is clear evidence that their abundance has declined dramatically. The total rockfish population in the Puget Sound region is estimated to have declined around 3 percent per year for the past several decades, which corresponds to an approximate 70 percent decline from 1965 to 2007. Fisheries catch data show that yelloweye rockfish have declined at a greater rate than the overall rockfish population. Past fisheries have disproportionately removed larger and older adults, leaving reproduction to smaller and younger fish. Smaller and younger females produce fewer and less fit larvae compared to older fish.

Threats and Impacts: Yelloweye rockfish continue to be incidentally taken in some commercial and recreational fisheries. Even though most fish are released, many die due to rapid pressure changes when they are removed from deep waters. Derelict fishing gear, such as lost fishing nets and crab and shrimp pots, kill yelloweye rockfish and their various prey. Actively fished shrimp pots (and possibly crab pots) also result in bycatch of juvenile yelloweye rockfish. Excess nutrients entering Puget Sound impact habitat suitability in some areas, such as Hood Canal, by creating low dissolved oxygen levels. Some contaminants within Puget Sound bioaccumulate within rockfish, possibly resulting in reproductive impairment. Nearly one-third of the nearshore of Puget Sound has been developed. This development impairs the productivity of food sources of rockfish. Climate change could result in temperature regime and circulation changes that impact food sources of yelloweye rockfish and affect reproductive success. Increasing levels of carbon dioxide in the ocean changes pH levels (ocean acidification), and can alter the physiology, metabolism, and reproductive biology of fish. Ocean acidification could also impact the food web, resulting in unknown changes in food availability to upper-level predators such as rockfish. As with nearly all marine species of Puget Sound, large oil spills represent a significant risk to yelloweye rockfish and their prey.

Conservation Actions: During 2008–2010, key conservation actions included:

- Funding from the American Recovery and Reinvestment Act enabled the removal of thousands of derelict fishing nets from waters shallower than 100 feet within the past several years, restoring many acres of the Puget Sound.
- The State of Washington has prohibited recreational fishing for bottomfish in waters deeper than 120 feet deep, and prohibited the retention of any rockfish species in Puget Sound, each reducing bycatch risks for yelloweye rockfish. The State has also closed several active and inactive commercial fisheries that targeted rockfish or resulted in bycatch of rockfish.
- The State of Washington has conducted Remotely Operated Vehicle surveys of rockfish habitats near the San Juan Islands, which enabled an estimate of the localized abundance of yelloweye rockfish in this region.
- NMFS funded surveys for derelict fishing gear in waters deeper than 100 feet, resulting in the documentation of over 50 nets.

- NMFS initiated research of ocean acidification affects on rockfish larvae in 2010.

Priority Recovery Actions Needed: The priority recovery actions for yelloweye rockfish include methods to address the primary threats and impacts, and include the following:

- Support Washington State's goal of developing a science-based system of marine reserves/rockfish conservation areas within each of the major basins of the Puget Sound to protect significant amounts of rockfish stocks, their habitats, and ecosystem. These reserves should be established with the input of scientists, tribes, recreational and commercial fishermen, and interested parties to enable the development of goals and objectives that facilitate recovery of yelloweye rockfish. The establishment of reserves would be aided by benthic habitat and fish abundance surveys, and research/modeling of adult and larval dispersal and recruitment.
- Only a portion of the waters less than 100 feet in depth have been surveyed for derelict nets and only a fraction of the deeper water areas of Puget Sound have been surveyed. The continued survey and removal of derelict fishing gear, including gear located in waters deeper than 100 feet (where most adult yelloweye rockfish live), would improve habitat suitability and ecosystem function.
- The prevention of new derelict fishing gear should occur by evaluating technologies and practices that could be used by commercial fishermen. In addition, systems to track nets upon their loss should be investigated to better aid their retrieval, as well as other measures necessary to prevent and track lost gear.
- Research and develop recreational fishing methods that reduce bycatch of rockfish, and improve the survival of unintentionally caught yelloweye rockfish, through actions such as identifying the best handling practices and rapid submergence techniques and educating fishermen about these techniques.
- Work with the Government of Canada to provide mutual benefits regarding rockfish research, management, and complementary recovery planning across transboundary waters.
- Work with fishing groups regarding rockfish species identification and understanding of rockfish life-history and recovery options.
- Support regional efforts to reduce nutrient and chemical contaminant inputs, cleaning up legacy contaminants, and spill response capability.

Recovery Priority Number: 7

This recovery priority number is based on a moderate magnitude of threat due to low abundance and low productivity of yelloweye rockfish and continuing threats to recovery. It is also based on a moderate recovery potential, and presence of conflict from potential future regulatory actions that could involve restrictions on recreational and commercial fishing, and other actions that may harm yelloweye rockfish habitat.

PLANTS

Johnson's Seagrass (*Halophila johnsonii*)

Date Listed: September 14, 1998 (63 FR 49035)

Legal Status: Threatened

Recovery Plan Status: The Johnson's Seagrass Recovery Plan was finalized in September 2002. NMFS is currently revising the plan and expects the draft plan will publish in 2011.

Species Status: Based on the 5-year review (November 2007) for the species, Johnson's seagrass remains vulnerable to natural and anthropogenic factors, and the species still meets the definition of "threatened" under the ESA because it is still likely to become an endangered species within the foreseeable future throughout its range. None of the threats identified at listing have been curtailed or eliminated.

Photo credit: Lori Morris

Threats and Impacts: With the exception of trampling, all of the threats to the species identified in the original listing impact the species' status. These include dredging and filling, shoreline alteration, and altered water quality (in particular, modification to salinity). There has been no improvement in the species' status in terms of its risk of extinction since its listing. Finally, no state or local efforts to protect Johnson's seagrass are ameliorating the impacts and threats to the species, even given Florida's rigorous permitting program regarding projects that impact seagrasses generally. Florida has not listed or otherwise identified Johnson's seagrass for specific protections.

Conservation Actions: During 2008–2010, key conservation actions included:

- Continued to monitor the established permanent monitoring plots within the range of the species.
- Supported studies to determine the physiological responses and salinity tolerance threshold(s) of the species from samples taken from river and inlet (marine) sites.
- Supported a study to develop a restoration plan that identifies potential site-specific restoration opportunities for the species.

Priority Recovery Actions Needed: Priority actions needed to recovery the species include:

- Conduct a comprehensive assessment of salinity threats to the species.
- Continue to monitor the northern and southern distribution limits of the species and monitor the temporal variation in these limits.
- Provide funding for experimental and modeling studies to determine the species' salinity tolerance.
- Monitor water management practices within the range of the species to determine the potential threats to species survival from freshwater discharges.

Recovery Priority Number: **7**
Johnson's seagrass is assigned a recovery priority number of 7, based on a moderate magnitude of threats, a low to moderate recovery potential, and potential for economic conflict. The recovery potential was considered low to moderate and the economic conflict was considered to exist based on anticipated in-water construction projects (i.e., dredging, dock construction, water discharges, and projects that adversely modify water quality).

INVERTEBRATES

Black abalone (*Haliotis cracherodii*)

Date Listed: January 14, 2009 (74 FR 1937)

Legal Status: Endangered

Recovery Plan Status: Recovery planning efforts are scheduled to get underway in 2011 and will continue through 2014.

Photo credit: David Witting, NOAA Restoration Center

Species Status: Black abalone has experienced major declines in abundance due to historical overfishing and, more recently, mass mortalities associated with a disease known as "withering syndrome." These declines prompted the closure of the commercial and recreational fisheries in 1993 and resulted in local extinctions and low local densities in the majority of long-term monitoring sites in California (Figure 11). These declines have been particularly severe in the California Channel Islands, which were major foci for the commercial fishery from 1970 to 1993 and where abalone densities were high (greater than 40 per square meter) as late as the mid- 1980s. Although the geographic range of black abalone extends to northern California, the vast majority of abalone populations have historically occurred south of Monterey, particularly in the California Channel Islands. Thus, black abalone populations have been severely reduced in areas that comprised the majority of the adult black abalone populations in California.

Natural recovery of severely reduced abalone populations can be a very slow process. This is largely due to the low reproductive success of widely dispersed adult populations coupled with short larval dispersal. Therefore, severely reduced populations, in addition to providing few reproductive adults, also experience reduced success of fertilization and recruitment of larval abalone. Moreover, many studies have shown that abalone larvae are generally not widely dispersed. Thus, although more abundant black abalone populations occur in central and perhaps northern California, decimated stocks in southern California are unlikely to receive significant recruitment from these distant populations. Studies indicate that a local adult density "threshold" exists and influences local recruitment. Below the critical threshold density, gametes released by males and females into the water column do not meet successfully and fertilization does not occur. Recovery will largely depend on the density of local brood stocks and whether this density is below the critical value necessary for successful recruitment. Based on empirical data from three long-term studies of black abalone in California, recruitment failure occurred below a mean adult density of 0.34 per square meter. Given that the majority of populations south of Cayucos in central California are below this threshold—many significantly so—it seems unlikely that these populations will be able to recover naturally to their former abundances, at least in the near future. Moreover, given the continued decline of most populations and the continued northward expansion of withering syndrome with ocean warming events, it seems likely that black abalone populations will continue to decline across their range.

Threats and Impacts: The most severe threat to black abalone populations is posed by the manifestation and continuing spread of withering syndrome disease. Increasing sea surface temperatures in the future will facilitate the spread of the disease to the remaining uninfected populations. Additionally, increased temperatures may increase the virulence of the disease in many of the northern, more abundant populations where the pathogen is present. Water temperatures can become elevated because of anthropogenic sources of thermal effluent and long-and short-term climate change (e.g., long-term climate change and El Niño—

Southern Oscillation). Throughout most of the species' range, local densities are below the critical threshold density required for successful spawning and recruitment. This phenomenon, known as the "Allee effect" or "depensation," has occurred because of mass mortalities due to withering syndrome and overutilization for commercial and recreational purposes. Overutilization no longer poses a threat in California because the black abalone fisheries were closed in 1993. However, forms of illegal take such as poaching resulting from inadequate law enforcement and unsafe aquaculture practices have had negative impacts on black abalone populations and are likely to continue to do so into the future.

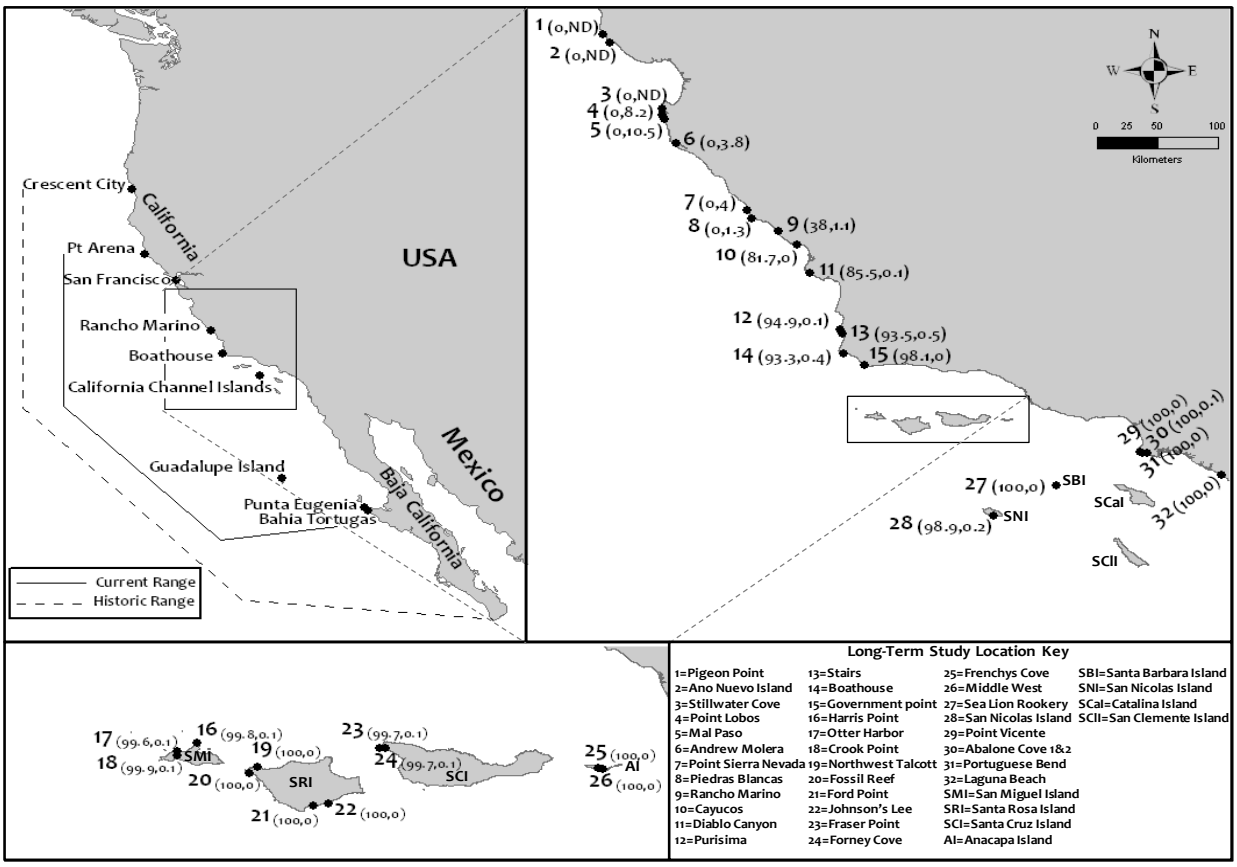


Figure 11. Point Arena (Mendocino County, California) to Bahia Tortugas, Mexico, including the offshore islands. The area between Rancho Marino (San Luis Obispo County) and Boathouse (Santa Barbara County) marks a transition zone where study locations to the north of Rancho Marino have not experienced population declines and those to the south of Boathouse have experienced population declines > 98%. Inset depicts 32 study locations examined for long-term monitoring data and the presence of black abalone in California from 1975-2006. Percent decline in abundance pre- and post- onset of disease (i.e., withering syndrome) and current mean density (number/m^2) of black abalone at each study location (2002-2006) are indicated parenthetically and respectively.

Conservation Actions:

- Studied the factors that control the transmission of the bacteria that causes withering syndrome, rates of infection, and resistance to the disease.
- Continued to monitor and tag/recapture wild black abalone to gather life history information for use in models (e.g., aggregative behavior and movement patterns) that can generate predictions about the future status of populations.
- Characterized the habitat quality of rocky intertidal coastlines in order to prioritize management and recovery efforts for black abalone.
- Studied the dynamics of black abalone reproduction to determine the appropriate spatial and temporal scale of recovery efforts.

- Published proposed critical habitat designation on September 28, 2010 along with supporting draft documents that compile and assess the habitat features essential for conserving black abalone and identify activities that may need to be managed in order to protect those features. Draft reports are available on line at http://swr.nmfs.noaa.gov/blackab/20100914_BACHD_BIORPT.pdf.

Priority Recovery Actions Needed: During 2008–2010, key conservation actions included:

- Reduce interactions between black abalone and anthropogenic sources of elevated sea surface temperatures such that rates of withering syndrome transmission and disease-induced mortality may slow.
- Help to eliminate illegal take through coordinated enforcement efforts and development of a unified outreach and education message.
- Employ safe and cost-effective methods for rebuilding populations through human intervention (e.g., translocations, captive propagation, and enhancement).

Recovery Priority Number: 3

The recovery priority number for the black abalone is 3. This risk of extinction is believed to be very high because of observed declines in abundance throughout more than 50 percent of the species' range, the continued threat of mass mortalities due to withering syndrome along the Central California coast, poaching, and sea-surface temperature rise (which has been linked to the expansion and increased transmission rate of withering syndrome) due to short- and long-term climate change. The recovery potential for this species is moderate given the uncertainty of whether (1) a successful captive breeding program can be used to supplement and/or create viable wild populations, and (2) disease resistance among the extant population exists and can spread. Another key component to recovering this species is to increase monitoring and enforcement efforts and limit anthropogenic impacts in areas where black abalone currently occur and in areas where they will be reestablished. The latter requirement may create conflict between the recovery of black abalone and economic interests. Activities that may have a negative impact on rocky intertidal habitats and coastal water quality could be limited. Commercial and recreational fishing for all species of abalone is currently closed in Southern California. However, there is continued pressure to open offshore island areas to fishing non-listed abalone species, which could put listed species at greater risk of illegal take even in seemingly remote areas (e.g., offshore islands).

Elkhorn and Staghorn corals (*Acropora palmata and A. cervicornis*)

Date Listed: May 9, 2006

Legal Status: Threatened

Recovery Plan Status: A Recovery Outline was completed in August 2006 and a Recovery Team was appointed in September 2006. Several meetings of the recovery team have been held. The Draft recovery plan is being prepared and will be made available for public comment when finalized.

Elkhorn coral (photo credit: Michael Barnette, NOAA)

Species Status: Elkhorn and staghorn corals are branching corals found in shallow (<30m) tropical waters throughout the wider Caribbean. Studies of historical distribution and abundance patterns for these two species focus on percent coverage, density, and relative size of the corals during three periods: pre-1980, the 1980s and 1990s, and recent (since 2000). Few data are present before the 1980 baseline, likely due in part to researchers' tendencies to neglect careful measurement of abundance of ubiquitous species. Both acroporid species underwent precipitous declines in the early 1980s throughout their ranges, and this decline has continued, albeit at a much slower rate. Although quantitative data on former distribution and abundance are scarce, in the few locations where quantitative data are available (e.g., Florida Keys, Dry Tortugas, Belize, Jamaica, and the U.S. Virgin Islands), declines in abundance (coverage and colony numbers) are estimated at greater than 97 percent.

Threats and Impacts: The major threats to both species are disease, temperature-induced bleaching, ocean acidification, and physical damage from hurricanes. These threats are severe, ongoing, and synergistic, and have displayed an increasing trend in the recent past. Disease is widespread, episodic, and unpredictable in its occurrence and results in high amounts of mortality. Sea-surface temperature and ocean acidity are expected to continue rising over time and may exacerbate disease impacts. The number of hurricanes affecting Caribbean reefs has increased over the past two decades. The threats to elkhorn and staghorn corals are exacerbated further by less severe threats (e.g., nutrients, sedimentation, anchoring, boating), which degrade coral condition and increase synergistic stress effects (e.g., bleaching).

Conservation Actions: The two species were listed approximately 5 years ago. Since then, an ESA 4(d) rule and a critical habitat rule have been finalized (October and November 2008, respectively). NMFS has supported several projects in the past 2 years:

- Conducted demographic monitoring in Puerto Rico and the U.S. Virgin Islands.
- Provided cross-jurisdictional monitoring data to fill demographic data gaps, refine surveys, develop maps, facilitate enforcement, and assist recovery through a Species Recovery Grant (ESA section 6 funding).
- Maintained Geographic Information System acroporid sighting and tracking database.
- Conducted genotype analyses on acroporid samples (e.g., population structure).
- Developed an exhibit-based experiment to investigate acroporid response to ocean acidification.
- Conducted a 2-day workshop to develop NOAA guidance on use of propagation in recovery.

- Developed acroporid field nurseries to complement an American Recovery and Reinvestment Act project.
- Identified acroporid propagule transfer zones (i.e., zones within which sexually and/or asexually produced transplants maybe moved safely) and conducted spawning observations/collection.
- Maintained acroporid land-based nursery facility on Curacao.
- Conducted response and restoration activities in reef sites.
- Conducted health characterization of Vega Baja, Puerto Rico.
- Sponsored SQUBAnauts to participate in collaboration with the Southeast Fisheries Science Center to collect coral gametes for crossing and settling.
- Responded to several vessel grounding in Florida, Puerto Rico, and the U.S. Virgin Islands to reattach injured acroporids and worked with responsible parties to conduct other restoration efforts as appropriate.


Staghorn coral (photo credit: NMFS Southeast Fisheries Science Center)

Priority Recovery Actions Needed: The focus of the initial phase of recovery will be the protection of the current species distribution, protection of their habitat, and finding additional populations. This will be accomplished by using a range of protection tools and will be based on the ecological requirements of the species and what is needed to fully protect its habitat. Public awareness through various outreach efforts may play a role in generating voluntary protection actions.

The recovery effort should be based on existing conservation efforts. Specific actions that will be undertaken early in the process may include the following:

- Establish large-scale *in situ* nurseries.
- Identify appropriate regulatory mechanisms for threat abatement.
- Identify the specific areas used by the species requiring habitat conservation and assign priorities to each of them.
- Continue research to determine distribution, abundance, habitat requirements, causal factors of disease, and genetic status.
- Continue and expand efforts to inform and educate the public about the needs of the species.

Recovery Priority Number: 7
Elkhorn and staghorn corals should be assigned a recovery priority of 7, based on assigning the magnitude of threat as moderate, recovery potential is low to moderate, and the potential for economic conflicts.

White abalone (*Haliotis sorenseni*)

Date Listed: May 29, 2001 (66 FR 29046)

Legal Status: Endangered

Recovery Plan Status: The final Recovery Plan for white abalone was finalized and made available to the public via *Federal Register* notice on October 20, 2008.

Photo credit: John Butler, Southwest Fisheries Science Center

Species Status: Commercial and recreational exploitation of white abalone has occurred over the past 50 years in California. Landings data indicate that catches reached a peak between 1972 and 1974, and declined to near zero in just 5 years (Figure 12). Fishery-independent surveys conducted in Southern California since that time confirm a 99 percent reduction in white abalone density occurred between the 1970s (densities on the order of 2,000 per hectare) and 2008 (< 5 per hectare). It is believed that overfishing drove white abalone densities to such low levels that, despite fishery closure in 1996, adults do not occur in high enough densities to successfully reproduce, resulting in repeated recruitment failure and an effective population size near zero. While the most recent estimates of total population size in three Southern California locations (Table 6) are higher than those estimated in a status review conducted in 2000 (1,600 individuals), the reproductive viability of these populations is still

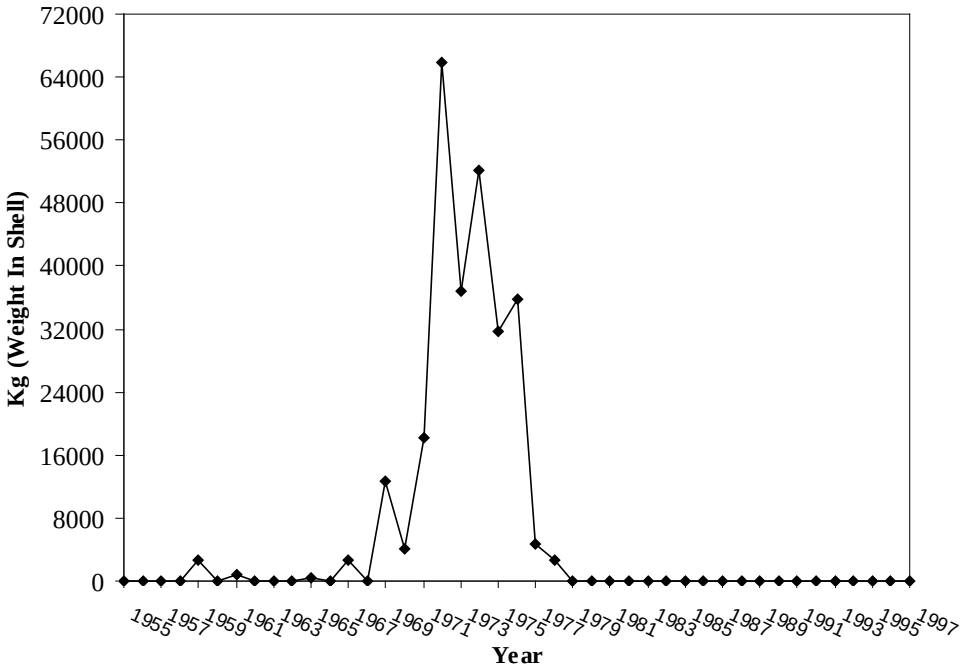


Figure 12. California commercial catch (weight in shell) of white abalone reported in CDFG bulletins for the period 1955-1997.

believed to be very low given that most individuals are reproductively isolated from one another (> 2m apart from their nearest neighbor; Table 7) and the absence of small individuals (< 9 cm) in extant populations. Although commercial fishing for white abalone in Mexico is not occurring, data from surveys conducted in October 2006 suggest that populations in Mexico have also declined dramatically in recent years.

Table 6. Changes over time in preliminary estimates of population size based on density estimates, area surveyed and habitat area by depth for Tanner Bank. Surveys were conducted using remotely operated vehicle and multi-beam sonar methods from 2002-2010 (J. Butler, unpublished data).

Depth(m)	Tanner Bank 2002	Tanner Bank 2004	Tanner Bank 2008	Tanner Bank 2010
30-40	2456 ± 893	587 ± 433	1120 ± 344	857 ± 587
40-50	10226 ± 2558	3141 ± 809	4232 ± 1137	1968 ± 537
50-60	2685 ± 1644	1332 ± 661	562 ± 376	0 ± 0
Total	**15367 ± 5095**	**5061 ± 1903**	**5913 ± 1857**	**2825 ± 1124**

Table 7. Preliminary nearest neighbor estimates over time for Tanner Bank from 2002-2008 (2010 data are not yet available). These data represent the number of individuals (and percent of observed individuals) found less than 2m and greater than 20m from the next nearest abalone observed. Also shown are the percentage of individuals observed in groups of 2 or more individuals that are all less than 2m apart from one another (J. Butler, unpublished data).

Year	Abalone sighted	<2m	>20m	% in groups
2002	195	28 (14%)	65 (33%)	6.0
2004	20	7 (35%)	5 (25%)	-
2008	73	12 (16%)	36 (51%)	2.8

Threats and Impacts:

- Critically low levels of abundance (< 0.1 % of the estimated pre-exploitation population size) resulting in increased distance between individuals and repeated recruitment failure during the 1990s resulting in a decreasing population trend.
- Inadequate enforcement.
- Reduced genetic diversity resulting in lower reproductive potential and fitness of wild populations.
- Spread of disease through supplementation.
- Illegal harvesting in the United States and Mexico.
- Habitat modification through human activities.
- Habitat modification through environmental/climate change.

Conservation Actions underway 2008–2010:

- Assessment and monitoring of historic and current white abalone populations along the mainland California coast, at the Northern and Southern Channel Islands, and offshore banks via SCUBA or a remotely operated vehicle by NMFS Southwest Fisheries Science Center, Southwest Regional Office, and the NOAA Restoration Center, the National Park Service, CDFG, and Occidental College.
- Continued development of captive propagation and enhancement program and associated laboratory studies designed to examine the dynamics of reproduction, settlement, disease prevention and treatment, and subsequent survival at the University of California Davis' Bodega Bay Marine Laboratory and participating entities through section 6 funding to the CDFG.
- Examination and assessment of future outplanting sites and methodologies by NMFS (Southwest Fisheries Science Center, Southwest Regional Office, and the NOAA Restoration Center), the National Park Service, and the CDFG partially sponsored through Species Recovery Grant (ESA section 6) funding to the CDFG.

Priority Recovery Actions Needed:

- Assess and monitor subpopulations of white abalone in the wild in cooperation with the State of California, other federal agencies, private organizations, and the Mexican government.
- Identify and characterize existing and potential white abalone habitat through acoustic remote sensing technology.
- Protect white abalone populations and their habitat in the wild.
- Continue and expand a captive propagation program for white abalone in California.
- Develop enforcement, public outreach, and education plans.

Recovery Priority Number: 1

The recovery priority number for the white abalone is 1. This risk of extinction is believed to be very high because of observed declines in abundance, the rarity of clusters that might reproduce, and the absence of small individuals in extant populations. The existing animals are reaching their maximum age (approximately 40 years) and dying without leaving younger animals to take their place. The recovery potential for this species is high if captive breeding in a disease-free facility can be achieved and these animals can be used to supplement and/or create viable wild populations. Another key component to recovering this species is to increase monitoring and enforcement efforts and limit anthropogenic impacts in areas where white abalone currently occur and in areas where they will be reestablished. The latter requirement may create conflict between the recovery of white abalone and economic interests. Commercial and recreational fishing for all species of abalone is currently closed in Southern California. However, there is continued pressure to open offshore island areas to fishing non-listed abalone species, which could put listed species at greater risk of illegal take even in seemingly remote areas (e.g., offshore islands and banks primarily > 100 feet deep). In addition, the recovery of the ESA-threatened Southern sea otter, whose population may be expanding, may conflict with the recovery of white abalone.

MARINE MAMMAL RECOVERY

Seals and Sea Lions

Guadalupe Fur Seal (*Arctocephalus townsendi*)

Date Listed: December 16, 1985 (50 FR 51252)

Legal Status: Threatened

Recovery Plan Status: No recovery plan has been completed for the Guadalupe fur seal.

Species Status: Commercial sealing during the 19th century reduced the once-abundant Guadalupe fur seal to near extinction in 1894. The size of the population prior to the commercial harvests of the 19th century is not known, but estimates range from 20,000 to 100,000 animals. Prior to the harvest, this species ranged from Monterey Bay, California, to the Revillagigedo Islands, Mexico. The capture of two adult males at Guadalupe Island in 1928 established the species' return; however, no individuals were seen again until 1954. Guadalupe fur seals pup and breed mainly at Isla Guadalupe, Mexico. The San Benito Archipelago was also an important breeding site for Guadalupe fur seals prior to the 1890s. In 1997, a second rookery was discovered at Isla Benito del Este, Baja California, and a pup was born at San Miguel Island, California. The population is considered to be a single stock because all individuals are recent descendants from one breeding colony at Isla Guadalupe.

Counts of Guadalupe fur seals have been made sporadically since 1954. A few of these counts were made during the breeding season, but the majority was made at other times of the year. In general, documented seal counts in the literature provided only the total of all Guadalupe fur seals counted (i.e., the counts are not separated by age/sex class). The counts made during the breeding season, when the maximum number of animals are present at the rookery, were used to examine population growth. These data, described in Gallo-Reynoso (1994), indicated that the population of Guadalupe fur seals has been increasing at an average annual growth rate of 13.7 percent. The population was estimated to be about 7,408 animals in 1993. Several censuses were conducted during the 2000 and 2006–2008 pupping seasons at the San Benito Islands (Aurioles-Gamboa et al. 2010). The animals were classified into five categories: pup, juvenile, subadult male, adult female, and adult male. During the 2000 survey, no pups, territorial activity, or nursing behavior was observed on San Benitos Este. A census conducted in 2006 located about 80 individuals in the northwest part of San Benitos Oeste Island. Only four pups were found; three on San Benito Este and one on San Benito Centro. In 2007, 564 animals were found on San Benito Oeste and most of the remaining 1,000 animals were on San Benito Este, and a few on San Benito Centro. A total of seven pups were found: four on San Benito Oeste and three on San Benito Este. The 2008 surveys for pups were similar to other years; two found on San Benito Oeste and six on San Benito Este. The Guadalupe fur seal population at San Benito Islands is experiencing an exponential increase ($r=18.9\%$, $r^2=.096$) in this first phase of population growth (Aurioles-Gamboa et al. 2010). This is similar to the population growth rate previously estimated by Gallo-Reynoso (1994). The relatively rapid growth rate of the population is mainly due to an increase in the number of females during the first 2 years and of juveniles during the last 2 years surveyed. The number of males and pups has remained fairly constant over time. This first phase of population growth is likely a result of emigration of animals from Guadalupe Island. According to Aurioles-Gamboa et al. (2010) the estimated population of Guadalupe fur seals on the San Benito Islands Archipelago is as follows: the total estimated

population was 582 in 2000, 1,013 in 2006, 1,566 in 2007, and 2,113 in 2008. Estimates may be considered a minimum not only because an unknown portion of the population is found at sea at any given time, but also because Guadalupe fur seals inhabit terrain that may hide animals so they could be missed during surveys. According to calculations detailed on the IUCN Red List (IUCN 2010), by combining the population estimates for the San Benito Islands and Guadalupe Island and factoring in the 13.7 percent increase, there are approximately 15,000 to 17,000 animals currently in the entire population.

Threats and Impacts: No conflicts with commercial fisheries are known to exist at the present time, although drift and set gillnet fisheries may cause incidental mortality of Guadalupe fur seals in Mexico and the United States from entanglement in marine debris. There is a possibility of negative interactions between Guadalupe fur seals and lobster fishermen when the seals occupy inshore areas to breed and haul out, particularly if the population continues to increase. In the United States, there have been no reports of incidental mortalities or injuries of Guadalupe fur seals in commercial fisheries. No information is available for human-caused mortalities or injuries in Mexico; however, similar drift gillnet fisheries for swordfish and sharks exist along the entire Pacific coast of Baja California, Mexico, and may take animals from the same population.

NMFS has documented strandings of Guadalupe fur seals in California. Although most of these animals died of natural causes, some mortality likely can be attributed to interactions with commercial fisheries and marine debris. NMFS documented an increasing number of stranded Guadalupe fur seals on California's Channel Islands and along the central California coast.

The species feeds around Guadalupe and San Benito Islands and the lower part of the California Current. This region is influenced by human population centers with contaminant runoff, extensive oil tanker traffic, and offshore oil extraction activity from southern California. Like all fur seals, Guadalupe fur seals are vulnerable to oil spills because of their dependence on their thick pelage for thermoregulation. Guadalupe fur seals share most of their haul out and breeding sites with California sea lions, which have suffered from viral disease outbreaks in the past, and which could be a vector for transmission of diseases from terrestrial sources to Guadalupe fur seals, because of their extensive use of coastal areas. Increasing levels of anthropogenic noise in the oceans may also be a concern for Guadalupe fur seals.

Guadalupe fur seals have undergone an extreme genetic bottleneck. This reduction in genetic diversity may influence further population expansion. Skewed sex ratios may also have an impact on breeding activity, specifically in the San Benito population. The average sex ratio for Guadalupe fur seals on Guadalupe Island during 1991–1993, when the population was in an exponential growth phase was 1:1.5 (male:female), while the average sex ratio on San Benito Islands in 2000 and during 2006–2008 was 1:24 (male:female) (Aurioles-Gamboa et al. 2010).

Conservation Actions: Guadalupe fur seals are listed as a threatened species by the State of California. In addition, they are listed as vulnerable on the World Conservation Union Red List and as an Appendix I species under the Convention on International Trade in Endangered Species. The Guadalupe fur seal is protected by the Government of Mexico, and the Isla de Guadalupe is now a pinniped sanctuary. As most of the range of this species lies in Mexico, NMFS took no conservation actions during 2008–2010.

Priority Recovery Actions Needed: As most of the range of this species lies in Mexico, no priority recovery actions are needed at this time for the Guadalupe fur seal.

Recovery Priority Number: 10
The recovery priority number for the Guadalupe fur seal is designated as 10, due to low magnitude of threat, a high recovery potential given that the population is increasing, and the absence of significant conflict with economic projects.

Hawaiian Monk Seal (*Monachus schauinslandi*)

Date Listed: November 23, 1976 (41 FR 51611)

Legal Status: Endangered

Recovery Plan Status: The first Recovery Plan for the Hawaiian Monk Seal was completed by NMFS in 1983. NMFS published a revised Recovery Plan in August 2007.


Photo credit: NMFS

Species Status: The prolonged and steep decline of the Hawaiian monk seal population continued through the 2-year reporting period. Although this decline (about 4 percent per year) does not bode well for species recovery, there are encouraging developments to report, including significant growth of the small monk seal sub-population in the main Hawaiian Islands and promising advances in juvenile seal survival enhancement, research, and local community engagement.

The best estimate of the current total Hawaiian monk seal population is 1,161 seals—1,048 in the Northwestern Hawaiian Islands (NWHI) and 113 in the main Hawaiian Islands (MHI). The total population has been in decline almost continuously since at least the 1950s when beach counts began in the NWHI. Since 2001, the total abundance at the six main NWHI sites (French Frigate Shoals, Laysan, Lisianski, Pearl and Hermes, Midway, and Kure) has been declining at an average annual rate of about 4.5 percent. However, total population decline over the past several years has been moderated to about 4 percent by recent increases in the relatively small MHI sub-population. The primary cause of the overall decline appears to be low juvenile survival in the NWHI, where only about one of every five seals survives to reproductive age.

Although Hawaiian monk seals were only rarely reported in the MHI over most of recorded history, since 1990 an increasing number of seal sightings and births have occurred in the MHI. Sightings in the MHI increased from 77 individually identifiable monk seals in 2005 to 113 in 2009. Documented annual births in the MHI have increased since the mid-1990s, with 21 births reported in 2009. Together, these observations suggest that monk seals are recolonizing the MHI. The small but increasing population of seals in the MHI is perhaps the most promising aspect of an otherwise bleak recovery outlook for Hawaiian monk seals, but this growing seal population in areas heavily populated by humans is creating a new set of recovery challenges as discussed below.

Threats and Impacts: Threats to Hawaiian monk seal recovery vary between the NWHI and MHI. In the NWHI, primary threats include food limitation for juveniles, shark predation on juveniles, entanglement in marine debris, male seal aggression on females and juveniles, and shoreline habitat loss. Threats in the MHI include disease and various types of human-induced impacts, such as disturbance at haul-out areas, fishery interactions, feeding and other interactions that cause habituation to humans, and, most recently, intentional killings.

Northwestern Hawaiian Islands

- Food limitation for juvenile seals is the dominant factor driving the steep population decline in the NWHI. In the NWHI, seals must compete for food with large populations of other apex predators, such as large jacks (Carangids) and sharks. "CritterCam" footage shows jacks and sharks aggressively following and stealing prey from seals as they forage along the bottom. Such "kleptoparasitism" appears to be a serious impediment to the foraging success of juvenile seals, but less so for older seals. Shifts in ecosystem productivity, caused by global climate change and/or cyclical changes, may also be contributing to food limitation.
- Shark predation is also contributing to the decline in the NWHI. Predation by Galapagos sharks on pre-weaned or recently weaned seal pups at French Frigate Shoals has become a major cause of shark-related injury and mortality.
- Hawaiian monk seals have one of the highest documented entanglement rates of any pinniped species, and marine debris and derelict fishing gear are chronic forms of pollution affecting monk seal habitat in the NWHI. The number of monk seals found entangled has not changed, nor have accumulation rates of marine debris in the NWHI.
- A significant cause of female and juvenile monk seal mortality and overall population decline during the 1980s and early 1990s was injury and death caused by aggression from multiple male seals (especially at Laysan, Lisianski, and French Frigate Shoals). This threat continues to be a concern, even though it tends to be episodic and geographically limited.
- The loss of terrestrial habitat is a significant issue in the NWHI, which are mostly low-lying atolls subject to beach loss from storm erosion and sea level rise. Some habitat loss, such as the subsidence of Whaleskate Island at French Frigate Shoals, has already been observed, and sea level rise over the longer term may threaten a large portion of the resting and pupping habitat in the NWHI.

Main Hawaiian Islands

- Human-caused impacts (disturbance, injury, and death) are the primary threat to the small but growing population of Hawaiian monk seals in the MHI. Beaches that are popular for human recreation are also increasingly used by monk seals for hauling out (resting) and molting. Female monk seals are also increasingly pupping on popular recreational beaches. These pupping events entail mother-pup pairs remaining on the beach to nurse for up to 7 weeks, during which time they are particularly vulnerable to human disturbance.
- Due to recent fishing restrictions, hookings and entanglements in active fishing gear have become virtually nonexistent in the NWHI. However, in the MHI, the growing seal population has led to increased fishery interactions. Over the past 2 years, several seals have required removal of embedded recreational fishing hooks. Twelve hookings were reported in 2009, and at least two seals drowned in lay gillnets over the reporting period.
- Intentional feeding and/or other direct interaction, such as swimming with juvenile seals, has recently become a serious concern for the MHI population. These human-seal interactions have increased over the past 2 years, and relocation of "conditioned" seals to remote locations has been required in at least three cases.
- Recent MHI monk seal deaths have heightened concern about monk seal exposure to diseases not previously encountered, such as leptospirosis and toxoplasmosis. The lack of antibodies in monk seals to these diseases makes them extremely vulnerable to potential infection. At least two seals died over the reporting period where toxoplasmosis was identified as the most likely cause of death.
- Finally, intentional killing of seals appears to be a growing problem in the MHI. Over the past 2 years, at least three seals have died from apparent gunshots, and foul play could not be ruled out as the cause of death for at least three other seals. Although these cases remain under investigation, they are probably linked at least partially to growing hostility toward monk seals by fishermen upset about the seals' real and perceived impacts on fishing activities, including seals taking fish from nets and lines.

Conservation Actions: During FY 2009 and 2010, enhanced federal funding has supported key conservation actions targeting four overriding priorities specified in the revised Hawaiian Monk Seal Recovery Plan:

1. Enhance survival of juvenile seals born in the NWHI
   - Initiated programmatic Environmental Impact Statement for new survival enhancement and research activities.
   - Removed and mitigated sharks preying on pups at French Frigate Shoals.
   - Successfully conducted deworming trials on juvenile seals at Laysan Island.
   - Continued essential population monitoring at six NWHI atoll breeding sites.
   - Conducted new winter camps for population assessment at key NWHI sites.
   - Developed comprehensive strategy and decision system for new temporary translocation program to increase juvenile female seal survival in NWHI.
2. Improve management of seals and reduce human-seal interactions in the MHI
   - Expanded response and rescue program, engaging over 400 trained volunteers in thousands of responses per year in partnership with Hawaii Department of Land and Natural Resources, NOAA's Office of National Marine Sanctuaries, U.S. Coast Guard, University of Hawaii Hilo, and various non-governmental organizations—funded in part via an ESA Species Recovery Grant.
   - Initiated Native Hawaiian liaison and community liaison programs, mobilizing new support from several local community leaders on five islands.
   - Used new cell phone telemetry technology for detailed tracking of seal foraging behaviors, movements, and habitat use—funded in part by Department of Defense-Navy.
   - Completed study to define baseline diet and foraging behavior of MHI seals.
   - Conducted enhanced population surveys to better quantify MHI seal population.
   - Partnered with Hawaii Department of Land and Natural Resources to increase fishermen's awareness and promote seal-friendly fishing practices—funded in part via an ESA Species Recovery Grant.
   - Developed new outreach products including brochures, fact sheets, web pages, and a 10-minute documentary on the value of monk seals in Hawaiian culture—funded in part by Hawaii Tourism Authority.
   - Conducted workshop on methods for aversive conditioning and behavior modification to prevent and mitigate "habituated" and/or "conditioned" seals.
   - Initiated response to petition to revise ESA critical habitat designation to consider including habitat in MHI.
3. Prevent and mitigate disease
   - Conducted expert external review of Health and Disease Program.
   - Facilitated development of captive care facilities at various locations in partnership with the Marine Mammal Center, Waikiki Aquarium, Sea Life Park, National Energy Laboratory of Hawaii Authority, and others.
   - Initiated vaccination trials on captive monk seals and surrogates.
   - Continued health screening of free-ranging MHI seals to determine disease prevalence and initiated research to determine MHI contaminant load and impacts.
4. Effectively administer recovery and research programs and leverage federal funds
   - Held annual Hawaiian monk seal recovery team meetings and responded to team recommendations, and expanded team membership to include local stakeholders.
   - Hired full-time recovery coordinator, assistant recovery coordinator, survival enhancement ecologist, and additional research staff.
   - Partnered extensively with State of Hawaii, Department of Defense, U.S. Coast Guard, NOAA's National Ocean Service, and other government agencies and non-governmental organizations in conducting numerous actions above.

Priority Recovery Actions Needed: The conservation actions listed in priorities 1 through 4 above—most of which were made possible with increased federal funding starting in FY 2009—should be continued at least over the next 5 years. In particular, the following are essential:

- Ensure the Environmental Impact Statement and permitting processes for new enhancement and research are completed to allow for full implementation of an integrated suite of survival enhancement activities for juvenile seals in the NWHI.
- Ensure that new and existing MHI management and research activities continue to foster nascent Native Hawaiian support, enhance promising government and non-government partnerships, and mitigate animosity toward monk seals within the local fishing community.

Recovery Priority Number: 1

The Hawaiian monk seal has a recovery priority number of 1 due to a high magnitude of threats, high recovery potential, and the potential for economic conflicts while implementing recovery actions. The magnitude of threat is considered to be high based on the population decline that has persisted for over 20 years. Although our understanding of the most serious threat of food limitation in the NWHI is improving, the recovery potential is also high because the mitigation of other critical threats are known and in place or are in the process of being implemented. For example, the species' current core habitat in the NWHI is well-protected and, if foraging conditions improve, recovery can be expected. In addition, the recovery potential can be considered high because the MHI represent a large amount of under-occupied habitat, which could support a larger population of seals if promising new management actions are given time and continued support to reach their full potential. Finally, potential economic conflict exists in the MHI with fishery interactions, coastal development, and increased tourism.

Steller Sea Lion (*Eumetopias jubatus)* – Eastern DPS

Date Listed: April 5, 1990 (55 FR 12645), original listing of threatened status for entire species; eastern DPS listed as a separate DPS effective June 4, 1997 (62 FR 24345)

Legal Status: Threatened

Recovery Plan Status: The first Recovery Plan for Steller Sea Lions was completed in December 1992. A revised draft plan was released for public review and comment in May 2006 and released in May 2007 (72 FR 28473). The Final Revised Recovery Plan was published in March 2008.

Photo credit: L. Fritz, NOAA National Marine Mammal Lab

Species Status: In 1997, NMFS reclassified Steller sea lions as two distinct population segments under the ESA, based on biological information collected since the species was originally listed as threatened in 1990. The Steller sea lion population segment west of 144°W longitude (a line near Cape Suckling, Alaska) was recognized as the western distinct population segment and reclassified as endangered. The threatened listing was maintained for the remainder of the U.S. Steller sea lion population—the eastern DPS—which includes sea lions east of Cape Suckling (144°W longitude) from California north through Southeast Alaska (Figure 13). However, sea lions are known to move across this boundary and may forage, rest, etc., in portions of the range of the other DPS.

Currently 13 rookeries and about 85 major haulout sites are within the breeding range of the eastern DPS, extending from Cape Fairweather, Alaska, to Año Nuevo Island off central California. Available data indicate that the population trend in recent years at 12 of these rookeries is either increasing or stable at relatively high levels. While Año Nuevo Island is the southernmost active rookery (37°06'N), some pups were born at San Miguel Island (34°05'N) until 1981. Data indicate that, overall, the eastern DPS increased at over 3 percent per year between 1982 and 2009, more than doubling in Southeast Alaska, British Columbia, and Oregon.

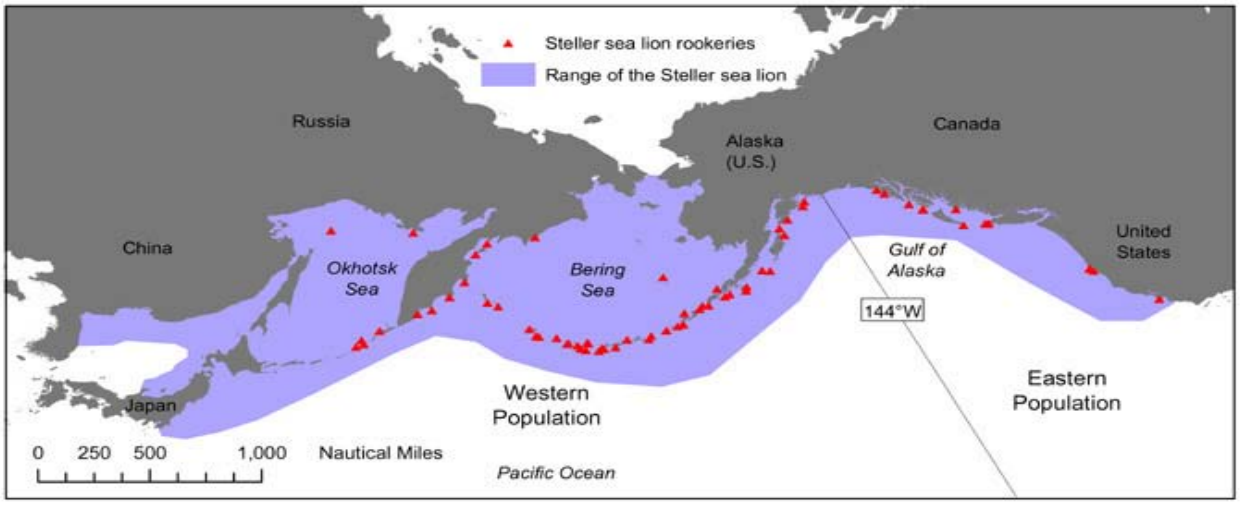


Figure 13. Steller sea lion range and rookeries.

Within the eastern DPS, the overall conditions for Steller sea lions appear to be most favorable in the northern portion of their range. At present, Southeast Alaska and British Columbia together account for nearly 82 percent of total pup production. All four rookeries founded in the past 25 years are located in the northern part of the breeding range of this DPS, in the northern portions of Southeast Alaska. In the past 2 decades, nearly all the increase in pup numbers in the eastern DPS has been at newer rookeries. In addition to the five rookeries in Southeast Alaska, Steller sea lions used 30 major haulouts, plus several other sites for brief periods each year. The use of these sites is probably related to the availability of seasonally abundant prey.

The southernmost portion of the range of the eastern DPS of Steller sea lions has contracted and exhibits an exception to the overall positive trend of the eastern DPS. The southernmost sites appear to have stabilized, but at levels far below their historical maximums.

Threats and Impacts: In the 2008 Steller Sea Lion Recovery Plan, NMFS concluded that the most important protection for this population has likely been prohibitions on lethal takes, and that no further substantial threats are evident at present. NMFS did note that the most likely threats are development, increased disturbance and habitat destruction, increases in magnitude or distribution of commercial or recreation fisheries, and environmental change.

However, rookeries tend to be located at remote sites such as isolated offshore reefs and islands unsuitable for development. Many rookeries are in protected areas such as parks, refuges, wilderness areas, and ecological reserves, where future on-land development is unlikely. NMFS is working with many partners to obtain further data on factors that now contribute, or could contribute in the future, to Steller sea lion injury and mortality throughout the range, including in the range of the eastern DPS.

Recently, biologists with the NMFS Alaska Region noted an increase in sea lion carcasses found in Southeast Alaska (particularly the northern region of Southeast Alaska) between 2009 and 2010, in contrast to previous years. Between 2009 and 2010, a total of 69 Steller stranded sea lions in Southeast Alaska were reported to the NMFS Alaska Region stranding program; 55 of these animals were mortalities (24 in 2009, 31 in 2010). While the cause of death of most of these sea lions is as yet undetermined, six of the mortality cases involved human interaction. NMFS is examining the pattern of these mortalities further, and samples collected from some of the individuals may shed light on their cause of death.

In addition, NMFS noted in the Recovery Plan that impacts related to entanglement in fishing gear and marine debris appear to be affecting sea lions in substantial numbers. Research conducted during 2000–2007 by biologists from the Alaska Department of Fish and Game documented that the incidence of entanglement of Steller sea lion in marine debris in Southeast Alaska and in northern British Columbia "contrasts sharply" and is much higher than the incidence reported in an assessment of entangled Steller sea lions conducted in the Aleutian Islands in 1985. During the Aleutian study, only 11 Steller sea lions, or 0.07 percent of the counted adult population, showed evidence of entanglement with debris. Identifiable materials included trawl net or twine and none were observed to be entangled in packing bands or other materials.

In contrast, in a more recent study in northern parts of the range of the eastern DPS, the researchers reported an entanglement incidence of 0.26 percent (SD = 0.0064, n = 69 sites). They documented 386 individuals of all age classes as being either entangled in marine debris or having ingested fishing gear. In the recent study in the range of the eastern DPS, the most common neck-entangling material was packing bands (54%), followed by rubber bands (30%), net (7%), rope (7%), and monofilament line (2%). They documented ingestion of kinds of fishing gear, including salmon fishery flashers (80%), longline gear (12%), hook and line (4%), spinners/spoons (2%), and bait hooks (2%). The researchers reported that neck entanglements are especially lethal to animals that become entangled at a young age. Their recommendations included additional effort to develop ways to disentangle the animals safely, further document the rates of entanglements concurrent with

ongoing research projects, and obtain necropsies on stranded carcasses. They concluded that the incidence of entanglement and population level effects calculated for Steller sea lions is likely to be underestimated.

Conservation Actions: From 2008–2010, a number of major conservation actions related to this DPS were accomplished or initiated, including:

- Completion and release of a draft Biological Opinion following consultation under section 7 of the ESA related to the effects of the Authorization of Groundfish fisheries under the Fishery Management Plan for Groundfish of the Bering Strait/Aleutian Islands Management Area, the Gulf of Alaska and the State of Alaska Parallel Groundfish Fisheries.
- Initiation of a status review under section 4 of the ESA for the eastern DPS of Steller sea lions. Following initiation of this status review, NMFS received two petitions to delist this species. In response to these petitions, NMFS reviewed available information and published a 90-day finding indicating that substantial information exists such that the petitioned action may be warranted. NMFS is continuing its comprehensive status review to determine whether the delisting of the DPS is warranted. A finding is required on this issue within 12 months of receipt of the first petition (August 2011).
- Continued aerial surveys throughout the range of the Steller sea lion in Alaska to evaluate recent trends of non-pups in this population.
- Aerial surveys in the Southern part of the range to ensure the availability of recent trend data in the ongoing status review.
- Continued research on Steller sea lion foraging ecology, habitat use, status, health, and predation threat.
- Funded the Makah Tribe and state partners to conduct research on Steller sea lion distribution, branded pup survival and vital rates, and prey competition between Steller and California sea lions through the Species Recovery Grants to Tribes Program. Issuance of a cooperative agreement between NMFS and the Alaska Sea Otter and Steller Sea Lion Commission for Steller sea lion–related outreach, education, and bio-sampling activities. This cooperative agreement enabled the Commission and NMFS to work together on key outreach and education projects, biosampling, and collaborative research activities on Steller sea lions throughout many parts of their range in Alaska. Funds from this cooperative agreement enabled the development of newsletters and other publications focused on Alaska Native marine mammal activities, as well as Steller sea lion research, management, and regulation. Funds were also used to hold public forums to enhance the involvement of Alaska Natives and the public in marine mammal management in Alaska. This cooperative agreement is ongoing.

Priority Recovery Actions Needed: The top-priority recovery actions for this species are to (1) complete the ongoing status review to determine whether delisting of this species is warranted and (2) develop a post-delisting monitoring plan that would guide monitoring activities for 10 years if the species is delisted. Key components of a monitoring plan, as identified in the 2008 Recovery Plan, include:

- Continue to estimate population trends (biennial or triennial) for pups and non-pups.
- Closely monitor trend and status of rookeries and haul-outs at southern end of range (California).
- Ensure protection of rookery and haul-out sites (through state, federal, or private measures) to ensure the continued use of these sites for pupping, breeding, attending young, and resting. Research and monitoring plans should be in place for all projects having a high probability of negatively impacting sea lions to ensure these activities do not result in harm to sea lions or their habitat.
- Pursue further conservation actions through federal, state, and local governments to ensure fisheries and other human actions do not adversely affect sea lion prey resources.
- Maintain marine habitats, particularly in regard to prey populations, through appropriate fisheries management and control of contaminants.
- Monitor the magnitude and distribution of commercial and recreational fisheries to ensure the continued protection of important sea lion prey resources.

- Monitor for unusual mortality events via a stranding network including impacts from fishing gear and other human-related materials (e.g., plastic bands, discarded fishing nets, and flashers).
- Work with partners to reduce the magnitude of human-caused mortality related to entanglement in marine debris, incidental take in fisheries, illegal shooting, research, and struck and lost animals during subsistence hunting.
- Conduct additional research on the genetic structure of the eastern population.
- Monitor direct takes and incidental takes in fisheries.
- Monitor frequency and severity of Steller sea lion interactions with humans in ports and harbors.
- Monitor impacts of recreational and commercial viewing operations.
- Monitor impacts of research activities.
- Monitor for disease and health related to contaminants.
- Monitor predation as a significant source of mortality.

Based on new information from published studies regarding rates of entanglement of eastern DPS Steller sea lions in southeast Alaska and northern British Columbia, it is important that Steller sea lion population monitoring occurs to quantify rates, types of gear/debris, and outcomes of entanglements. Such monitoring is needed to assess the impact of marine debris on the vital rates and population trends. Collaborative actions are recommended between NMFS, research partners, and the fishing industry to develop ways to reduce Steller sea lion fishery interactions. Management action should include outreach and education to raise awareness of entanglements and to encourage measures to eliminate the use of packing bands and other entangling materials.

Other recovery actions that have been identified and should be implemented include the following:

- Research and/or monitoring programs should be put into place to oversee activities in these areas that have the potential to negatively impact Steller sea lions. Human disturbance has increased in previously remote areas. Little is known about the potential impacts from changes to the physical environment, disturbance due to vessel traffic, or tourism-related activities. Because of lack of information, it is not possible to quantify these threats. However, the potential threat from increased human disturbance highlights the need to keep regulatory mechanisms in place to protect sea lions.
- Other actions to protect haul-out and pupping areas could provide substantial insurance against future impacts from development and anthropogenic disturbance. These actions include reaching an agreement with the State of Alaska regarding fishery management plans to minimize the take of Steller sea lions, and working with the State to ensure that their future actions will comply with the ESA and Marine Mammal Protection Act (MMPA).

Recovery Priority Number: 10

The recovery priority number for the eastern DPS is 10 due to a low magnitude of threat, high recovery potential, and no significant potential for economic conflict.

Steller Sea Lion – Western DPS (*Eumetopias jubatus*)

Date Listed: Original listing of threatened status for entire species April 5, 1990 (55 FR 12645; see also, 55 FR 13488, April 10, 1990; 55 FR 49204, November 26, 1990; and, 55 FR 50005, December 4, 1990); the western DPS was listed as endangered as a separate DPS effective June 4, 1997 (62 FR 24345; published May 5, 1997)


Photo credit: L. Fritz, NOAA National Marine Mammal Lab

Legal Status: Endangered

Recovery Plan Status: The first Recovery Plan for Steller Sea Lions was completed in December 1992. A revised draft plan was released for public review and comment in May 2006 and released on May 2007 (72 FR 28473). The Final Revised Recovery Plan was released in March 2008.

Species Status: The western DPS of Steller sea lion breeds on rookeries in Alaska (the U.S. portion of the western DPS) from Prince William Sound (144°W) west through the Aleutian Islands and in Russia on the Kamchatka Peninsula, Kuril Islands and the Sea of Okhotsk. Steller sea lions use 38 rookeries and hundreds of haul-out sites within the range of the western DPS in Alaska. The first reported counts of Steller sea lions in Alaska, made in 1956–1960, totaled approximately 140,000 for the Gulf of Alaska and Aleutian Islands regions.

The endangered western DPS of Steller sea lion has declined by almost 90 percent throughout its range, reaching its smallest size in 2000. Prior to the 1990s, the primary causes of the decline may have been commercial harvests of Steller sea lions, entanglement of juvenile Steller sea lions in commercial fishing gear, and intentional shooting by fishermen. However, since 1991 these effects have been nearly eliminated, yet the overall population in the western portion of the species' range is not increasing in abundance at a rate similar to that observed for the eastern portion of the species' range.

Steller sea lion populations in parts of the Alaskan range of the western DPS may have begun to drop between the late 1950s and the mid 1970s. Surveys showed a major decline in numbers first detected in the eastern Aleutian Islands in the mid-1970s. The decline spread eastward to the central Gulf of Alaska during the late 1970s and early 1980s and westward to the central and western Aleutian Islands during the early and mid-1980s. From the mid-1970s to 1990 the overall western DPS in Alaska declined by over 70 percent, with the largest declines in the Aleutian Islands (76 to 84%) and smaller declines in the Gulf of Alaska (23 to 71%). Approximately 110,000 adult and juvenile Steller sea lions were counted in the Kenai-Kiska region in 1976–1979, and by 1985 and 1989 counts had dropped to about 68,000 and 25,000, respectively.

Between 1990 and 2000, trend site counts continued to decline, although more slowly than in the 1980s, resulting in a total reduction of almost 90 percent since the 1950s and 83 percent since the 1970s. Sub-area declines from 1990 to 2000 had a different pattern than in the 1970–1990 period, with smaller changes in the center of the Alaskan range and larger declines at the edges. The average rate of decline between 1990 and 2000 for all trend sites in the western DPS was 5.1 percent per year. Counts of adult and juvenile Steller sea lions at all trend sites within the range of the western DPS in Alaska increased 12 percent between 2000 and 2008, and most of this increase occurred in the first 4 years. Non-pup surveys conducted in 2006 and 2007 did not result in complete assessments of the population.

In the core of the western DPS range in Alaska (Kenai-Kiska), all of the 2000–2008 increase of 10 percent occurred between 2000 and 2004. In the larger Kenai-Attu region, counts increased 7 percent in the first 4 years, but then dropped slightly between 2004 and 2008. Consequently, the overall increase of 3 percent observed between 2004 and 2008 in the western DPS in Alaska was due entirely to a 35 percent higher count in the eastern Gulf of Alaska.

Russia and Asia

Steller sea lions use 10 rookeries and approximately 77 haul-out sites within the range of the western DPS in Russia. Analysis of available data collected in the former Soviet Union indicates that in the 1960s the Steller sea lion population totaled about 27,000 (including pups), most of which were in the Kuril Islands. Between 1969 and 1989, numbers of adult and juvenile Steller sea lions at major rookeries and haul-outs in the Kuril Islands declined 74 percent. By 1990, the total Russian population had declined by approximately 50 percent to about 13,000 (including pups). Between the early 1990s and 2004, the Russia and Asian population increased slowly to about 16,000 animals, and since then it is thought to have increased to about 25,000 animals. The Steller sea lion is listed as an endangered species under Russian legislation.

Threats and Impacts: For the western DPS, the first slowing of the decline began in the 1990s, suggesting that the management measures implemented in the early 1990s may have been effective in reducing some anthropogenic effects (e.g., shooting, harassment, and incidental take). The apparent relative population stability or slight decline observed in recent years is correlated with comprehensive fishery management measures implemented since the late 1990s. However, because of the lack of recovery of this population and continued decline in some large portions of its range, there is concern that potentially high threats to the recovery of this population remain. Most of the 61 recovery actions in the original 1992 recovery plan were accomplished to a substantial degree with one exception—the development of international conservation agreements. Much of the conservation effort under the 1992 recovery plan was focused on eliminating the most direct and certain causes of decline (e.g., shooting and incidental take). These efforts resulted in the following:

- Substantial reduction in disturbance of important rookeries and haul-outs.
- Substantial reduction in the incidental catch of Steller sea lions in commercial fishing operations, particularly the groundfish trawl fishery.
- Significant efforts to reduce intentional take by prohibiting shooting at or near Steller sea lions.
- Intensive research to better describe the threats to Steller sea lions and to provide management with options for recovery actions.
- Potential reduction in the competitive interactions between Steller sea lions and commercial fisheries for pollock, Atka mackerel, and Pacific cod in Alaska.
- Additional information on the status, foraging ecology, and survivorship of Steller sea lions.

An extensive research program increased NMFS understanding of the relative impacts of threats that potentially impede the recovery of Steller sea lions. For the western DPS, NMFS concluded that the following threats are now relatively minor: (1) Alaska Native subsistence harvest, (2) illegal shooting, (3) entanglement in marine debris, (4) disease, and (5) disturbance from vessel traffic and scientific research. Uncertainty remains about incidental take by fisheries (believed to be low). The threat posed by predation by killer whales remains controversial, especially within stakeholder communities. Considerable concern remains about the impacts of fisheries and environmental variability, including climate change.

Conservation Actions: From October 1, 2008, to September 30, 2010, the major conservation actions related to this DPS was the completion and release of a draft Biological Opinion following consultation under section 7 of the ESA related to the effects of the authorization of groundfish fisheries in the Bering Sea and Aleutian Islands region under the Fishery Management Plan for Groundfish of the Bering Sea and Aleutian Islands Management Area, and on the authorization of groundfish fisheries in the Gulf of Alaska under the Fishery Management Plan for Groundfish of the Gulf of Alaska, including the prosecution of parallel groundfish fisheries in Alaska state waters. This opinion concluded that the action, as proposed, is likely to

jeopardize the continued existence of the western DPS of Steller sea lion and adversely modify the designated critical habitat for the western DPS of Steller sea lion. It included one Reasonable and Prudent Alternative, which has multiple management measures to avoid the likelihood of the groundfish fisheries jeopardizing the continued existence of the endangered western DPS of Steller sea lion or adversely modifying its designated critical habitat. Together these measures are designed to ameliorate adverse effects of removing prey biomass and avoid competition in the short and long term.

Other important conservation actions included implementation of actions identified or directly consistent with recovery actions identified in the recovery plan. Such activities included:

- Continued aerial surveys throughout the range of the Steller sea lion in Alaska to enable evaluation of recent trends of non-pups in this endangered population.
- Continued coordination of Steller sea lion research.
- Implementation of a new policy and guidance document for the issuance of research permits for Steller sea lions and northern fur seals following section 7 consultation and NEPA evaluation.
- Continuation of high-quality research on Steller sea lion foraging ecology, habitat use, status, health, and predation threat.
- Continuation of cooperative research with Russian scientists on Steller sea lions in Russian waters.
- Continuation of work under co-management agreements for northern fur seals and Steller sea lions between NMFS and the Aleut Community of St. George Island and the Aleut Community of St. Paul Island.
- Funded the Aleut Community of St. Paul Island to investigate Steller sea lion diet and assess levels of contaminants that may be detrimental to the animals and subsistence users through the Species Recovery Grants to Tribes Program. Continuation of cooperation between NMFS and the Aleut Marine Mammal Commission for the conservation and management of all marine mammal subsistence species, with particular focus on Steller sea lions and harbor seals in November 2006.
- Issuance of a cooperative agreement between NMFS and the Alaska Sea Otter and Steller Sea Lion Commission for outreach, education, and bio-sampling related activities in the breeding range of the western DPS and eastern DPS.

Priority Recovery Actions Needed: Priority actions are identified in the 2008 Recovery Plan and in the 2010 Groundfish Biological Opinion. They include:

- Continued trend monitoring in the abundance of pups and non-pups.
- Research on adult female body condition, health, foraging, reproduction, and movements in the western part of the range in Alaska to better evaluate factors that may be impeding recovery.
- Research on foraging ecology of all population segments in the western and central Aleutians.
- Maintain or improve management actions until substantive evidence demonstrates that these measures can be reduced without limiting recovery.
- Design and implement an adaptive management program to evaluate fishery conservation measures.
- Develop a more detailed recovery task implementation plan, including a research implementation plan, to include a comprehensive ecological and conceptual framework that integrates and further prioritizes numerous recovery actions.

Recovery Priority Number: 5

NMFS increased the recovery priority number for the western DPS from 7 in 2008 to 5 in 2010. Steller sea lions in significant portions of the range are still in very sharp decline and some other subregions are not recovering, and the recent trend of the population overall is not significantly different from zero. NMFS believes they have a moderate to high magnitude of threats depending on which area of the range is of concern, moderate recovery potential, and a substantial potential for economic conflict in some areas.

Whales

Beluga Whale (*Delphinapterus leucas*) – Cook Inlet DPS

Date Listed: October 22, 2008 (73 FR 62919) and proposed critical habitat (74 FR 63080, December 2, 2009)

Legal Status: Endangered

Recovery Plan Status: Recovery plan is currently under development. NMFS has prepared a final Conservation Plan for this DPS that serves many of the functions of a recovery plan and provides interim recovery measures until a recovery plan is available.

Photo credit: U.S. Navy

NMFS published a notice of intent to prepare a recovery plan for the Cook Inlet beluga whale (75 FR 4528) on January 28, 2010. The Recovery Plan Team, consisting of 13 Scientific Panel members and 18 Stakeholder Panel members, has held several meetings.

Species Status: The endangered Cook Inlet beluga whale population is not showing recovery, according to the 2010 annual survey and population estimate conducted by NMFS. The 2010 abundance estimate is 340 animals in 2010, up from the 2009 abundance estimate of 321 belugas, but confirms an annual decline of 1.1 percent (Figure 14). No reliable estimate of historic abundance exists, although NMFS has used partial survey data from the State of Alaska to estimate the carrying capacity to be 1,300 whales. Despite measures to regulate subsistence harvests by Alaskan Natives (only five beluga whales have been harvested since 1999), the population is still in decline. An extinction risk analysis completed in 2008 projected a 29 percent probability of extinction within 100 years for the Cook Inlet beluga.

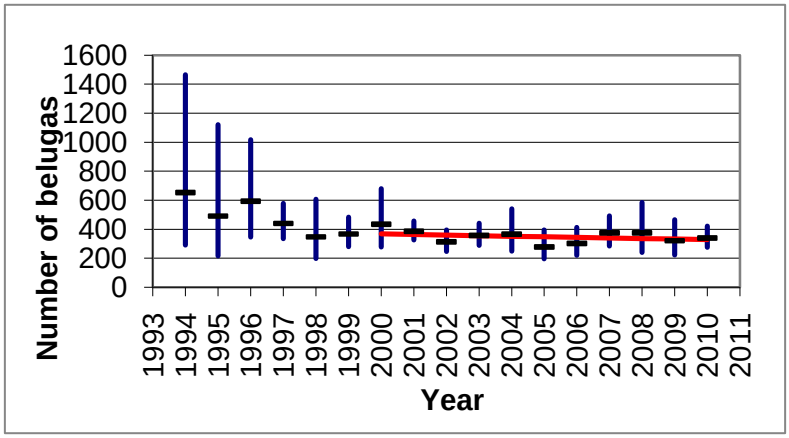


Figure 14. Population of Cook Inlet beluga whales, 1993–2011.

The small, isolated population of Cook Inlet beluga whales has had a distinct contraction in range over the past three decades (Figures 15, 16, and 17). Significant changes in beluga whale distribution are evident across three periods: 1978–1979 (the earliest well-documented data); 1993–1997 (during the recorded decline in abundance); and 1998–2008 (when hunting was regulated and recovery was anticipated). The center of the

summer range for beluga whales contracted northeastward into upper Cook Inlet from the 1970s to the 1990s and continued into the 2000s with a longitudinal shift east towards Anchorage (the largest city and port in Alaska) occurring between the 1990s and 2000s (Rugh et al. 2010).

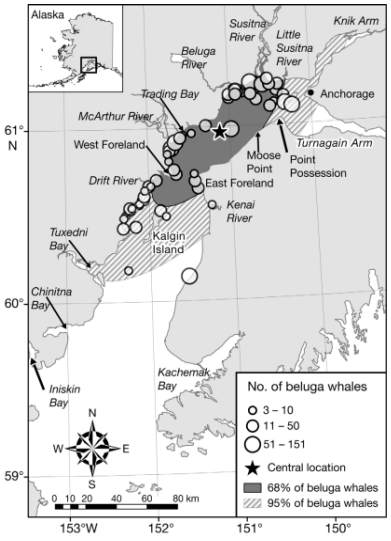


Figure 15. Delphinapterus leucas. Areas occupied by beluga whales in Cook Inlet, Alaska, in June/July 1978–1979. The distribution of beluga whales around each central location for each period was calculated at 1 SD (capturing ca. 68% of the whales) or 2 SD (95%).

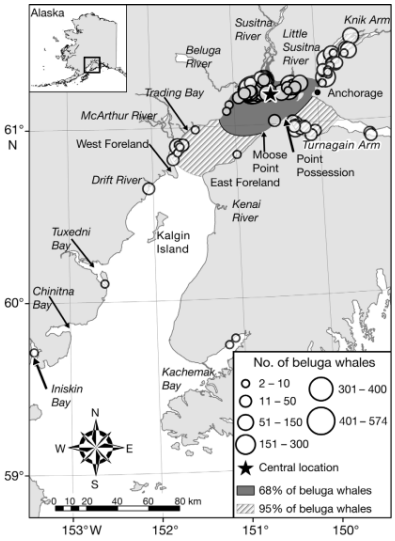


Figure 16. Delphinapterus leucas. Areas occupied by beluga whales in Cook Inlet, Alaska, in June/July 1993–1997.

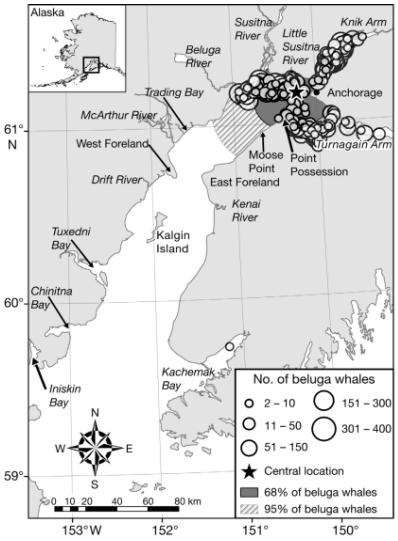


Figure 17. Delphinapterus leucas. Areas occupied by beluga whales in Cook Inlet, Alaska, in June 1998–2008.

Threats and Impacts: The Cook Inlet beluga population may be affected by myriad natural and human impacts. Natural threats include stranding events, predation, parasitism and disease, and environmental change. Potential human impacts include poaching, fishing, pollution, vessel traffic, coastal development, noise, oil and gas activities, and scientific research. Tourism and whale watching is a projected human-induced threat for this population, while subsistence harvest is a past threat which was regulated in 1999. Only five whales were harvested in 1999–2007, and no harvest is allowed between 2008–2012.

Stranding events, reduced prey, and noise are threats that have been identified by NMFS as having both a high likelihood of occurrence and a high potential impact to species recovery in the next 5 years. The frequent use of shallow nearshore and estuarine habitats makes beluga whales particularly prone to threats from human activities.

Conservation Actions: During 2008–2010, key conservation actions included:

- Final Cook Inlet beluga whale subsistence harvest Supplemental Environmental Impact Statement.
- Final regulations that establish long-term limits on the maximum number of Cook Inlet beluga whales that may be taken by Alaska Natives for subsistence and handicraft purposes.
- Final Cook Inlet Beluga Whale Conservation Plan.
- Response to Cook Inlet beluga strandings.
- Development of a long term enforcement plan by NOAA Office of Law Enforcement, encompassing traditional enforcement methods and Community Oriented Policing and Problem Solving.
- Coordination among agencies and project applicants to analyze activities under NEPA, the MMPA, and ESA.

- Development of an interagency area oil spill contingency plan.
- Development of noise guidelines to minimize the likelihood of adverse impact to belugas or their habitat.
- Restrictions on research permits whereby animal capture is not allowed to reduce the possibility of injury or mortality.
- Completion of an ESA Section 6 Agreement in 2009, which allows the State of Alaska to compete for beluga-specific research and management funds.

Priority Recovery Actions Needed:

- Continue with the annual abundance surveys in June and calf index surveys in July.
- Continue to respond to stranded (alive and dead) beluga whales.
- Identify prey quality, quantity, preference, and availability in summer and winter.
- Identify beluga whale groups and family through photo identification and genetics.
- Model habitats.
- Use acoustic tools to understand beluga behaviors, distribution, and habitat needs.
- Identify disease and parasite types related to Cook Inlet belugas.
- Conduct risk assessment by age, gender, and reproductive status.
- Investigate and mitigate noise pollution, chemical and biological pollution, and introduction of novel biota (disease and parasites).
- Protect habitat from development.
- Ensure prey availability, study impacts to prey by fisheries.
- Conduct studies to compare a thriving beluga population (Bristol Bay) with the declining Cook Inlet beluga population.

Recovery Priority Number: 2

The magnitude of threats for this species is considered high, as the results of a NMFS population viability model place the risk of extinction to be very high in the near future. In addition, the magnitude of threat is considered high based on the fact that the subsistence harvest was regulated in 1999 and yet the population continues to decline annually at 1.1 percent (NMFS 2010). The second criterion, recovery potential, can be considered high because NMFS understanding of the most serious threat to Cook Inlet beluga whales, subsistence harvest, has been regulated, while genetic viability remains healthy and the calving rate appears normal. The third criterion reflects the ESA's requirement that recovery priority be given to those species that are, or may be, in conflict with development projects or other forms of economic activity. There are conflicts associated with Cook Inlet belugas and ongoing and proposed new activities, as the population shares its range with the most populated and industrialized region of Alaska.

Blue Whale (*Balaenoptera musculus*)

Date Listed: June 2, 1970 (35 FR 18319)

Legal Status: Endangered

Recovery Plan Status: A recovery plan for the blue whale was completed in July 1998.

Species Status: Blue whales are found in all oceans worldwide and are separated into populations from the North Atlantic Ocean, North Pacific Ocean, and Southern Hemisphere. Worldwide, blue whales were significantly depleted by commercial whaling activities.

Photo credit: NOAA Southwest Fisheries Science Center

In the entire North Pacific, pre-exploitation population size is speculated to be approximately 4,900 blue whales (Gambell 1976). Blue whale population structure in the North Pacific remains uncertain, but two stocks are recognized within U.S. waters: the western North Pacific (formerly Hawaii) and the eastern North Pacific (formerly California/Mexico) stocks. No data are available to provide a minimum population estimate or to determine a population trend for the western North Pacific stock. The eastern North Pacific stock feeds in waters from California to Alaska in summer and fall, and migrates south to waters from Mexico to Costa Rica in winter. The best abundance estimate for the eastern North Pacific stock is the average of mark-recapture estimates, 2,842 (CV= 0.41) whales. It is unclear whether this population is increasing, decreasing, or stable (Carretta et al. 2009).

In the North Atlantic, pre-whaling population size estimates for the entire basin are considered unreliable, but range from 1,100 to 1,500 blue whales (Gambell 1976). The distribution of blue whales in the western North Atlantic generally extends from the Arctic to at least mid-latitude waters. The current range of the blue whale in the North Atlantic remains unknown, but it is considered an occasional visitor in U.S. Atlantic waters, which may represent the current southern limit of its feeding range. The 2010 minimum population estimate for the western North Atlantic stock is 440 whales. There are insufficient data to determine a population trend for this stock (Waring et al. 2011).

In the Southern Hemisphere, pre-exploitation population estimates range from 150,000 to 210,000 whales (Gambell 1976); recent abundance estimates place the population size at 400 to 1,400 whales (IWC 2007).

Threats and Impacts: A primary threat to blue whales is mortality and serious injury caused by ship strikes. Ship strikes were implicated in the deaths of five blue whales from 2004 to 2008 and averaged 1.0 whales per year in waters off California between 2004 and 2008. Four of these deaths occurred in 2007, the highest number recorded for any year. Additional, unreported ship-strike mortality of blue whales likely occurs. Several of the whales photo-identified off California had large gashes on the dorsal body surface thought to be caused by collisions with vessels. There are no recent confirmed records of mortality or serious injury to blue whales in the U.S. Atlantic Exclusive Economic Zone, however, in March 1998 a dead blue whale was brought into Rhode Island waters on the bow of a tanker. The cause of death was determined to be a ship strike, although the location of the strike is unknown (Waring et al. 2011).

Other potential threats to blue whales include fishing gear entanglement and anthropogenic noise. Off California and Mexico, blue whales may potentially encounter and be by-caught in drift gillnet fisheries for swordfish and sharks. In the observed fisheries, no blue whale mortality was documented; however, entanglement rates may be underestimated, as blue whales may break through or carry away fishing gear, perhaps suffering unrecorded subsequent mortality. There were no observed fishery-related mortalities or serious injuries in the North Atlantic (Waring et al. 2011). While impacts are unknown, the increasing levels of anthropogenic underwater noise may affect blue whale communication.

Conservation Actions:

- Continued issuing vessel speed advisories of 10 knots or less for vessels transiting the Santa Barbara Channel when aggregations of five or more blue whales occur within or adjacent to the shipping lane. This is a collaborative effort (beginning in 2008) by NMFS, U.S. Coast Guard, and the National Ocean Service's Channel Islands National Marine Sanctuary In the coming years NMFS expects to continue monitoring the occurrence of this species in nearshore waters and enact protective measures to reduce the threat of a ship strikes.
- Continued implementing the blue whale strike response plan, including weekly overflights to record whale locations (see http://channelislands.noaa.gov/focus/alert.html).
- Continued monitoring the status of the eastern North Pacific stock of blue whales via shipboard surveys, conducted every 3 years with MMPA funding.
- Continued placing observers onboard vessels in the California/Oregon swordfish/thresher shark drift gillnet fishery to monitor for the take of protected species, including marine mammals (MMPA funding).
- Continued implementing marine mammal take reduction measures identified in the Pacific Offshore Cetacean Take Reduction Plan (including the use of acoustic pingers) to reduce the bycatch of marine mammals (MMPA funding).
- Increasing training by NMFS Marine Mammal Stranding and Response program for responses to entangled whales, and maintains a reporting number for any whale in distress: 1-877-SOS-Whal(e).
- Funded cooperative research with the states of Oregon and Washington to determine whether recent sightings off Washington represent a return to use of these waters and verify expanded use of southern Oregon waters by blue whales seen in recent years through a Species Recovery Grant (ESA section 6).
- Along with collaborators, convened workshops and panel discussions (and fostered other discussions) toward identifying measures to reduce vessel collisions with large whales in waters off Southern California and toward steps to implement them. Among other things, this involves collaboration with other agencies and NOAA line offices.

Priority Recovery Actions Needed: Continue ongoing recovery actions listed above.

Recovery Priority Number: 5
This priority number ranking reflects a moderate magnitude of threat, high recovery potential, and the presence of conflict (shipping and the associated threat of collisions).

Bowhead Whale (*Balaena mysticetus*)

Date Listed: June 2, 1970 (35 FR 8495)

Legal Status: Endangered

Recovery Plan Status: No recovery plan has been written for this species. NMFS has determined the combined efforts of several managing entities, especially those of the International Whaling Commission, NMFS, and the Alaska Eskimo Whaling Commission (operating under a NOAA/ Alaska Eskimo Whaling Commission Cooperative Agreement)—coupled with the fact that four of the five stocks of bowhead whales exist outside of U.S. waters—obviate the need for and benefit of a recovery plan.

Photo credit: NMFS

Species Status: Five populations of bowhead whales are currently recognized. The Spitsbergen population is found in the North Atlantic east of Greenland in the Greenland, Kara, and Barents Seas. Thought to have been the most numerous of bowhead populations (estimated unexploited population of 24,000 animals), the Spitsbergen bowhead is now severely depleted, possibly numbering in the tens of animals.

The Davis Strait population is found in Davis Strait, Baffin Bay, and along the Canadian Arctic Archipelago. The current population is estimated at 350 animals and recovery is described as "at best" exceedingly slow.

No reliable estimate exists for the Hudson Bay population. Recent estimates of 256 to 284 have been presented for the number of whales occurring in Foxe Basin. There has been no appreciable recovery of this population.

The Okhotsk Sea population may have been 3,000–6,500 animals, and may now number between 300–400, although reliable population estimates are not currently available.

The Western Arctic stock of bowhead whales is growing, and may be nearing a recovered status. The current abundance estimate for this stock is 10,545 and is increasing at a rate of about 3 percent per year. This is considered to be between 46 percent and 101 percent of pre-exploitation abundance. Some analysts suggest this stock may be approaching carrying capacity, although the population growth rate shows no sign of slowing.

Threats and Impacts: While commercial exploitation of bowhead whales is prohibited, managed subsistence hunting in Alaska and Russia by native groups still occurs. Other current and projected threats include oil and gas exploration and development, interaction with commercial fishing gear, and water quality issues, oil and gas exploration and development being the greatest of these. Climate change may also present a threat to these whales, as high northern latitudes are expected to be affected more than other areas. Ice-associated animals, such as the bowhead whale, may be sensitive to changes in Arctic weather patterns, sea-surface temperatures, ice extent, and associated prey availability. However, the current and potential future effects of climate change on this species are poorly understood.

Conservation Actions:

- Closely managed, in cooperation with the International Whaling Commission, NMFS, and the Alaska Eskimo Whaling Commission, the subsistence harvest of the Western Arctic population by Alaskan Natives. The most recent 5- year harvest quota was issued in 2008, and this group continues to set harvests at sustainable levels consistent with conservation and recovery.
- Continued to administer the MMPA section 101(a)(5) program to authorize small takes of bowhead whales incidental to lawful activities, including mitigative measures to reduce adverse effects.
- Ongoing consultations under Section 7 of the ESA concerning offshore oil and gas actions in the Beaufort and Chukchi seas.

Priority Recovery Actions Needed: The Western Arctic (U.S.) population is increasing at approximately 3 percent annually and may be nearing a recovered state. No priority actions are identified.

Recovery Priority Number: **7**
The magnitude of threats for this species is considered moderate, as four of the five extant populations are greatly reduced and at precariously low levels, and although some threats remain, biological extinction is not expected to occur in the immediate future. The recovery potential for bowheads is considered low to moderate, as the limiting factors to at least four of the five populations are not sufficiently understood.

Fin Whale (*Balaenoptera physalus*)

Date Listed: June 2, 1970 (35 FR 18319)

Legal Status: Endangered

Recovery Plan Status: A recovery plan for fin whales was completed in July 2010.

Species Status: Fin whales occur in oceans of both the Northern and Southern Hemispheres between 20–75° N and S latitudes. Worldwide, fin whales were severely depleted by commercial whaling activities.

Photo credit: NMFS Southwest Fisheries Science Center

The MMPA stock assessment reports for the fin whale recognize one stock in the U.S. North Atlantic Ocean (the western North Atlantic stock) and three stocks in the U.S. North Pacific Ocean (California/Oregon/Washington stock, Northeast Pacific stock, and Hawaii stock). In the North Atlantic, a reliable estimate of pre-exploitation population size does not exist and it seems unlikely that a robust estimate can be possible, considering the long history of exploitation and the many uncertainties about current abundance and population boundaries (Breiwick 1993). The best abundance estimate available for the western North Atlantic stock is 3,985 whales (CV= 0.24) (Waring et al. 2011).

In the North Pacific, the total pre-exploitation population size of fin whales is estimated at 42,000 to 45,000 (Ohsumi and Wada 1974; Omura and Ohsumi 1974). The best estimate of fin whale abundance in the California/Oregon/Washington stock is 3,044 (CV = 0.18) whales (Carretta et al. 2011), and for the Hawaiian stock is 174 (CV=0.72) (Carretta et al. 2011). The minimum population size of the Northeast Pacific stock is 5,700 (Angliss and Allen 2011).

The pre-exploitation abundance of fin whales in the Southern Hemisphere is estimated at 400,000 and the most current population estimate (1979) for fin whales in the southern oceans is 85,200 (IWC 1979).

Threats and Impacts: Although the main direct threat to fin whales was addressed by the International Whaling Commission (IWC) whaling moratorium on commercial whaling, several potential threats remain. Among the current potential threats are collisions with vessels, reduced prey abundance due to overfishing and/or climate change, the possibility that illegal whaling or resumed legal whaling will cause removals at biologically unsustainable rates and, possibly, the effects of increasing anthropogenic ocean noise.

Fin whales from the western North Atlantic stock are seriously injured or killed at least occasionally by fishing gear (e.g., gillnets) off eastern Canada and the United States, and are relatively commonly injured or killed by ship strikes off the U.S. East Coast. NMFS' records on this stock from 2004 through 2008 yield a minimum annual rate of 3.2 human-caused deaths per year—1.2 per year resulting from fishery interactions or entanglements and 2.0 due to collisions with vessels (Waring et al. 2011). Because fin whales are also among the main attractions of whale-watching enterprises in eastern Canada and the northeastern United States, they are regularly subjected to close and persistent following by vessels.

Interaction with commercial fisheries and ship strikes are also threats to the Northeast Pacific and California/Oregon/Washington stocks. Between 2002 and 2006, there was one observed incidental mortality of a fin whale in the Bering Sea/Aleutian Island pollock trawl fishery, an average of 0.23 deaths annually

(Angliss and Allen 2011). Between 2004 and 2008, ship strikes were implicated in the deaths of four fin whales and the injury of another in U.S. west coast waters, averaging 1.0 whale annually (Carretta et al. 2011). Additional mortality from ship strikes probably goes unreported because the whales do not strand or, if they do strand, they do not always have obvious signs of trauma.

Fin whales are much less subject to whale watching in the eastern North Pacific than in the western North Atlantic. Thus, disturbance of fin whales in the Pacific is more likely to come from the abundant industrial, military, and fishing vessel traffic off the Mexican, U.S., and Canadian coasts than from the deliberate approaches of whale-watching vessels.

Conservation Actions: For conservation actions for the western North Atlantic stock involving fishing gear interactions, see the North Atlantic Right Whale section of this report. North Atlantic right, humpback, and fin whales are all managed under the Atlantic Large Whale Take Reduction Plan implemented through the MMPA.

NMFS Marine Mammal Stranding and Response program has increased training for responses to entangled whales, and maintains a reporting number for any whale in distress: 1-877-SOS-Whal(e).

There are no conservation actions specifically for the Hawaii and Alaska/Northeast Pacific stocks of fin whales.

Conservation actions for the California/Oregon/Washington stock of fin whales are ongoing and include the following:

- Continued monitoring the status of the California/Oregon/Washington stock of fin whales via ship-board surveys, dependent upon availability of MMPA funding.
- Continued placing observers onboard vessels in the California/Oregon swordfish/thresher shark drift gillnet fishery to monitor for the take of protected species, including marine mammals.
- Continued implementing marine mammal take reduction measures identified in the Pacific Offshore Cetacean Take Reduction Plan (including the use of acoustic pingers) to reduce the bycatch of marine mammals.
- Continued conducting genetic analyses to examine the global taxonomic status of fin whales, with a focus on the potential for a new subspecies in the North Pacific.
- Conducted a combination of genetic and acoustic analyses to clarify stock structure of North Pacific fin whales.
- Funded cooperative research with the states of Oregon and Washington to determine habitat and use in offshore waters, examine distribution relative to shipping lanes to evaluate vulnerability to ship strikes, and determine population structure through photo-ID, genetics, and satellite tag movements through a Species Recovery Grant (ESA section 6).
- The North Atlantic stock of fin whales likely benefits from various ship strike reduction measures established to protect right, humpback, and minke whales on the U.S. east coast.

Priority Recovery Actions Needed: The priority recovery actions for fin whale include continuing the ongoing conservation actions listed above as well as the following:

- Estimate population size and monitor trends in abundance.
- Determine population discreteness and structure of fin whales.
- Investigate sources of human-caused injury and mortality.

Recovery Priority Number: 9
This priority number reflects a low degree of threat, high recovery potential, and the presence of conflict with economic activities (shipping and the potential for collisions).

Humpback Whale (Megaptera novaeangliae)

Date Listed: June 2, 1970 (35 FR 18319)

Legal Status: Endangered

Recovery Plan Status: A recovery plan for the humpback whale was completed in November 1991.

Species Status: Humpback whales live in all major ocean basins from equatorial to sub-polar latitudes.

Photo credit: NOAA National Undersea Research Program

In the entire North Pacific Ocean prior to 1905, it was estimated there were 15,000 humpback whales basin-wide (Rice 1978). In 1966, after heavy commercial exploitation, humpback abundance was estimated at 1,000 to 1,200 whales (Rice 1978), although it is unclear whether estimates were for the entire North Pacific or just the eastern North Pacific. The most current estimate of abundance for the North Pacific overall comes from the SPLASH project and is 18,302 individuals (Calambokidis *et al.*, 2008). For the entire North Atlantic Ocean, the best available estimate is 11,570 whales (CV=0.069) (Stevick *et al.*, 2003).

Five stocks of humpback whales are recognized in U.S. waters: the Gulf of Maine (formerly western North Atlantic) stock in the Atlantic Ocean, and the western North Pacific, central North Pacific (including the Southeast Alaska feeding area), California/Oregon/Washington, and the American Samoa stocks in the Pacific Ocean. While estimating humpback whale abundance is inherently difficult, best estimates of abundance are: 847 (CV=0.55) for the Gulf of Maine stock (Waring et al 2011), 938 (CV=0.30) for the western North Pacific stock (Angliss and Allen 2011), 7,469 (CV=0.30) for the central North Pacific stock (Angliss and Allen 2011), and 2,043 (CV=0.10) for the California/Oregon/Washington stock (Carretta et al. 2011). There is currently no estimate of abundance for humpback whales in American Samoan waters. The minimum population estimate for this stock is 150 whales, which is the number of individual humpback whales identified in the waters around American Samoa between 2003–2008 by individual fluke photo identification (J. Robbins, personal communication). Based on study design in which it is likely not all individuals are sampled, this is considered an underestimation of the true minimum population size. The Gulf of Maine, central North Pacific, California/Oregon/Washington and western North Pacific stocks seem to be increasing.

In the entire Southern Hemisphere, humpback whale abundance prior to commercial exploitation is estimated at 100,000 whales (Gambell 1976). Recent abundance estimates south of 60°S latitude in the summer range from 34,000–52,000 whales (IWC 2011). Based on mark-recapture studies, an estimated 82 individuals (95% CI 60–111) exist in the Northern Indian Ocean. However, sample sizes were small, and there were various sources of possible negative bias (Minton *et al.*, In press).

Threats and Impacts: Fishing gear entanglements and ship strikes are the most common human-related causes of serious injury and mortality for humpback whales. Similar to other large whales, humpback whales are capable of becoming entangled and swimming away with parts of fixed fishing gear. Up to 60 percent of mortalities for humpback whales along the United States mid-Atlantic and southeastern coasts were determined to have resulted from either gear entanglements or vessel collisions (Wiley et al. 1995, Volgenau et al. 1995).

Entanglements

Entanglement can result in abrasions, lesions, debilitating injury, or even death depending on the type, amount, and location of entangling gear. Even without injury, entanglement can impair swimming and feeding ability leading to isolation of individual members from groups and/or metabolic stress. Stressed animals may alter normal behavior associated with courting, breeding, giving birth, and nursing their young (Robbins 2010). Robbins and Mattila (2001) reported that male humpback whales are more likely to become entangled than females. Scarring data from these studies suggested that yearlings were more likely than other age classes to be involved in entanglements. Female humpback whales showing evidence of prior entanglements produced significantly fewer calves, suggesting that entanglement may impact reproductive success.

For the period 2004 through 2008, the minimum annual rate of fishing-related mortality and serious injury to the Gulf of Maine stock averaged 3.0 per year (U.S. waters, 2.8; Canadian waters, 0.2). During this same period, five deaths and ten serious injuries to North Atlantic humpback whales were attributed to entanglement (Glass et al. 2010, as described in Waring et al. 2011).

NMFS has observed the incidental take of humpback whales in the California/Oregon swordfish/thresher shark drift gillnet fishery and believes humpback whales are also taken in drift gillnet fisheries off Baja California, but quantified information regarding takes in these fisheries is not available. In the North Pacific Ocean, humpback whales migrate annually from Hawaii to northern British Columbia, Southeast Alaska and Prince William Sound west to Kodiak, and they may become entangled in gear from several fisheries. A total of 18 humpback whales were observed entangled in fishing gear during 2004–2008 in California, Oregon, and Washington—11 were reported entangled at sea in trap/pot fishery gear off California and Oregon, including two humpback whales that were later found dead in Oregon (Northwest Regional Stranding Program, unpublished data). Seven humpback whales were reported entangled in gillnet-type or other gear, including lines and buoys of unknown origin. Two of the 11pot/trap gear entanglements could be attributed to specific fisheries: One whale was entangled in sablefish trap gear and another in spot prawn trap gear (NMFS, Southwest Regional Stranding Program, unpublished data). The whale entangled in sablefish trap gear was successfully disentangled by divers who removed all the gear, and the whale swam away immediately following disentanglement. Another whale entangled in crab pot gear in 2008 was successfully disentangled. One of the sightings involving crab pot gear included a cow/calf pair in which the cow was entangled. Due to the nature of the entanglements, including gear being towed, 14 of the humpback whales are considered serious injuries. Including the 14 serious injuries and two deaths, total mean annual serious injury and mortality for the commercial fisheries was 3.2 per year for the period 2004–2008.

In Alaska, most reported events have occurred in the region of Southeast Alaska, with the majority of gear being crab, shrimp, and unidentified pot gear, as well as gillnet and other unidentified nets. Between 2008 and 2010, NMFS received 37 humpback whale entanglement reports in Alaska. Longline gear, crab pots, and other non-fishery-related lines have been implicated in the entanglement of humpback whales seen in Hawaii.

Ship Strikes

Another threat to humpback whales is mortality or serious injury from ship strikes. Over the last two decades, the number of reports involving confirmed vessel-whale collisions has increased, likely the result of increased awareness and reporting from boat operators or perhaps from increased boat traffic. While it is difficult to evaluate the number of vessel-whale collisions based on those reported to the media and authorities, it is clear that not all incidents are documented. From 2004 through 2008, eight mortalities from the Gulf of Maine stock were attributed to collisions with vessels, averaging 1.6 deaths per year (Glass et al. 2010, as described in Waring et al. 2011).

In the Pacific Ocean, two humpback whale deaths were attributed to ship strikes in 2004–2008 (NMFS, unpublished stranding data). An additional humpback whale that was struck in Washington waters in 2008 was reported to have broken the stabilizer on the vessel that struck it, but the condition of the whale is

unknown. During 2004–2008, there were an additional eight injuries of unidentified large whales attributed to ship strikes and some of these could have involved humpback whales. Additional mortality from ship strikes probably goes unreported because the whales do not strand or, if they do, they may not have obvious signs of trauma. Several humpback whales have been photographed in California with large gashes in their dorsal surface that appear to be from ship strikes (J. Calambokidis, pers. comm.). The average number of documented humpback whale deaths by ship strikes for 2004–2008 is 0.4 per year, but it remains likely that not all humpback whale deaths from vessel strikes are documented.

Between 2003 and 2007, eight vessel collisions were reported for the Central North Pacific stock of humpback whales. Of those, seven ship strikes occurred in Southeast Alaska and one occurred in the northern portion of this stock's range. It is not known whether the difference in ship strike rates between Southeast Alaska and the northern portion of this stock is due to differences in reporting, amount of vessel traffic, whale densities, or other factors. From 2003 to 2007, the annual average of known humpback whale ship strike deaths was 1.6 humpback whale mortalities per year for the entire stock (0.2 ship strikes/year for the northern portion of the stock, and 1.4 strikes/year for the Southeast portion) (Angliss and Allen 2011). In Hawaii, from 2005 through the end of the 2010 whale season, at least 42 confirmed collisions occurred, with at least 14 whales showing signs of injury (Lammers et al. 2003, Lyman 2010).

Interactions with whale-watching vessels (e.g., disturbance or harassment, vessel strikes) are also a threat to humpback whales. The Gulf of Maine stock of humpback whales is the focus of whale watching in New England from late spring to early fall, particularly within the Stellwagen Bank National Marine Sanctuary. The central North Pacific stock is the focus of a developed whale-watching industry on its wintering grounds in the Hawaiian Islands. The feeding aggregation in southeast Alaska is also the focus of a developing whale-watching industry that may affect whales in localized areas.

Habitat loss and degradation may also impact humpback whales. Shipping channels, fisheries, and aquaculture, and alternative energy production may all occupy or degrade humpback whale aggregation habitats. Recreational use of marine areas, including resort development and increased boat traffic (thrill craft), may displace whales that would normally use an area. In Hawaii, acoustic impacts from vessel operation, oceanographic research using active sonar, and military operations are also potential threats.

Conservation Actions: During 2008–2010, key conservation actions included:
Reduction of incidental take

- For conservation measures concerning fishing gear interactions in the North Atlantic, see the North Atlantic Right Whale section of this report. North Atlantic right, humpback, and fin whales are all managed under the Atlantic Large Whale Take Reduction Plan.
- Between 2005–2010, a dedicated effort to train personnel and build capacity throughout Alaska occurred through a partnership between NMFS Alaska Region and the Hawaiian Islands Humpback Whale National Marine Sanctuary. The Alaska Response Network has grown since inception in 1998, now comprises over 120 participants statewide. Trainings sessions were provided in 10 communities in Alaska during this time, and over 60 on-water responses were mounted. To date, over 33 large whales have been completely or partially disentangled in Alaska.
- NMFS implements marine mammal take reduction measures identified in the Pacific Offshore Cetacean Take Reduction Plan (including the use of acoustic pingers to deter whales from fishing gear) to reduce the bycatch of marine mammals.
- NMFS is finalizing a risk assessment of the co-occurrence of fisheries and whale densities in the Pacific Ocean.
- The Hawaiian Islands Humpback Whale National Marine Sanctuary continues to play a leading role—locally, nationally, and internationally—in mitigating the impact to humpback whales from entanglement in ropes and nets. Locally, the sanctuary continues to conduct personnel training sessions, is acquiring specialized equipment for islands with histories of events, and responds to calls concerning humpback whales in distress.

Education and outreach

- NMFS Marine Mammal Stranding and Response program has increased amount of training provided for responses to entangled whales, and maintains a reporting number for any whale in distress: 1-877-SOS-Whal(e).
- Stellwagen Bank National Marine Sanctuary maintains a working group on whale-watching issues.
- NMFS continues to reach out to the commercial whale-watch vessels in New England ports about whale-watching guidelines.
- In 2010, NMFS co-convened with the Hawaiian Islands Humpback Whale National Marine Sanctuary an IWC-sponsored workshop on large whale entanglement. The workshop covered a broad range of topics, including the global scope of the problem, the nature of entangling gear, the likelihood of adverse effects to both the individual whale and the population, the efforts to respond, and the challenges involved in addressing the problem. The workshop included participants from many countries including those that have well-established whale disentanglement programs. The workshop highlighted U.S. concern and leadership on this important issue, and noted that fishing gear entanglement remains the most significant human-generated cause of mortality in many large whale populations.

Surveys and research

- NMFS continued to monitor the status of the eastern North Pacific stock via shipboard surveys, which are conducted every 3 years, and through mark-recapture studies conducted annually.
- Funded cooperative research with the states of Oregon and Washington to refine information on population structure thought genetics, photo-ID and satellite tag movements, examine seasonal occurrence, estimate abundance from both mark-recapture and line-transect, and assess overlap with human activities through a Species Recovery Grant (ESA section 6).
- NMFS continued to place observers onboard vessels in the California/Oregon swordfish/thresher shark drift gillnet fishery to monitor for the take of protected species, including marine mammals. The agency plans to place observers with other fisheries, including large-mesh drift gillnet, deep-set pelagic longline, Southern California set gillnet, Southern California small-mesh gillnet, and coastal pelagic species purse seine.
- The Hawaiian Islands Humpback Whale National Marine Sanctuary has continued to build partnerships to conduct marine mammal surveys, concentrating on humpback whales, including the waters surrounding American Samoa.
- In 2002, the Hawaiian Islands Humpback Whale National Marine Sanctuary working with NMFS, USCG, and the State of Hawaii spearheaded the creation of the Hawaiian Islands Entanglement Response Network. At the end of 2009, the network had more than 170 trained participants. Since 2002, the network has conducted more than 60 on-water entanglement responses, and successfully disentangled 15 humpback whales from life threatening entanglements. The ultimate goal of the network is to continue gathering valuable information that will help mitigate the issue of marine debris and future entanglements.
- NMFS Marine Mammal Health and Stranding Response Program worked in partnership with the Hawaiian Islands Humpback Whale National Marine Sanctuary and private institutions such as the Provincetown Center for Coastal Studies and the Cascadia Research Collective to develop new techniques to assess the health of free-swimming humpback whales and the impact from and circumstances leading to humpback whale entanglement in fishing gear and marine debris. Most of the results from this research have been presented in various national and international venues.
- The MoNAH (More North Atlantic Humpbacks) project was a cooperative venture to estimate the population size of North Atlantic humpback whales that visit the primary calving grounds in the West Indies. A genetic marker–based mark recapture estimate from this venture should be available by the end of 2011 and be comparable to the YoNAH (Year of the North Atlantic Humpback) project of the prior decade.

- In 2010, NMFS convened a BRT to conduct a global status review of humpback whales. This status review is underway.

Priority Recovery Actions Needed: NMFS will continue its efforts to address human-caused mortality and serious injury of humpback whales associated with fishing gear and vessel interactions. Additional work is needed to complete the development and implementation of a more comprehensive ship-strike strategy that encompasses large cetacean species in addition to right whales. Although substantial work has been done concerning gear modifications to address entanglement risks associated with the groundline of pot/trap and gillnet gear, additional work is needed to better understand the entanglement risk posed by the endlines (buoy lines) of fixed gear, and to better understand humpback whale behavior once whales become entangled. Additional studies must also be conducted to evaluate the effectiveness of the right whale take reduction measures on humpback whale entanglements. In addition, improved quality of reporting and efforts to validate reports are needed, as well as study of the type of gear involved in an entanglement to assign interactions accurately to fishery. Dedicated stand-by vessels to monitor entangled animals until a trained disentanglement team can be mobilized are also crucial to the success of response.

Recovery Priority Number: 5
The species recovery priority reflects a moderate magnitude of threat in some regions, a high recovery potential in many regions, and the presence of conflict (because restrictions on commercial fishing and shipping would potentially create a conflict).

Killer Whale (*Orcinus orca*) – Southern Resident DPS

Date Listed: November 18, 2005 (70 FR 69903)

Legal Status: Endangered

Recovery Plan Status: A final recovery plan for Southern Resident killer whales was completed in January 2008.

Photo credit: NOAA

Species Status: In the 1980s and early 1990s, the Southern Resident population increased following reductions due to live captures for public display in the 1960s and 1970s. From 1996–2001, the population declined by almost 20 percent, prompting a petition to list them under the ESA. The population increased for several years, reaching 90 whales in 2006, but has declined to 87 whales as of the 2010 census. In March 2011, NMFS completed a 5-year review for Southern Resident killer whales (http://www.nmfs.noaa.gov/pr/pdfs/species/swkw_5year_review.pdf).

Threats and Impacts: Threats identified for Southern Resident killer whales include limited prey availability, pollution/contaminants, vessel effects, and sound. Concerns regarding the demographics of the population include the small number of reproductive-age males, presence of reproductive-age females that are not having calves, and potential for inbreeding. In addition, the small population size and social structure make Southern Resident killer whales susceptible to catastrophic oil spills or disease outbreaks, which have the potential to impact the entire population. Live captures have been discontinued and are no longer a threat to the population.

Conservation Actions: During 2008–2010, research programs included projects on population monitoring, winter distribution, prey associations and diet, vessel interactions, contaminant levels, health assessments, taxonomy and genetics, improving research techniques and technology, research planning, and coordination. In 2009 the Northwest Fisheries Science Center compiled a newsletter with an update on recent research results and it is posted on their web page at:
http://www.nwfsc.noaa.gov/research/divisions/cbd/marine_mammal/marinemammal.cfm

In addition to research projects, continued implementation of actions identified in the recovery plan including:

- Proposed Rule regarding protective regulations for killer whales in the Northwest Region published July 29, 2009 (74 FR 37674). The proposed rule was accompanied by a draft Environmental Assessment under NEPA with the Washington Department of Fish and Wildlife, U.S. Coast Guard, and Department of Fisheries and Oceans, Canada serving as cooperating agencies. The comment period on the Proposed Rule and Environmental Assessment closed January 15, 2010.
- Collected data on vessel activities and the use of San Juan Islands area to respond to comments on proposed rule and draft Environmental Assessment and inform development of final rule.
- Increased on-water stewardship and vessel monitoring, including continued monitoring of vessel activities in the vicinity of whales and addition of kayak education and compliance in partnership with the Soundwatch Boater Education Program.

- Supported enforcement presence on the water in coordination with Washington State law prohibiting approach within 100 yards of Southern Resident killer whales (RCW 15.77.740) and evaluated enforcement of state law with Washington Department of Fish and Wildlife.
- Funded cooperative research with the states of Oregon and Washington to examine winter distribution, an apparent key element that has been difficult to study, and examine winter prey, which is poorly understood, using examination of prey remains in footprints of whales as has been used during summer months through a Species Recovery Grant (ESA section 6).
- Incorporated the Oil Spill Response Plan for Killer Whales as an appendix to the Northwest Area Contingency Plan. Continued development of protocols for hazing techniques to keep whales from oiled areas.
- Coordinated with salmon recovery programs to support killer whale recovery (see Pacific Salmon Recovery).
- Completed the Puget Sound Partnership Action Agenda for cleaning up, restoring, and protecting Puget Sound by 2020. The Plan recommends implementation of the Recovery Plan for Southern Resident Killer Whales.
- Reduced and mitigated effects of in-water construction and other federal actions through section 7 consultations under the ESA.
- Implemented education and outreach programs, including continued promotion of the "Be Whale Wise" campaign, partnering with the Seattle Aquarium and The Whale Museum, and support of "Killer Whale Tales" and "Saving Springer" classroom programs.
- Conducted training for whale watch naturalists in partnership with the Northwest Fisheries Science Center and The Whale Museum.
- Increased capability to respond to killer whale strandings in partnership with UC Davis and Northwest Marine Mammal Stranding Program and developed initial stranding protocol for Northwest Region Marine Mammal Stranding Network.

Priority Recovery Actions Needed: There is considerable uncertainty regarding which threats may be responsible for the decline in the population or which is the most important factor to address for recovery. The recovery plan lays out an adaptive management approach and a recovery strategy that addresses each of the potential threats based on the best available science. The recovery program links management actions to an active research program to fill data gaps and incorporates monitoring to assess effectiveness. Feedback from research and monitoring will provide the information necessary to refine ongoing recovery actions and develop and prioritize new actions. Needed recovery actions include:

- *Prey availability*: Support salmon restoration efforts in the region including habitat, harvest and hatchery management considerations, and continued use of existing NMFS authorities to ensure an adequate prey base.
- *Pollution/contamination*: Clean up existing contaminated sites, minimize continuing inputs 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.
- *Acoustic effects*: Continue agency coordination and use of existing mechanisms to minimize potential impacts on the whales from anthropogenic sound.
- *Oil spills*: Prevent oil spills and improve response preparation to minimize effects on Southern Resident killer whales and their habitat in the event of a spill.
- *Education and outreach*: Enhance public awareness, educate the public on how they can help conserve killer whales, and improve reporting of southern resident killer whale sightings and strandings.
- *Respond to sick, stranded, and injured killer whales*: Improve responses to live and dead killer whales to implement rescues, conduct health assessments, and determine causes of death to learn more about threats and guide overall conservation efforts.
- *Transboundary and interagency coordination*: Coordinate monitoring, research, enforcement, and complementary recovery planning with Canadian agencies and U.S. federal and state partners.

- *Research and monitoring*: Conduct research to facilitate and enhance conservation efforts. Continue the annual census to monitor trends in the population, identify individual animals, and track demographic parameters.

Recovery Priority Number: 3
This recovery priority number is based on a high magnitude of threat due to low population numbers and continuing threats to recovery, a moderate recovery potential based on uncertainty regarding most important threats, and presence of conflict, because regulatory actions taken could involve restrictions on commercial fishing, contaminant discharge, and vessels.

North Atlantic Right Whale (*Eubalaena glacialis*)

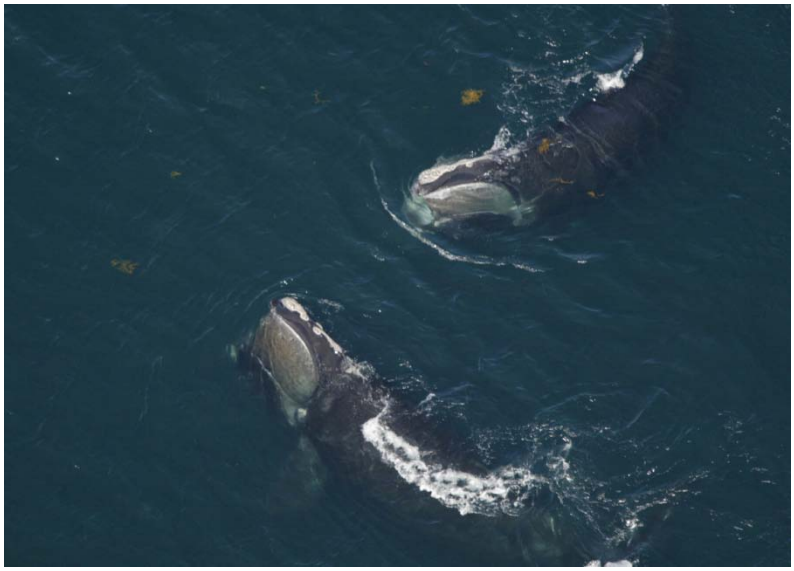


Photo credit: NOAA Northeast Fisheries Science Center

Date Listed: June 2, 1970 (35 FR 18319). Based on a December 2006 status review of the northern right whale, NMFS listed the North Pacific and North Atlantic right whale populations as separate endangered species on March 6, 2008 (73 FR 12024).

Legal Status: Endangered

Recovery Plan Status: A recovery plan for the North Atlantic right whale was completed in May 2005.

Species Status: The pre-exploitation distribution of northern right whales in the North Atlantic probably included coastal and continental shelf waters in temperate to subarctic latitudes. Pre-exploitation abundance is unknown but has been estimated at over 1,000 individuals (Reeves *et al.* 1992). Current distribution and abundance data suggest significant reductions from historic levels. In the eastern North Atlantic, the northern right whale population probably numbers in the low tens, with little known regarding their distribution and migration pattern. The western north Atlantic population had at least 361 individuals in 2005 having grown at a mean rate of 2.1 percent from 1990–2005 (Waring et al. 2011). In 2009 at least 39 calves were observed off the coasts of Georgia and Florida, the most ever recorded since record keeping and systematic surveys began in the early 1980s. While movements of western North Atlantic right whales are extensive, there are six major habitats or congregation areas: coastal waters of the southeastern United States, the Great South Channel, Georges Bank/Gulf of Maine, Cape Cod and Massachusetts Bays, the Bay of Fundy, and the Scotian Shelf.

Threats and Impacts: Ship strikes and fishing gear entanglements are the most common human-related causes of serious injury and mortality in the western North Atlantic right whale population. Other potential threats are habitat degradation, energy exploration, ship noise, contaminants, military activities, and climate and ecosystem change. Of 14 recorded deaths or serious injuries to North Atlantic right whales attributed to human causes during 2004–2008 (in both U.S. and Canadian waters), four involved entanglement or fishery interactions and ten were from collisions with vessels (Waring et al. 2011). Entanglement records from 1990 through 2008 included 47 confirmed right whale entanglements, including right whales caught in weirs, gillnets, and trailing line and buoys (Waring et al. 2011). These numbers are likely underestimates, given unreported or unseen incidences. Any human-caused serious injury or mortality is problematic for this species because of its low population size.

Conservation Actions: NMFS has many new and ongoing programs to reduce the threats of incidental ship strikes and commercial fishing gear entanglement. Many of these activities (e.g., the Atlantic Large Whale Take Reduction Plan) are intended to protect not only North Atlantic right whales but also endangered humpback and fin whales and to benefit non-endangered minke whales. NMFS' Marine Mammal Health and Stranding Response Program and its partners continue to respond to stranding and entanglements. The Program also administers grants for response and recovery of marine mammals through the John H. Prescott Marine Mammal Rescue Assistance Grant Program.

<u>Reduction of Incidental Take- Ship Strike Reduction</u>

- In December 2008, NMFS promulgated new rules for all vessels 65 feet or greater to limit speed to 10 knots or less in Seasonal Management Areas where whales are known to occur at particular times. NOAA also expects, but does not require, mariners to avoid or limit speed to 10 knots or less in Dynamic Management Areas (http://www.nmfs.noaa.gov/pr/shipstrike/).
  - NMFS and its partners made a concerted effort to notify the public and maritime community about the requirements both prior to their enactment and during the periods in which Seasonal Management Areas were in effect. Such notifications appear in various navigational aids, including the U.S. Coast Pilots, Sailing Directions, U.S. Coast Guard Local and Broadcast Notices to Mariners; via periodic NOAA Weather Radio announcements; distribution of laminated "compliance guides" and free interactive CDs through U.S. Coast Guard personnel, port captains, and marine exchanges; National Weather Buoy and other web sites; NOAA shipping industry liaisons and NOAA's Nav Managers; e-mail distribution lists; press releases; notifications provided directly to their members by maritime associations; announcements and articles in trade journals and periodicals; distributions by agencies such as the Department of Transportation's Maritime Administration; outgoing messages of the U.S. east coast right whale Mandatory Ship Reporting systems (see below), and other means.
- The U.S. submitted proposals to the International Maritime Organization to modify vessel operations to reduce the risk of ship strikes to right whales. These proposals were adopted by the International Maritime Organization and the measures are now in effect. One measure modified the Boston Traffic Separation Scheme (by shifting traffic 12 degrees and narrowing the traffic lanes by about one half mile each) to move the shipping lanes away from known right whale aggregation areas. The second measure is a voluntary seasonal Area To Be Avoided in the Great South Channel off of Massachusetts, in effect from April 1st to July 31st (the Area To Be Avoided first went into effect in summer 2009). These actions have moved ships away from the greatest densities of whales while minimizing overlap between whales and ships.
- NOAA and the U.S. Coast Guard have developed and implemented Mandatory Ship Reporting Systems to protect right whales; the systems were endorsed by the International Maritime Organization. The systems require ships 300 tons or larger to report relevant ship information when they enter certain waters off New England and calving/nursery areas in waters off Georgia and Florida. This reporting prompts an automated return message providing information about the vulnerability of right whales to ship strikes and recent right whale sighting locations. Begun in 1999, this joint NOAA/ U.S. Coast Guard program is ongoing.
- NOAA and other federal and state agencies continue to support and conduct extensive aircraft and vessel-based surveys to monitor the right whale population, including aerial and vessel-based surveys. NMFS assembles reports and "alerts" are disseminated to mariners via e-mail, fax, web pages, U.S. Coast Guard Broadcast Notices to Mariners, NOAA Weather Radio, NAVTEX, NOAA Weather Buoys, shipping agents, pilots, and port authorities. These efforts have been ongoing since the early 1980s.
- NMFS contributed to many outreach and education projects including: continued distribution of placards, brochures, and videos to mariners on ways to reduce ship strikes; maintenance of two websites devoted to ship-strike reduction; implementation of reprinted updates to whale advisory charts; contributions to mariner trade magazines; and production and distribution of an interactive CD on reducing ship strikes.

<u>Reduction of Incidental Take- Gear Entanglement Mitigation</u>

- NMFS prohibited gillnet fishing during the right whale calving season within the Southeast U.S. Restricted Area.
- As part of the Atlantic Large Whale Take Reduction Plan, NMFS implemented 68 Dynamic Area Management zones between 2002 and 2009 requiring gear modifications for trap/pot and gillnet gear in areas of unexpected aggregations of right whales north of 40° N latitude.
- In 2008, NMFS promulgated regulations implementing broad-based gear modifications and completed the associated Environmental Impact Statement. Conservation measures include

expanded sinking groundline and weak link requirements; additional gear marking requirements; changes in boundaries; and seasonal restrictions for gear modifications. These modifications to the Atlantic Large Whale Take Reduction Plan were in place by April 2009. The sinking groundline requirement removed thousands of miles of floating groundline from the water column potentially reducing the chance of whale/gear interactions.

- NMFS recently developed a strategy for the Atlantic Large Whale Take Reduction Team to assist in the development of conservation measures intended to reduce the risk of serious injury and mortality of whale interactions with vertical lines (buoy lines or endlines) associated with commercial fixed gear. NMFS is using a co-occurrence model for the East Coast depicting the overlap between density of fixed fishing gear and large whale distribution (right, humpback, and fin whales). The results of this model are currently being used in deliberations of the Atlantic Large Whale Take Reduction Team to develop additional measures to further reduce the entanglement risk associated with vertical lines.
- NMFS provided earmarked funding of over $3 million to the Gulf of Maine Lobster Foundation beginning in June of 2006 for the administration and implementation of the Maine groundline exchange program. This program provided financial assistance to Maine lobster trap/pot fishermen through the exchange of floating groundline for a voucher to be used toward the purchase of sinking groundline. The final exchange was conducted in August 2010.
- NMFS provided additional funds in the amount of $1.7 million to the Maine Department of Marine Resources of which approximately $650,000 sent to the Gulf of Maine Lobster Foundation to administer and implement additional groundline exchanges in the state of Maine. Maine Department of Marine Resources is using the remaining funds to collaborate with whale researchers and industry groups to conduct both large whale biological and gear research off the coast of Maine.
- NMFS provided $3 million in funding to the Commercial Fisheries Research Foundation in October 2009 for the administration and implementation of a groundline exchange/conversion program for Lobster Management Area 2 lobster fishermen in the state of Rhode Island and Lobster Management Area 3 fishermen.
- NMFS provided nearly $1.25 million in funding to the New England Aquarium to administer the Consortium for Wildlife Bycatch Reduction, a group dedicated to reducing bycatch and entanglements of protected marine species. A number of sub-projects being conducted by this group relate to reducing entanglement risks to right whales.
- NMFS provided nearly $250,000 to fishing industry and academic groups to support gear research focused on reducing the entanglement risk associated with vertical lines of fixed fishing gear.
- NMFS conducted investigations on gear removed from entangled whales.
- NMFS provided funding assistance for the large whale disentanglement programs of East Coast states, including the states of Maine, Massachusetts, Georgia, and Florida.
- NMFS contributed to many outreach and education projects including: conducting dockside outreach meetings throughout the east coast; collaborating with fishermen and fishing associations throughout the Northeast and Mid-Atlantic on conservation measures and gear research; and providing high level disentanglement training for fishermen, the U.S. Coast Guard, and State Marine Patrols.

Priority Recovery Actions Needed: Continue to enhance efforts to reduce threats from vessel collisions and fishing gear entanglement.

Objective 3 of the Right Whale Recovery Plan is to identify, characterize, protect and monitor important habitats. On October 5, 2010, NMFS published a notice of a 90-day petition finding and notice of 12-month determination in the Federal Register. This combined notice was in response to a petition to revise critical habitat for the North Atlantic right whale.[9]

In the notice, NMFS announced it is reviewing critical habitat designations for the North Atlantic right whale. Prior to the receipt of this petition, NMFS was already conducting an ongoing analysis and evaluation of new information not available at the time of the original 1994 critical habitat designation. Although the petition called for the expansion of critical habitat, it is NMFS' responsibility to make the determination if revisions, if any, are needed.

When NMFS has completed its review it will publish a proposed rule and will solicit public comments which will be considered in preparing a final determination. NMFS expects to propose changes right whale critical habitat in the latter half of 2011.

Recovery Priority Number: 1
This recovery priority number reflects a high degree of threat based on extremely low population numbers, high recovery potential, and potential conflict with economic activities.

[9] The petition seeks to expand existing critical habitat boundaries and designate new areas along the east coast as critical habitat for North Atlantic right whales. In 1994, NMFS designated three critical habitat areas in U.S. waters for these whales: calving grounds off Florida and Georgia and feeding grounds in Cape Cod Bay and the Great South Channel, both off Massachusetts.

North Pacific right whale (*Eubalaena japonica*)

Date Listed: June 2, 1970 (35 FR 18319). Based on a December 2006 status review of the northern right whale, NMFS listed the North Pacific and North Atlantic right whale populations as separate endangered species on March 6, 2008 (73 FR 12024).

Legal Status: Endangered

Recovery Plan Status: A recovery plan for the recently listed species is not currently under development. The 1991 recovery plan for Northern Right Whales has a section devoted to the North Pacific population.

Photo credit: John Durban, NOAA National Marine Mammal Lab

Species Status: Photographic and genotype data were used to calculate mark-recapture abundance estimates for right whales in the Bering Sea and Aleutian Islands of between 20 and 30 individuals (Wade et al. 2010), and the total North Pacific right whale population is not likely much larger. The eastern population of the North Pacific right whale is arguably the most endangered stock of whales in the world. Little is known about the distribution, movements, migrations, or habitat use of this population. It is thought that North Pacific right whales were once widely distributed across the Gulf of Alaska and Bering Sea. The current range of this population is probably significantly reduced from historic levels.

Threats and Impacts: Ship collisions and fishing gear entanglements are the most common anthropogenic causes of mortality in the western North Atlantic right whale population, but the extent of this problem in the North Pacific is unknown. Gillnets were implicated in the death of a right whale off the Kamchatka Peninsula (Russia) in 1989. No other incidental takes of right whales are known to have occurred in the North Pacific, but entanglement evidence has been documented in 1998 aerial photographs of one whale. There is no evidence of entanglement scars in the photographic catalog, but, due to incomplete body coverage of most of the animals, it is impossible to discount this possibility.

There has been recent interest in oil and gas exploration and development in the Bering Sea North Aleutian Basin, an area that overlaps with the North Pacific right whale critical habitat. Such activity could potentially alter the distribution of North Pacific right whales. On March 31, 2010, President Obama issued a memorandum for the Secretary of the Interior withdrawing from disposition by leasing through June 30, 2017, the Bristol Bay area of the North Aleutian Basin in Alaska. Accordingly, Sale 214 has been removed from the 2007–2012 Program.

Conservation Actions: A final rule designating areas in the Bering Sea and Gulf of Alaska as critical habitat was released on April 8, 2008 (73FR 19000).

In 2007, the National Marine Mammal Laboratory and Minerals Management Service (now Bureau of Ocean Energy Management, Regulation and Enforcement) entered into an Interagency Agreement for the National Marine Mammal Laboratory to conduct integrated surveys of right whales and other cetaceans (and their habitat) in the Bering Sea. This work was prompted by the need for better data to assess the potential impact of oil and gas development in the North Atlantic Basin area.

The overall goal of the Interagency Agreement study is to facilitate development of future oil and gas–related mitigation by assessing the distribution, occurrence, and habitat use of North Pacific right whales in the southeastern Bering Sea (North Atlantic Basin lease sale area and adjacent waters). The general objectives of the study are to estimate seasonal distribution, relative abundance, and movement patterns of right whales in and adjacent to the lease sale area and to characterize right whale habitat, foraging behavior, health, and prey distribution. The proposed study will have three component projects: right whale biology, passive acoustics, and right whale feeding and prey.

The specific objectives are to:

1. Assess the distribution of right whales using fixed-winged aircraft and ship-based surveys (focused in the lease sale and adjacent areas).
2. Assess short- and long-term movements of whales through satellite tagging of individuals in the lease sale area and Critical Habitat.
3. Locate whales for tagging, behavioral observations, and habitat studies using ship-based passive acoustic methodology.
4. Conduct acoustic tagging and concurrent oceanographic and zooplankton sampling to investigate right whale foraging ecology and assess related habitat characteristics.
5. Use acoustic monitoring to assess year-round presence and relative abundance of whales in the lease sale area and Critical Habitat, as well as to identify potential migration routes from the Bering Sea.
6. Photo-identify and biopsy-sample individual right whales during tagging operations for analysis of population structure, genetics, pollutants, and diet. In addition, samples of copepods will be taken during oceanographic operations to establish a baseline of existing anthropogenic compounds.

The 2007 portion of this work was limited in scope due to the short time available for organization of the field work; this resulted from the relatively late finalization of the Interagency Agreement between the two agencies. The 2008 study included a ship survey, foraging ecology studies, satellite tagging, photo-identification, and biopsy sampling. The 2009 study was a continuation of the full survey work.

Priority Recovery Actions Needed: For right whales in the North Pacific, the most urgent recovery need is better information on the basic distribution and occurrence of right whales in the eastern North Pacific, including identification of their wintering areas, which remain unknown and to identify threats to the population. Surveys need to be continued, as well as the use of autonomous underwater recording devices and satellite-monitored radio tags. Additional specific recovery actions for this population will be specified upon completion of a recovery plan.

Recovery Priority Number: 4
This recovery priority number reflects a high degree of threat based on extremely low population numbers, low recovery potential, and no known conflict with economic activities.

Sei Whale (*Balaenoptera borealis*)

Date Listed: June 2, 1970 (35 FR 18319)

Legal Status: Endangered

Recovery Plan Status: A draft recovery plan is under development and is expected to be finalized in December 2011.

Species Status: Sei whales live in temperate regions of all oceans in the Northern and Southern Hemispheres and are not usually associated with coastal features. Worldwide, sei whales were severely depleted by commercial whaling activities.

The stock identity of sei whales in the North Atlantic Ocean is not well understood; however, NMFS provisionally recognizes one stock in U.S. waters—the Nova Scotia (formerly Western North Atlantic) stock, which is found in continental shelf waters of the northeastern U.S. and ranges northeast to waters south of Newfoundland. In the North Atlantic, information is not available on the pre-exploitation population size of sei whales. The best abundance estimate for the Nova Scotia stock 386 (CV=0.85) sei whales. A population trend analysis for this stock has not been done at this time (Waring et al. 2011).

In the North Pacific Ocean, there are two stocks of sei whales in U.S. waters—the eastern North Pacific stock and the Hawaii stock. Pre-exploitation population estimates for sei whales in the North Pacific Ocean is 42,000 and the most current population estimate for the entire North Pacific Ocean (from 1977) is 9,110 (Tillman 1977). The best abundance estimate for the eastern North Pacific stock is 126 (CV=0.53), and for the Hawaii stock is 77 (CV=1.06) (Carretta et al. 2011).

In the Southern Hemisphere, between 63,000 and 65,000 sei whales existed prior to commercial exploitation (IWC 1980). Current estimates for sei whale abundance in the southern oceans range from 9,718 to 12,000 whales (IWC 1980, IWC 1996).

Threats and Impacts: Although the main direct threat to sei whales was addressed by the IWC whaling moratorium on commercial whaling, several potential threats remain. Among the current potential threats are collisions with vessels, reduced prey abundance due to overfishing and/or climate change, the possibility that illegal whaling or resumed legal whaling will cause removals at biologically unsustainable rates and, possibly, the effects of increasing anthropogenic ocean noise.

Sei whales in the western North Atlantic are occasionally injured or killed as a result of fishing gear entanglement and ship strikes. The minimum annual rate of human-caused mortality and serious injury between 2004 and 2008 was 1.0 (Waring et al. 2011). This value includes incidental fishery interaction records (0.6) and records of vessel collisions (0.4). A review of NMFS stranding and entanglement records from 2004 through 2008 shows three serious injuries resulting from a fishery interaction and two mortalities resulting from ship strikes (Waring et al., 2011). One of these was in April 2006 when a fresh sei whale carcass was brought in to Baltimore on the bow of a ship. A second ship strike mortality was an adult female documented in May 2007 off Deer Island, Massachusetts with wounds consistent with a vessel collision (Waring et al., 2011). A fishery entanglement serious injury was discovered on Jeffreys Ledge in southern Maine in September 2006.

Threats and impacts to the eastern North Pacific and Hawaii stocks of sei whales are relatively unknown at this time. There is a potential for bycatch of sei whales in drift gillnet fisheries off California and Mexico, and in the gillnet and pelagic longline fisheries off Hawaii. No sei whale entanglements were reported between 2004 and 2008 for these stocks (Carretta et al. 2011). There is also a potential for sei whales in the North

Pacific to be killed or seriously injured by ship strikes, however no ship-strike mortalities were recorded for these stocks from 2004 to 2008 (Carretta et al. 2011).

Conservation Actions: There are no specific conservation actions for the Nova Scotia stock of sei whales at this time. Conservation actions for the sei whale in the western North Pacific include the following:

- Continued monitoring the status of the California/Oregon/Washington stock of sei whales that may coincide with shipboard marine mammal surveys, which are conducted every 3 years. (Sei whale presence is rare and unpredictable.)
- Continued placing observers onboard vessels in the California/Oregon swordfish/thresher shark drift gillnet fishery to monitor for the take of protected species, including marine mammals.
- Continued implementing marine mammal take reduction measures identified in the Pacific Offshore Cetacean Take Reduction Plan (including the use of acoustic pingers) to reduce the bycatch of marine mammals.

Priority Recovery Actions: The priority recovery actions for sei whale include continuing the ongoing conservation actions listed above as well as the following:

- Estimate population size and monitor trends in abundance.
- Determine population discreteness and structure of sei whales.
- Investigate sources of human-caused injury and mortality.

Recovery Priority Number: 11
This recovery priority number reflects a low degree of threat, low to moderate recovery potential (based on paucity of data), and potential conflict with commercial activities.

Sperm Whale (*Physeter macrocephalus*)

Date Listed: June 2, 1970
(35 FR 18319)

Legal Status: Endangered

Recovery Plan Status: A recovery plan for sperm whales was completed in December 2010.

Photo credit: NOAA Southwest Fisheries Science Center

Species Status: Sperm whales occur throughout all ocean basins from equatorial to polar waters, including the entire North Atlantic Ocean, North Pacific Ocean, northern Indian Ocean, and the southern oceans. Whitehead (2002) estimated current sperm whale abundance to be approximately 300,000–450,000 worldwide. Although his estimates are based on extrapolating surveyed areas to unsurveyed areas, without a systematic survey design, these are probably the best available and most current estimates of global sperm whale abundance. Five stocks of sperm whales are recognized in U.S. waters: the North Atlantic stock, northern Gulf of Mexico stock, Hawaiian stock, California/Oregon/Washington stock, and North Pacific stock.

The geographic distribution of the North Atlantic stock appears to have a distinct seasonal cycle, ranging from being concentrated off Cape Hatteras (in winter), to being widespread throughout the central portion of the mid-Atlantic bight up to Georges Bank (in spring and summer), to being concentrated on the continental shelf south of New England and along the continental shelf edge into the mid-Atlantic bight (in fall). The best estimate of abundance for the western North Atlantic sperm whale stock is 4,804 (CV=0.38) (Waring et al. 2011). There are insufficient data to determine the population trend for this stock.

Sperm whales are present year-round in the Gulf of Mexico. Preliminary results of genetic, satellite tagging, photo-identification, and vocalization studies support the distinct stock status of Gulf of Mexico sperm whales. The best abundance estimate for the northern Gulf of Mexico stock of sperm whales is 1,665 (CV=0.20) (Waring et al. 2011). There are insufficient data to determine the population trend for this stock.

In the waters around Hawaii, sounds of sperm whales have been recorded throughout the year off Oahu. In addition to the main Hawaiian Islands, sperm whales have also been sighted around several of the Northwest Hawaiian Islands. The most up–to-date population estimate for the Hawaiian stock is 6,919 (CV=0.81) (Carretta et al. 2011). No data are available on the current population trend for this stock.

The geographic distribution of the California/Oregon/Washington stock of sperm whales varies seasonally. Sperm whales are found year-round in California waters, but peak in abundance from April through mid-June and from the end of August to mid-November. Off Washington and Oregon, whales from this stock are present in every season except winter. The best abundance estimate for this stock is 971 (CV=0.31) whales (Carretta et al. 2011). Sperm whale abundance appears to have been rather variable off California and does not show any apparent trend at this time.

Sperm whales are widely distributed across the entire North Pacific Ocean and into the southern Bering Sea in summer, but the majority are thought to be south of 40°N in winter. Estimates of pre-whaling abundance in the North Pacific are considered somewhat unreliable, but may have totaled 1,260,000 sperm whales (Rice 1989). Whaling harvests from 1800 to the 1980s took at least 436,000 sperm whales from the entire North

Pacific Ocean (Carretta et al. 2009). Sperm whales in the North Pacific stock are found in Alaskan waters (Gulf of Alaska, Bering Sea, and Aleutian Islands). The number and population trend of sperm whales of the North Pacific occurring within Alaskan waters is unknown.

No estimates of density, abundance, or trends are available based on surveys in the Indian Ocean. If we use Whitehead's methods to estimate global sperm whale abundance, then abundance in the Indian Ocean is approximately 62,000–92,000 sperm whales. Assuming that the population is growing at about 1.1 percent/year (in Whitehead 2002), Whitehead also estimated that the global population is at about 32 percent of historical numbers.

Threats and Impacts: Although the main direct threat to sperm whales was addressed by the IWC whaling moratorium on commercial whaling, several potential threats remain. Among the current potential threats are collisions with vessels, reduced prey abundance due to climate change, the possibility that illegal whaling or resumed legal whaling will cause removals at biologically unsustainable rates, contaminants and pollutants, fishing gear entanglement, and, possibly, the effects of increasing anthropogenic ocean noise.

During 2001–2005, human-caused mortality for the North Atlantic stock was estimated at 0.2 sperm whales per year, resulting from a vessel strike to a sperm whale by a naval vessel in 2001. Prior to this most recent analysis, several sperm whale entanglements and ship strikes had been documented, including five cases of observed entanglement from 1990–1997 (Waring et al. 2007).

The level of past or current, direct, human-caused mortality of sperm whales in the northern Gulf of Mexico is unknown. There has been no reported fishing-related mortality of a sperm whale during 1998–2008, however, in 2008 there was one sperm whale released alive with no serious injury after an entanglement interaction with the pelagic longline fishery (Garrison et al. 2009). One possible sperm whale mortality due to a vessel strike was documented for the Gulf of Mexico in 1990 (Jensen and Silber 2004).

For the California/Oregon/Washington stock, one sperm whale stranded dead in 2004 with 5- to 6-inch mesh nylon netting found in its stomach. The fishery source of this netting is unknown. Mean annual takes for this fishery are based on 2004–2008 data—this results in an average estimate of 0.2 sperm whale deaths per year (Carretta et al. 2011). More recently, two sperm whales were taken in the California/Oregon/Washington drift gillnet fishery in December 2010; one whale was dead and the other was released seriously injured with fishing gear still attached. NMFS expects sperm whales are also taken in drift gillnet fisheries for swordfish and sharks off Baja California, but detailed information regarding takes in these fisheries is not available.

There are currently two distinct longline fisheries based in Hawaii: a deep-set longline fishery that targets primarily tunas, and a shallow-set longline fishery that targets swordfish. Both fisheries operate within U.S. waters and on the high seas. Between 2004 and 2008, no sperm whales were observed hooked or entangled either fishery (Carretta et al. 2011).

Sperm whales in the North Pacific stock are also known to interact with fisheries. Interactions with longline fisheries in the Gulf of Alaska typically involve sperm whales feeding off the gear set to target both sablefish and halibut and may be increasing in frequency. Between 2004 and 2008, there were four observed serious injuries of sperm whales in the Gulf of Alaska sablefish longline fishery. Specifically, in 2006 there were three observed serious injuries in the Gulf of Alaska sablefish longline fishery and an additional observed interaction in 2007. Total estimated annual takes is 3.25 animals (Angliss and Allen 2011).

Conservation Actions: During 2008–2010, key conservation actions included:

- Continued monitoring the status of the California/Oregon/Washington stock of sperm whales via shipboard surveys, which are conducted every 3 years.

- Funded cooperative research with the states of Oregon and Washington to determine occurrence in offshore waters, determine population structure through photo-ID comparisons, genetics, and satellite tag movements, and assess overlap and conflicts with commercial fishing especially known depredation of long-lines for blackcod and halibut through a Species Recovery Grant (ESA section 6).
- Continued placing observers onboard vessels in the California/Oregon swordfish/thresher shark drift gillnet fishery to monitor for the take of protected species, including marine mammals.
- Continued implementing marine mammal take reduction measures identified in the Pacific Offshore Cetacean Take Reduction Plan (including the use of acoustic pingers) to reduce the bycatch of marine mammals.
- Continued placing of observers on all oil and gas exploration vessels operating in the Gulf of Mexico to monitor for sperm whales, implement mitigation measures, and collect data.

Priority Recovery Actions Needed: The priority recovery actions for sperm whale include continuing the ongoing conservation actions listed above as well as the following:

- Estimate population size and monitor trends in abundance.
- Determine population discreteness and structure of sperm whales.
- Investigate sources of human-caused injury and mortality.

Recovery Priority Number: 5

This recovery priority number reflects a moderate magnitude of threat, high recovery potential in most regions, and the presence of conflict with commercial activities.

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APPENDIX A. NMFS Recovery Priority Number Guidelines