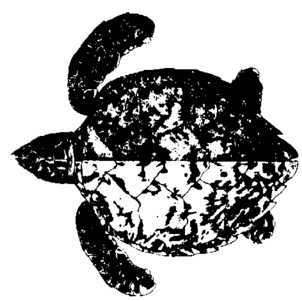
Endangered Species Act Biennial Report to Congress

on the Status of Recovery Programs
July, 1994 - September, 1996



U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Office of Protected Resources

The Honorable John H. Chafee
Chairman, Committee on Environment and
Public Works
United States Senate
Washington, D.C. 20510

Dear Mr. Chairman:

I am pleased to submit the National Marine Fisheries Service (NMFS) Biennial Report for July 1994-September 1996, regarding the status of efforts to develop and implement recovery plans for species listed under section 4 of the Endangered Species Act (ESA). Recovery plans for many of these species have been developed, as required by section 4(f)(3) of the ESA.

Detailed information on status and recovery programs for marine mammals is available in a separate publication, the Marine Mammal Protection Act Annual Report. Therefore, to avoid duplication, this report includes only information on non-marine mammal species that are listed or proposed for listing under the ESA.

Sincerely,

Rolland A. Schmitten

Enclosure

The Honorable Don Young
Chairman, Committee on Resources
House of Representatives
Washington, D.C. 20515

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I am pleased to submit the National Marine Fisheries Service (NMFS) Biennial Report for July 1994-September 1996, regarding the status of efforts to develop and implement recovery plans for species listed under section 4 of the Endangered Species Act (ESA). Recovery plans for many of these species have been developed, as required by section 4(f)(3) of the ESA.

Detailed information on status and recovery programs for marine mammals is available in a separate publication, the Marine Mammal Protection Act Annual Report. Therefore, to avoid duplication, this report includes only information on non-marine mammal species that are listed or proposed for listing under the ESA.

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Introduction

The 1978 amendments of the Endangered Species Act of 1973 (ESA) contained a requirement that the U.S. Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS) develop and implement recovery plans for species under their jurisdiction. During the 1988 reauthorization of the ESA, an amendment was added to the ESA requiring the Secretaries of Commerce and the Interior to prepare a biennial report "on the status of efforts to develop and implement recovery plans for all species listed pursuant to this section and on the status of all species for which such plans have been developed."

To satisfy this reporting requirement, a summary of recovery efforts for species under NMFS jurisdiction for the period July 1994 through September 1996 has been prepared. Included in this report is the most current species status and trends information available. Recovery plans can be obtained by writing to:

Endangered Species Division - Recovery Plans
Office of Protected Resources - F/PR3
National Marine Fisheries Service
1315 East-West Highway, 13th Floor
Silver Spring, MD 20910-3226

NMFS manages an information database that tracks: (1) the status of endangered or threatened marine species; and (2) the development and implementation of recovery plans to promote survival of species. This report was generated from the data in that system. The information is also available on the Internet at the following address: http://kingfish.ssp.nmfs.gov/tmcintyr/prot_res.html.

The ESA requires development and implementation of recovery plans unless such plans will not promote the conservation of the species. Although the ESA does not differentiate between domestic and foreign species in this regard, specific management actions are often not feasible for species whose range is either totally or primarily outside of U.S. jurisdiction. The range of a number of listed marine species is totally outside U.S. jurisdiction. In other cases, the range in areas under the jurisdiction of the United States is limited, and management actions in the U.S. portion of their range are not likely to contribute to recovery. Therefore, NMFS has focused recovery plans to those species primarily under U.S. jurisdiction.

NMFS believes that local efforts and initiatives are key to restoring environmental health and fisheries resources. It is our view that collaboration between Federal, state, tribal, and local authorities, and private entities, has the greatest chance of ensuring the recovery of listed species. Aggressive initiatives in habitat, hatcheries, and harvest have the potential to restore species to levels such that listing under ESA is unwarranted. In perhaps the most complex and controversial program ever attempted under the ESA, the Pacific Northwest, under NMFS leadership, is moving ahead with significant actions to improve overall environmental health and recover listed Snake River salmon. NMFS is also investing substantial funding, technical expertise, and policy guidance in support of state, tribal, and local initiatives to restore salmon, steelhead, and cutthroat trout populations in coastal areas of California, Oregon, and Washington.

Since NMFS' last Report for FY 1992-1994, the gray whale has been delisted. Subsequent to delisting, all previously-listed species undergo a 5-year monitoring period.

Included in this report is information on species proposed for listing under the ESA. During the period of this report, the following species were also proposed for listing: Umpqua River cutthroat trout, Klamath Mountains Province steelhead, Atlantic salmon, and three populations of coho salmon. Of these, Umpqua trout and one coho population have been listed. Proposed reclassifications are currently pending for Steller sea lions and Snake River spring/summer and fall chinook salmon. All species currently under NMFS jurisdiction, including proposed and foreign species, are listed in the Appendix.

For the sake of efficiency, information on marine mammals is not included in this Biennial Report. Detailed information on status and recovery programs for marine mammals is available in a separate publication, the Marine Mammal Protection Act of 1972 (MMPA) Annual Report.

Recovery Programs

Turtles

STATUS OF RECOVERY PROGRAM

GREEN TURTLE - ATLANTIC POPULATION

Plan Stage: Final **Plan Approved Date:** 10/29/91

SPECIES COVERED

GREEN TURTLE (ATLANTIC)

RECOVERY PLAN STATUS

NMFS approved and distributed a final recovery plan for green sea turtles in the Atlantic Ocean in 1991.

RECOVERY ACTIONS

The major points outlined in the recovery plan are:

1. Protect and manage nesting habitat:
   a. Evaluate current laws on beach armoring, and strengthen laws if necessary;
   b. Ensure laws regulating construction and beach armoring are enforced; and
   c. Acquire in fee-title all undeveloped nesting beaches between Melbourne and Wabasso Beach, Florida.

2. Protect and manage populations on nesting beaches:
    a. Monitor trends in nesting activity by means of standardized surveys;
    b. Evaluate nest success and implement appropriate nest protection measures;
    c. Protect and manage populations in the marine environment;
    d. Determine seasonal distribution, abundance, and status of sea turtles in the nearshore marine environment; and
    e. Determine etiology of sea turtle fibropapillomas and monitor mortality of those turtles affected.

NMFS has made a major effort to reduce green turtle mortality in shrimp trawl fisheries by improving the regulations that require the use of Turtle Excluder Devices (TEDs).

NMFS has provided resources for collecting information on basic sea turtle biology.

NMFS funded projects are being conducted to determine species composition, relative abundance, and seasonal distribution of sea turtles in important nearshore waters of the southeastern U.S.

Historically, Cedar Key, Florida, supported large numbers of green turtles. NMFS is sponsoring a project to determine distribution and species composition in this area. The agency is also conducting research to determine similar information about turtles during their pelagic life stages.

NMFS laboratories are conducting research on sea turtle habitat utilization in the Gulf of Mexico. The project focuses on known sea turtle developmental habitats. Analyses of sea turtle strandings have been conducted to monitor the level of strandings and possible causes of mortality. Research has been conducted on the effects of pollutants on sea turtles.

NMFS is currently conducting research on the etiology and epidemiology of fibropapillomas in green turtles from Hawaiian waters and the Atlantic. In addition, NMFS is developing an integrated health assessment plan for sea turtles in coastal southeastern U.S. waters.

RECOVERY GOALS

The Atlantic population of the green turtle in the United States can be delisted if, over a period of 25 years, the following conditions are met:

1. The level of nesting in Florida has increased to an average of 5,000 nests per year for at least 6 years;
2. At least 25% (105km) of all available nesting beaches (420km) is in public ownership and encompasses greater than 50% of the nesting activity;
3. A reduction in mortality is reflected in higher counts of individuals on foraging grounds; and
4. All priority 1 tasks have been successfully implemented.

Six major actions are needed to achieve recovery:

1. Provide long-term protection to important nesting beaches;
2. Ensure at least 60% success on major nesting beaches;
3. Implement effective lighting ordinances or lighting plans on nesting beaches;
4. Determine distribution and seasonal movements for all life stages in marine environment;
5. Minimize mortality from commercial fisheries; and
6. Reduce threats to population and habitat from marine pollution.

STATUS OF RECOVERY PROGRAM

HAWKSBILL TURTLES - ATLANTIC POPULATION

Plan Stage: Final **Plan Approved Date:** 11/24/93

SPECIES COVERED

HAWKSBILL TURTLE (ATLANTIC)

RECOVERY PLAN STATUS

NMFS approved and distributed a final recovery plan for hawksbill sea turtles in the Atlantic Ocean in 1993.

RECOVERY ACTIONS

The major points outlined in the recovery plan are:

1. Identify important nesting beaches;
2. Ensure long-term protection of important nesting beaches;
3. Ensure long-term protection of marine habitat;
4. Prevent degradation or destruction of marine habitats from upland erosion and siltation;
5. Prevent degradation of reef habitat from oil, sewage, and other pollutants;
6. Monitor trends in nesting activity;
7. Evaluate nest success and implement nest protection measures;
8. Ensure that law enforcement activities prevent poaching on nesting beaches;
9. Determine nesting beach origins for juvenile and adult populations;
10. Quantify threats to adults and juveniles on foraging grounds; and
11. Increase law enforcement to reduce poaching in U.S. waters.

NMFS is examining the status of hawksbills in Cuban waters in response to a proposal to downlist hawksbills from CITES Appendix I to Appendix II.

In the Caribbean, NMFS is involved with protecting nesting beaches, conducting surveys on primary hawksbill nesting areas, and conducting genetic research. NMFS has also made a major effort to reduce hawksbill turtle mortality in shrimp fisheries by improving regulations that require the use of turtle excluder devices (TEDs).

Analyses of sea turtle strandings have been conducted to monitor the level of strandings and possible causes of mortality.

STATUS OF RECOVERY PROGRAM

INTERIM PLAN FOR HAWAIIAN SEA TURTLES

Plan Stage: INTERIM

SPECIES COVERED

HAWKSBILL TURTLE (PACIFIC)
LEATHERBACK TURTLE (PACIFIC)
GREEN TURTLE (PACIFIC)
OLIVE RIDLEY TURTLE (PACIFIC/MEXICAN)

RECOVERY PLAN STATUS

A recovery plan for Hawaiian sea turtles was drafted by a recovery team appointed in 1985. This was published as an Interim Plan in February of 1992. Recovery plans for sea turtles in the Pacific Ocean have been drafted and should be completed, along with an implementation plan, by 1998.

RECOVERY ACTIONS

Hawksbill turtles:
The major actions recommended for hawksbill turtles in the interim plan are:

1. Eliminate adverse human-induced habitat alteration in order to maintain foraging and resting habitats and nesting beaches; and
2. Monitor trends in nesting activity and develop an index to track the population.

The major actions recommended for green turtles in the interim plan are:

1. Continue census of adults through mark-recapture methods;
2. Monitor subadults and adults in resident nearshore habitat; and
3. Investigate etiology of fibropapillomas, a significant tumor disease of the population.

Recovery actions for leatherback and olive ridley turtles will focus on international cooperative efforts, since there are no known nesting colonies of these two species under U.S. jurisdiction in the Pacific region.

RECOVERY GOALS

Goals of the Interim Recovery Plan are to secure habitat, and restore and maintain Hawaiian sea turtle populations at levels of abundance that provide for maximum hatchling production. Criteria for recovery have been set for the various Hawaiian stocks as follows:

Hawksbill turtle:
Recovery of the Hawaiian hawksbill population will be reached when the numbers of females nesting at each currently used nesting beach have been restored and maintained at levels that ensure maximum hatchling production.

The first step in this recovery process will be to reduce and overcome limiting factors affecting the immediate survival of the population to the extent that it is no longer in danger of becoming extinct (e.g., reclassified from endangered to threatened status).

To eliminate commercial trade in hawksbill turtles, the Secretaries of Commerce and the Interior certified Japan under the Pelly Amendment to the Fishermen's Protective Act of 1967 for engaging in activities that diminish the effectiveness of CITES, primarily, that Japan was importing hawksbill and Kemp's ridley turtle products from Mexico. The Pelly amendment provides that the President may prohibit the importation of wildlife products from the offending country. After negotiations with the U.S. government, Japan announced in 1991 that it would end all trade in hawksbill turtles, and in 1992, withdraw its CITES reservation for hawksbills.

Green turtle:
Recovery of the Hawaiian green turtle population will be reached when the numbers of females nesting at each currently used nesting beach have been restored and maintained at levels that ensure maximum hatchling production.

Leatherback and olive ridley turtles:
A determination of conditions for the recovery of the leatherback and olive ridley in Hawaiian waters will only be possible when adequate knowledge becomes available on their life history and ecology.

STATUS OF RECOVERY PROGRAM

KEMP'S RIDLEY TURTLES - ATLANTIC POPULATION

Plan Stage: Final **Plan Approved Date:** 9/21/92

SPECIES COVERED

KEMP'S RIDLEY TURTLE (ATLANTIC)

RECOVERY PLAN STATUS

NMFS approved and distributed a final recovery plan for Kemp's ridley sea turtles in 1992.

RECOVERY ACTIONS

The major points outlined in the recovery plan are:

1. Encourage Mexico to expand and codify the Kemp's Ridley Natural Reserve at Rancho Nuevo;
2. Redefine and codify regulations for better reserve protection;
3. Encourage Mexico to restrict development that may degrade the nesting habitat;
4. Identify important marine habitat;
5. Protect nesting females at Rancho Nuevo;
6. Protect nests and increase hatchling protection at Rancho Nuevo;
7. Monitor population trends at Rancho Nuevo;
8. Determine juvenile and subadult nearshore habitat use;
9. Determine migration routes and foraging areas of adults;
10. Enforce and expand TED regulations;
11. Enforce the trawling prohibitions near Rancho Nuevo; and
12. Promote TED use in Mexico.

NMFS has made a major effort to reduce Kemp's ridley mortality in shrimp trawl fisheries by improving regulations that require the use of turtle excluder devices (TEDs). In addition, NMFS has provided technical assistance to the Government of Mexico on TED utilization.

Projects are being conducted to determine species composition, relative abundance, and seasonal distribution in Atlantic and Gulf of Mexico waters. A continuing project to determine distribution and species composition is being carried out in the Cedar Key area of Florida's west coast. Historically, this area supported large numbers of Kemp's ridleys.

NMFS laboratories are conducting research on sea turtle habitat utilization in the Gulf of Mexico. The project focuses on known sea turtle developmental habitats. Kemp's ridleys are tracked with radio and sonic transmitters to determine their temporal and spacial utilization of these areas.

Analyses of sea turtle strandings have been conducted to monitor the level of strandings and possible causes of mortality.

Physiological research has been conducted on the effects of forced submergence on Kemp's ridleys.

NMFS fully funded and participated in the Turtle Expert Working Group (TEWG) which compiled and examined information on the status of the loggerhead and Kemp's ridley turtles and produced a status report for those turtle species.

RECOVERY GOALS

Because of Kemp's ridleys' aggregated nesting behavior, restricted breeding range, and increasing threats from the expanding global human population and general environmental degradation, complete recovery (delisting) may not be achievable. Since the principal nesting beach is in Mexico, continued, long-term cooperation between the U.S. and Mexico is necessary to recover the species. The goal of this recovery plan is to upgrade the species from endangered to threatened status. Criteria for delisting will be addressed in future revisions of the recovery plan.

Criteria for upgrading the status are as follows:

1. Continue complete and active protection of the known nesting habitat, and the waters adjacent to the nesting beach concentrating on the Rancho Nuevo area) and continue the bi-national protection project;

2. Eliminate mortality from incidental catch in commercial shrimping in the United States and Mexico through use of turtle excluder devices (TEDs) and achieve full compliance with the regulations requiring TED use;

3. Attain a population of at least 10,000 nesting females per year; and

4. Successfully implement all priority 1 recovery tasks.

The major actions necessary for recovery are to:

1. Assist Mexico to ensure long-term protection of the major nesting beach and its environs, including the protection of adult breeding stock and enhanced production/survival of hatching turtles;

2. Continue TED regulation enforcement in U.S. waters, expanding the areas and seasonality of required TED use to reflect the distribution of the species. Encourage and assist Mexico to incorporate TEDs in their Gulf of Mexico shrimp fleet; and

3. Fill in gaps in knowledge of Kemp's ridley life history that will result in better management decisions. In order to minimize threats and maximize recruitment we should determine distribution and habitat use for all life stages, determine critical mating/reproductive behaviors and physiology, determine survivorship and recruitment.

STATUS OF RECOVERY PROGRAM

LEATHERBACK TURTLES - ATLANTIC POPULATION

Plan Stage: Final **Plan Approved Date:** 4/6/92

SPECIES COVERED

LEATHERBACK TURTLE (ATLANTIC)

RECOVERY PLAN STATUS

NMFS approved and distributed a final recovery plan for leatherback sea turtles in the Atlantic Ocean in 1992.

RECOVERY ACTIONS

The major points outlined in the recovery plan are:

1. Identify and ensure long-term protection of important nesting beaches;
2. Identify important marine habitat;
3. Monitor trends in nesting activity on important nesting beaches with standardized surveys;
4. Evaluate nest success and implement appropriate nest protection measures;
5. Implement measures to reduce capture and mortality in the shrimp trawl fishery;
6. Evaluate extent of entanglement in and ingestion of marine debris; and
7. Implement and enforce MARPOL.

Analyses of sea turtle strandings have been conducted to monitor the levels of strandings and possible causes of mortality.

NMFS conducted a coordinated series of research activities to estimate mortality and physiological impacts on marine turtles hooked or entangled by Hawaii's domestic longline fishery. Based on this research, NMFS developed guidelines for handling marine turtles hooked or entangled in the Hawaii longline fishery.

NMFS is supporting research to develop methods to reduce entanglement of marine turtles in the lobster pot fishery in the northeastern U.S.

RECOVERY GOALS

The goal of the recovery plan is to delist the U.S. population of leatherback turtles. Delisting would be considered when the following conditions are met:

1. The adult female population increases over the next 25 years, as evidenced by a statistically significant increase in the number of nests at Culebra, Puerto Rico; St. Croix, USVI; and along the east coast of Florida;

2. Nesting habitat encompassing at least 75% of nesting activity in the U.S. Virgin Islands, Puerto Rico and Florida is in public ownership; and

3. All priority 1 tasks have been successfully implemented.

STATUS OF RECOVERY PROGRAM

LOGGERHEAD TURTLE - ATLANTIC POPULATION

Plan Stage: Final **Plan Approved Date:** 12/26/91

SPECIES COVERED

LOGGERHEAD TURTLE (ATLANTIC)

RECOVERY PLAN STATUS

NMFS approved and distributed a final recovery plan for loggerhead sea turtles in the Atlantic Ocean in 1991.

RECOVERY ACTIONS

The major points outlined in the recovery plan are:

1. Evaluate current laws on beach armoring;
2. Enforce laws regarding coastal construction;
3. Acquire nesting beaches between Melbourne and Wabasso Beach, FL;
4. Monitor trends in nesting activity;
5. Evaluate nest success and implement nest protection measures;
6. Determine seasonal distribution, abundance, population characteristics, and status in inshore and nearshore waters; and
7. Implement and enforce TED regulations.

NMFS has made a major effort to reduce loggerhead turtle mortality in shrimp fisheries by improving regulations that require the use of turtle excluder devices (TEDs).

Analyses of sea turtle strandings have been conducted to monitor the level of strandings and possible causes of mortality.

NMFS fully funded and participated in the Turtle Expert Working Group (TEWG) which compiled and examined information on the status of the loggerhead and Kemp’s ridley turtles and produced a status report for those turtle species.

Fish

STATUS OF RECOVERY PROGRAM

SACRAMENTO RIVER WINTER-RUN CHINOOK SALMON - DRAFT

Plan Stage: Pending

SPECIES COVERED

CHINOOK SALMON (SACRAMENTO RIVER WINTER-RUN)

RECOVERY PLAN STATUS

The Sacramento River winter-run chinook salmon was listed as threatened on an emergency basis on August 4, 1989, and was listed as threatened on November 30, 1990. In response to a petition received in June 1991, NMFS reclassified this species as endangered in January 1994. A recovery team has been appointed to prepare a recovery plan.

RECOVERY ACTIONS

Most of the recovery actions for the winter-run chinook salmon involve consultations under section 7 of the ESA with Federal agencies that either control the diversion of water in the river or permit activities by other water users. This species depends on an adequate flow of water at a specific temperature in the Sacramento River where drought conditions have existed for the past 7 years.

NMFS is a member of the Bureau of Reclamation's Temperature Advisory Committee, and is working with the Bureau on temperature management strategies to attract winter-run as far up the Sacramento River as possible and increase the amount of spawning in the reach of the river that the Bureau can manage with available water. NMFS is also working with the State of California by reviewing impacts of state actions on winter-run chinook.

In 1988, NMFS, the State of California, the Fish and Wildlife Service, and the Bureau of Reclamation signed a cooperative agreement to restore Sacramento River winter-run chinook.

The Ten-Point Winter-Run Restoration Plan includes actions such as raising the gates at the Bureau's Red Bluff Diversion Dam from December 1 through April 1 to allow free passage of adult winter-run chinook to suitable spawning habitat and maintaining water temperatures at levels below lethal limits in the reach of river above Red Bluff Dam that is used for spawning. A biological opinion issued in 1993 to the Bureau of Reclamation on the operation of its Central Valley Project, and the State Water Project controls activities in most of the species' important habitats.

In June 1991, NMFS issued a biological opinion to the Army Corps of Engineers stating that issuance of a permit to the Glenn-Colusa Irrigation District (GCID) would likely jeopardize the continued existence of the Sacramento River winter-run chinook because GCID did not plan to install new fish screens that would exclude fish when water is diverted from the Sacramento River. NMFS requested that GCID take immediate action to prevent a take of juvenile winter-run chinook before they would pass GCID's pumping station. NMFS requested the Department of Justice move to enjoin the operation of the pumping plant when the fish are likely to be taken. A Federal District Court Judge issued a temporary restraining order against GCID which was effective on August 19, 1991, and cuts diversion of water by about 50 percent. GCID currently operates under a court-approved plan that protects winter-run chinook salmon.

NMFS has consulted under section 7 with the Pacific Fishery Management Council. Because a direct take of Sacramento River winter-run chinook salmon by sport or commercial fishermen is not allowed, the biological opinion includes measures in the incidental take statement to decrease the potential incidental take of the species. These measures include not approving an early opening of the commercial fishery south of Point Arena, California, and delaying the recreational fishery for 2 weeks and closing it 2 weeks early south of Point Arena. Fishing regulations in 1996 include increased size limits in California recreational and commercial ocean salmon fisheries to further reduce impacts on winter-run chinook salmon.

STATUS OF RECOVERY PROGRAM

SNAKE RIVER SALMON - DRAFT

Plan Stage: Draft

SPECIES COVERED

CHINOOK SALMON (SNAKE RIVER SPRING/SUMMER)
CHINOOK SALMON (SNAKE RIVER FALL)
SOCKEYE SALMON (SNAKE RIVER)

RECOVERY PLAN STATUS

A Snake River Salmon Recovery Team was formed in 1991. The team submitted recommendations for a NMFS recovery plan in June 1994. A draft recovery plan was released in March, 1994 for public comment. A final recovery plan is expected to be released in mid-1997.

RECOVERY ACTIONS

<u>Institutional Structure, Accountability, and Monitoring</u>
The decision-making process for Columbia-Snake River Basin salmon ESA concerns must be improved. Institutional changes are necessary to achieve recovery, to prevent further listings, and to minimize costs and accelerate progress.

Future management must emphasize disciplined coordination, teamwork, and communication. A Regional Implementation Team has been established to identify and recommend solutions to problems and issues affecting recovery schedules, direct research, recommend modifications to the Recovery Plan and prepare an annual report. The Implementation Team should have a lead role in the formulation, implementation, evaluation, and monitoring of the adaptive management process.

To ensure that the best science is clearly understood and used in the recovery process, NMFS has established a Scientific Advisory Panel (SAP). The SAP assists the Implementation Team and NMFS in avoiding gridlock over scientific uncertainty and resolving conflicting advice and opinions on recovery issues and measures. In addition, a Regional Executive Committee is in place to coordinate management among all Columbia Basin fish and wildlife entities.

Committees and working groups have also been convened to provide NMFS and the Implementation Team with scientific, technical, and management advice on specific topics related to the recovery of listed Snake River salmon and their habitat. Some long-term functions, generally those addressing continued areas of concern (e.g. river operations, fish passage improvements, hatchery operations, and habitat) may be designated as permanent committees. Others are designated as work groups to address shorter-term problems on an ad hoc basis (e.g. a genetics protocol work group for the captive broodstock program.)

To further improve the management of salmon, NMFS proposes to establish a dispute resolution process, and integrate the scientific review, planning, and information management functions of the Recovery Plan with the Northwest Power Planning Council's Fish and Wildlife Program. Other Proposed Recovery Plan tasks include coordinating information and data gathering systems and consolidating regional efforts for biological analysis and modeling and hydrological analysis.

Delisting Criteria

NMFS' recovery requirements and delisting criteria for ESA-listed Snake River Basin salmon fall into two major categories: (1) Remedying the environmental (and other) factors that have reduced the stocks to levels which are in danger of extinction; and (2) rebuilding populations to levels where there is evidence of improved productivity, even when considering the potential impacts of severe stochastic environmental events (e.g., protracted drought, oceanic El Niño effects, etc.). Both of these categories must be achieved in order to consider delisting. To determine (2) above, NMFS proposes to use cohort replacement rates and numeric delisting criteria.

The natural cohort replacement rate describes the rate at which each subsequent cohort, or generation, replaces the previous one. When this rate is exactly 1.0, a population is neither increasing nor decreasing. If the ratio remains less than 1.0 for extended periods, a population is in decline, and could continue into extinction--a risk which originally led to listing Snake River salmon. For population rebuilding, the natural cohort replacement rate must be greater than 1. For delisting to be considered, the eight-year geometric mean cohort replacement rate of a listed species must exceed 1.0. For Snake River spring/summer chinook salmon, this goal must also be met for 80% of the index areas available for estimating cohort replacement rates.

For sockeye salmon, the numerical escapement goal is an eight-year (approximately two-generation) geometric mean of at least 1,000 natural spawners returning annually to Redfish Lake and 500 naturally-produced spawners in each of two other Snake River Basin lakes. The numerical escapement goal for Snake River fall chinook salmon is an eight-year geometric mean of at least 2,500 naturally-produced spawners in the mainstem Snake River annually. Snake River spring/summer chinook salmon have two numeric delisting criteria; both must be met for delisting to be considered. The first numerical escapement goal for Snake River spring/summer chinook salmon is an eight-year geometric mean corresponding to at least 60% of the pre-1971 brood year average redd counts for 80% of the available index areas. The second numerical escapement goal for spring/summer chinook salmon is an eight-year geometric mean equal to 60% of the 1962-1967 brood year average count of naturally-produced spawners past Ice Harbor Dam (goal is equal to 31,440).

Tributary Ecosystem

Land and water management actions, including water withdrawals, unscreened water diversions, stream channelization, road construction, timber harvest, livestock grazing, mining, and outdoor recreation have degraded important salmon spawning and rearing habitats. To protect tributary ecosystem health, NMFS proposes a three part approach: (1) Protect remaining high quality habitat by ceasing activities that would degrade ecosystem functions and values that listed fish need, (2) restore degraded habitats, and (3) provide connectivity between high quality habitats. Federal lands and Federal actions should bear, as much as possible, the burdens of recovering listed salmon species and their habitat. NMFS' March, 1995 biological opinion on eight Land and Resource Management Plans in the Snake River Basin established guidelines to maintain or improve aquatic habitats. These guidelines are in effect until geographically specific environmental impact statements for ecosystem management are completed. The U.S. Forest Service adopted standards collectively called "PACFISH" in February, 1995; these standards sunset in August, 1996, and were extended by the Forest Service until the East Side EIS's are completed. However, non-federal lands constitute approximately 35 percent of the Snake River salmon critical habitat. Therefore, an ecosystem approach that emphasizes integrated Federal and non-federal land management is needed. To achieve this, all stakeholders in a subbasin or watershed are encouraged to participate in management partnerships. The Recovery Plan also proposes actions that will reduce the loss of listed species at water withdrawal sites, rebuild salmon populations by providing adequate instream flows and improving fish passage at barriers, reduce losses of listed salmon associated with poor water quality, and reduce impacts on salmon resulting from recreational activities.

Mainstem and Estuarine Ecosystem

In the mainstem and estuarine ecosystem, salmon face problems associated with their downstream and upstream migrations. The journey through the lower Snake and Columbia Rivers has become more hazardous since eight hydroelectric dams were built and their reservoirs created. Each dam delays juvenile fish in their transition to the ocean environment and exacts additional losses. Seventy percent of the 482 miles between the mouth of the Columbia River and Lewiston/Clarkston on the Snake River has been converted from free-flowing river into reservoirs. This change has slowed the rate of downstream travel for smolts and increased the amount of habitat favorable to predator species. Hatchery fish and exotic species compete with and prey on the listed salmon in the mainstem ecosystem.

The plan prescribes immediate actions to improve mainstem survival and calls for acceleration of evaluations to determine the efficacy of these actions, and evaluations to determine the feasibility and likely biological benefits of major structural modifications of dams. Actions already taken to improve river conditions include drawdown of reservoirs behind the dams to minimum operating pool, increased river flows, and increased spill at dams. Changes implemented to improve fish survival past the dams include installation of extended length screens, construction of bypass systems (seven of the eight dams these fish must pass now have bypasses), and design and installation of a prototype surface diversion structure. Within four years, new information should help clarify whether surface diversion in combination with improved river conditions (i.e., increased flow and spill) and barge transportation would improve survival sufficient to achieve recovery, or whether major structural modification of dams (i.e., drawdowns below minimum operating pool) are necessary.

The listed and unlisted fish also need improvements in their upstream passage conditions. To accomplish this, the Proposed Recovery Plan prescribes actions such as installing extended length screens, operating turbines at peak efficiency, extending the period during which the juvenile bypass system is in operation, implementing a gas abatement program, decreasing power peaking operations from mid-March through mid-December, remedying water pollution problems, developing emergency auxiliary water supplies for adult fishways, and decreasing water temperatures.

To minimize predation and competition problems in the migration corridor, the Proposed Recovery Plan contains actions to control predation by squawfish, birds, marine mammals, and non-native fishes such as smallmouth bass, walleye, and channel catfish. Measures are also proposed to reduce American shad populations in the Columbia River because they both prey on and compete with juvenile salmon.

Environmental conditions in the Columbia River estuary and nearshore ocean environments are factors that influence juvenile salmonid survival. The Proposed Recovery Plan calls for improvement in the estuarine ecosystem through better management of dredging and water quality issues.

Harvest Management

Snake River salmon are not directly targeted for harvest, but they are incidentally caught by commercial, recreational, and tribal fisheries in the ocean and in the Columbia and Snake Rivers. Incidental harvest in the ocean of Snake River sockeye salmon and Snake River spring/summer chinook salmon is minimal. However, fall chinook salmon are caught incidentally in commercial and sport fisheries from Southeast Alaska to California, in non-treaty inriver sport and commercial fisheries, and in treaty fisheries above Bonneville Dam. In each of these fisheries, listed Snake River fall chinook are mixed with a number of other natural and hatchery-origin stocks. At present, these fisheries are managed through a complex system of interrelated forums.

The proposed Recovery Plan recommends amending the existing inriver harvest management rules so that they incorporate explicit management criteria to protect Snake River salmon. To minimize the number of fall chinook caught in ocean fisheries, NMFS proposes to implement a management strategy that is consistent with the Pacific Salmon Commission's objective of meeting adult chinook goals by 1998. These goals are established for a number of stocks and are based on a chinook rebuilding program that was fully implemented in 1984. This approach takes a broad view of stock protection and focuses on the coastwide status of chinook stocks including those from Puget Sound, the Washington and Oregon coast, and the Columbia River, all of which are under review for listing under the ESA.

Artificial Propagation

Artificial propagation of salmon in the Columbia River Basin has successfully contributed to ocean and inriver commercial, sport, and tribal fisheries. In some cases, hatchery production has slowed the decline of natural salmon populations or helped preserve them. However, effects from intensive hatchery production (such as supporting harvest rates in excess of what the natural populations can withstand, using natural fish for hatchery broodstock, and causing introgression into natural gene pools) have also contributed to the continued decline of some natural salmon populations. Ecological interactions between hatchery fish and natural fish such as competition, predation, displacement, and disease transfer need to be minimized.

Under the proposed recovery plan, captive broodstocks are being maintained to conserve remaining sockeye and spring/summer chinook salmon gene pools. Other supplementation efforts designed to support listed salmon recovery are also underway in the Snake River Basin.

The proposed Recovery Plan also suggests protecting listed species from excessive genetic introgression, minimizing impacts on listed salmon resulting from interactions between Columbia River Basin hatchery salmon and natural salmon, improving the quality of fish released from hatcheries, reducing predation and competition interactions between listed salmon and steelhead and hatchery trout, restoring listed chinook by reintroducing them to historic habitat, and conducting research for the purpose of optimizing production and conserving natural populations.

The final Recovery Plan will not be self-implementing under the Endangered Species Act. Instead, it will be used by NMFS and a Regional Implementation Team to guide the various agencies in refining their management plans, procedures, and strategies. This is so that individual on-the-ground operations will act in conjunction to help achieve recovery of the listed species. The Proposed Recovery Plan includes an implementation schedule which, if followed, will expedite progress toward recovery. NMFS' final Recovery Plan will also contain such a schedule.

Given that the Proposed Recovery Plan calls for use of adaptive management, and many of the recovery actions will be addressed over an extended period of time, the NMFS recommends that a new committee be established to guide implementation efforts over the long term.

RECOVERY GOALS

The goal of the Proposed Recovery Plan is to restore the health of the Columbia and Snake River ecosystem and to recover listed Snake River salmon stocks. Many of the recommended actions will directly benefit other species such as other salmon stocks, sturgeon, and bull trout. Implementation of the Proposed Recovery Plan should also increase biodiversity, a factor which is essential to ecosystem integrity and stability.

Snake River salmon survival should be improved in every segment of their life history. Recovery must address the total sequence of habitats and life history stages, not simply concentrate on a single type or aspect of action. Moreover, it is important to remember that actions taken at one stage in the life cycle will almost certainly have consequences in another life stage.

NMFS' recovery plan proposes coordinated actions or tasks to address salmon productivity in each phase of the salmon's life cycle and in the tributary, mainstem, and estuarine ecosystems. Recovery efforts are focused on the life-cycle segments where human influence can be effective, and those points of focus may differ by species and by area.

STATUS OF RECOVERY PROGRAM

GULF STURGEON

Plan Stage: Draft

SPECIES COVERED

GULF STURGEON

RECOVERY PLAN STATUS

The U.S. Fish & Wildlife Service has released a recovery plan for the Gulf sturgeon. For a copy of the recovery plan, write to:

Fish and Wildlife Reference Service
5430 Grosvenor Lane, Suite 110
Bethesda, Maryland 20814

The major actions recommended in the plan are:

1. Conduct and refine field investigations to locate important habitats;
2. Characterize riverine, estuarine, and neritic essential habitat;
3. Develop and implement population sampling and monitoring techniques;
4. Eliminate potential for introductions of non-native stock or other sturgeon;
5. Conduct life history studies on the requirements of little-known life stages;
6. Identify potential harmful chemical and water quantity and quality changes associated with surface water restrictions;
7. Identify and eliminate point and non-point sources of chemical contaminants;
8. Seek resolution of conflict between authorized projects and restoration of fish populations;
9. Reduce or eliminate incidental mortality;
10. Restore natural riverine habitats;
11. Utilize existing authorities to protect habitat, and where inadequate, enact new laws and regulations;
12. Identify dam and lock sites which offer the greatest flexibility for successful restoration of essential habitats;
13. Modify specific navigation projects which alter riverine habitats or modify thermal or substrate characteristics of those habitats;
14. Implement projects or actions which will achieve recovery plan objectives;

15. Increase effectiveness and enforcement of state and federal take prohibitions;
16. Seek funding for recovery actions;
17. Identify and eliminate known and potential impacts to water quantity and quality associated with existing and proposed uses and water diversions; and
18. Assess the relationship between groundwater pumping and reduction of groundwater flows and quantify loss of riverine habitat related to reduced groundwater in-flows.

RECOVERY GOALS

The short-term recovery objective is to prevent the further reduction of existing wild populations of Gulf sturgeon. The long-term recovery objective is to establish population levels that would allow delisting of the Gulf sturgeon in discrete management units. Gulf sturgeon in discrete management units could be delisted by 2023, if the required criteria are met. Following delisting, a long-term fishery management objective is to establish self-sustaining populations that could withstand directed fishing pressure within discrete management units.

STATUS OF RECOVERY PROGRAM

SHORTNOSE STURGEON

Plan Stage: Pending

SPECIES COVERED

SHORTNOSE STURGEON (ALL POPULATIONS)

RECOVERY PLAN STATUS

A shortnose sturgeon recovery team was appointed by NMFS in 1993, and they are currently working on a draft recovery plan.

RECOVERY ACTIONS

While the recovery plan is being drafted, NMFS is implementing recovery actions through the ESA section 7 consultation process and has issued scientific research permits directed at recovery of the species.

Recently issued scientific research permits allow studies in the southern rivers where there is a lack of information on shortnose sturgeon. Current research on shortnose sturgeon is being conducted by the U.S. Fish and Wildlife Service, University of North Carolina, Connecticut Department of Environmental Protection, National Biological Service, Maine Department of Natural Resources, New York Cooperative Fish and Wildlife Research Unit, and the University of Florida.

Species Status

Turtles

GREEN TURTLE

Common Name: GREEN TURTLE
Scientific Name: *Chelonia mydas*

Listing Date: 07/28/78
Species Status: Endangered/Threatened
Species Trend: Unknown
Current Estimated Population: 145-1,266 females nesting on Florida beaches per year and 214-768 females nesting on Hawaiian beaches per year.

SPECIES POPULATION STATUS

The green sea turtle was listed as endangered/threatened on July 28, 1978. The breeding populations off Florida and the Pacific coast of Mexico are listed as endangered; all other populations are listed as threatened.

Total population estimates for the green turtle are unavailable, and trends are particularly difficult to assess because of wide year-to-year fluctuations in numbers of nesting females, difficulties of conducting research on early life stages, and long generation time. Present estimates of nesting females in the U.S. range from 145-1,266 on Florida beaches per year and 214-768 on Hawaiian beaches per year. Nesting in Florida is likely reduced from historical levels and has been virtually eliminated in the Dry Tortugas; however, nesting has recently (1989-1995) appeared to be stable or increasing. In Hawaii, nesting numbers are lower than historical levels, but have increased substantially in the past 20 years. Populations in Surinam, Ascension Island, and Tortuguero, Costa Rica, appear to be stable, but other populations including Seychelles; Europa, Reunion; Indonesia; Peninsular, Malaysia; and Ogswara Island, Japan continue to decline. The recovery team for the green turtle concluded that the species status has not improved appreciably since listing.

The greatest cause of decline in green turtle populations in the U.S. is the loss of habitat. Worldwide, commercial harvest and egg poaching are the primary causes of population decline. Turtles are harvested for food, leather, and jewelry, and small turtles are sometimes stuffed for curios. Boat and ship strikes, and incidental capture in commercial and recreational fishing gear are also factors that adversely affect recovery.

SPECIES BIOLOGY

Adult green turtles are the largest of the hard-shelled turtles. Average carapace length and mass of nesting females range from 92 cm and 110 kg to 109 cm and 182 kg. On average, adult males are smaller than adult females. The carapace is smooth and colored grey, green, brown and black. The plastron is yellowish white. An adult male can be easily differentiated from an adult female in that the male has a thick prehensile tail that extends far beyond the posterior margin of its carapace. Green turtle hatchlings weigh approximately 25 g and measure approximately 50 mm in length. The hatchling carapace is colored blue-black and the plastron is creamy-white.

Green turtles begin inhabiting shallow coastal waters when they reach approximately 30-40 cm. At this stage and through adulthood, green turtles are benthic herbivores that feed on seagrasses and macroalgae. Age at sexual maturity is estimated at 24-50 years.

Green turtles are distinguished from other sea turtle species by the presence of a single pair of large prefrontal scales between the eyes, a strongly serrated lower jaw, non-overlapping carapace scutes, and four pairs of costal (lateral) scutes. The common name “green turtle” specifically refers to the color of the animal’s fat.

SPECIES DISTRIBUTION

In the southeastern United States, green turtles are found around the U.S. Virgin Islands, Puerto Rico, and the continental U.S. from Texas to Massachusetts. Important feeding grounds in Florida include Indian River Lagoon, the Florida Keys, Florida Bay, Homosassa, Crystal River, Cedar Key, and all nearshore Atlantic and Gulf waters from Cape Canaveral to Tampa. The primary nesting sites in U.S. Atlantic waters are along the east coast of Florida, with additional sites in the U.S. Virgin Islands and Puerto Rico.

Green turtles are found throughout the North Pacific, ranging as far north as Eliza Harbor, Admiralty Island, Alaska, and Ucluelet, British Columbia. In the eastern North Pacific, green turtles have been sighted from Baja California to southern Alaska. In the central Pacific, green turtles can be found at most tropical islands. In U.S. Hawaiian waters, green turtles are found around most of the islands in the Hawaiian Archipelago. The primary nesting site is at French Frigate Shoals.

MAJOR IMPACTS

Impacts in the nesting environment

In the United States, harvesting of nesting green turtles and egg poaching is infrequent. However, in other parts of the world, harvesting of nesting turtles and egg poaching is a serious threat. Animal predation of eggs and hatchlings is also a concern.

Artificial lighting can cause disorientation or misorientation of both adults and hatchlings. Green turtle hatchlings are attracted to artificial light, which disrupts their natural sea-finding behavior and can result in increased predation and mortality. In addition, adult females are discouraged from nesting in highly developed areas with intense artificial lighting.

Erosion of nesting beaches can result in loss of nesting habitat. However, natural processes of beach erosion are not generally a significant threat.

Beach armoring (seawalls, revetments, riprap, sandbags, and sand fences) to protect property from erosion can cause the loss of dry nesting beach and/or interference with access to suitable nesting sites.

Beach nourishment results in heavy machinery, pipelines, increased human activity, and artificial lighting on a project beach, and can cause the burial of nests and disturbance of nesting turtles.

Repeated mechanical raking of nesting beaches by heavy machinery can result in compacting sand and cause tire ruts which may hinder or trap hatchlings. Rakes can penetrate the surface and disturb or uncover a nest. Disposing of the raked debris on the high beach can cover nests and may alter nest temperature affecting temperature dependent sex determination mechanisms.

Human disturbance of nesting females is a serious concern. Also, heavy utilization of nesting beaches by humans may result in lowered hatchling success due to sand compaction.

The placement of physical obstacles on a beach can hamper or deter nesting attempts as well as interfere with the incubation of eggs and the emergence of hatchlings.

The use of off-road vehicles on beaches is a serious problem in certain areas. It may result in decreased hatchling success due to sand compaction, or directly kill hatchlings and adults. Tire ruts may also interfere with the ability of hatchlings to get to the ocean.

The invasion of nesting sites by non-native beach vegetation can lead to increased erosion and degradation of nesting habitat. Trees shading a beach can also change nest temperatures, altering the natural sex ratio of the hatchlings.

Impacts in the marine environment

Commercial fishing: It is estimated that before the implementation of turtle excluder device (TED) requirements, the commercial shrimp fleet captured approximately 925 green turtles each year; approximately 225 of those captures were fatal. With TED regulations in place and based on current observer coverage, the lethal and nonlethal take of green turtles in shrimp trawlers is now estimated to be 200 turtles per year. Most turtles killed are juveniles and sub-adults. Bluefish, croaker and flounder trawl fishing are also serious threats. Turtles are taken by purse seine fisheries in the Atlantic and Gulf of Mexico, but the magnitude of take is currently not known. Several thousand commercial vessels and an extensive recreational fishery are involved in hook and line fishing for various coastal species. The capture of turtles in this fishery is common, but the number is not known.

Significant numbers of green turtles were killed by gill and trammel net fisheries off the eastern coast of central Florida. However, in 1995, gill and trammel net fisheries were banned from operating in Florida state waters. Pound net fisheries are primarily a problem in waters off Virginia, where turtles become entangled in the gear and drown. In North Carolina, live turtles are often released from pound nets. Green turtles are incidentally taken by the U.S. pelagic longline fisheries in the Western North Atlantic, Eastern Pacific, and Hawaii when they are hooked and/or become entangled with the mainline or buoy line. The estimated annual take by the Hawaiian-based longline fishery is 119 green turtles. Traps, commonly used to capture crabs, lobster and reef fish result in incidental takes of green turtles when they become entangled in the trap lines and drown. The impact of this gear on green turtle populations has not been quantified.

Marine debris: Green turtles eat a wide variety of marine debris such as plastic bags, plastic and Styrofoam pieces, tar balls, balloons, and plastic pellets. Effects of consumption include interference in metabolism or gut function, even at low levels of ingestion, as well as absorption of toxic byproducts. Discarded monofilament fishing line and abandoned netting can entangle turtles, causing injury and/or death.

Fibropapillomatosis disease has been found to affect large numbers of green turtles in certain areas, including Florida and Hawaii. The disease is characterized by large tumorous growths commonly found on the skin and eyes. The cause of the disease is unknown; however, significant numbers of green turtles are infected and many of these infected individuals die.

Illegal harvesting of green turtles is uncommon in the U.S. No estimates of take exist. Illegal take of green turtles in the Caribbean, particularly near Puerto Rico, is a significant problem. Legislation and treaties to protect and conserve green turtles are more extensive than they have been in the past, although laws are often poorly enforced, especially among developing nations and smaller islands where resources and geography limit implementation.

Marine pollution: Green turtles are at risk when encountering an oil spill. Respiration, skin, blood chemistry and salt gland functions are affected. Pesticides, heavy metals, and PCB's have been detected in turtles and eggs, but the effect is unknown.

Dredging can result in habitat destruction by disrupting nesting or foraging grounds. Hopper dredges can also kill turtles caught in dragheads.

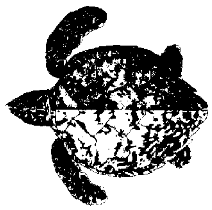
In areas where recreational boating and ship traffic is intense, propeller and collision injuries are common and likely play a significant role in hampering recovery.

Marina and dock construction result in a loss of green turtle foraging habitat. This development also leads to increased boat traffic, increasing the risk of turtle/vessel collisions.

Turtles have been caught in saltwater intake systems of coastal power plants. The mortality rate of the turtles involved is estimated at 7%.

Underwater explosions (e.g. gas and oil structure removal and testing using explosives) can kill or injure turtles, and may destroy or damage habitat.

HAWKSBILL TURTLE



Common Name: HAWKSBILL TURTLE
Scientific Name: *Eretmochelys imbricata*

Listing Date: 06/02/70
Species Status: Endangered
Species Trend: Decreasing
Current Estimated Population: Unknown

SPECIES POPULATION STATUS

The hawksbill turtle's status has not changed since it was listed as endangered in 1970. There are no world population estimates for hawksbill turtles, but a minimum of 15,000 to 25,000 females are thought to nest annually in more than 60 geopolitical entities. Nesting usually occurs at low densities. Moderate population levels appear to persist around the Torres Straits, in the Red Sea and Gulf of Aden, and probably around the Arnavon Islands, Northern Australia, Palau, Persian Gulf islands, Oman, and parts of the Seychelles. Papua New Guinea, Queensland, and Western Australia likely host 500-1,000 nesting females per year, while Indonesia and the Seychelles may support greater than 1,000 nesting females per year. The largest known nesting colony in the world is located on Milman Island, Queensland, Australia where in an 11-week period in 1995, 365 hawksbills were tagged while nesting.

In the wider Caribbean, recent surveys have documented relatively large nesting colonies on the shores of the Yucatán Peninsula. Other regionally-important nesting colonies occur in Nicaragua; Cuba; the San Blas Islands and Bocas del Toro region of Panama; Mona Island, Puerto Rico; the Grenadines; the Manabique Peninsula; Guatemala; near Manatee Bar, Belize; and Long Island, Antigua. Excluding the U.S. Pacific where firm data are virtually non-existent, the United States (Caribbean/Atlantic) probably supports a minimum of 650 nests per year or, based on annual average clutch frequency of five nets per female, perhaps 130 nesting females. Worldwide, approximately half of the known nesting populations are known or suspected to be in decline, in particular, the entire Western Atlantic-Caribbean region is greatly depleted.

Commercial exploitation is the major cause of the continued decline of the hawksbill turtle. There is a continuing demand for the hawksbill's shell and other parts of the turtle are used to produce leather, oil, perfume, and cosmetics. Hawksbill shell commands high prices, a major factor hampering recovery. As recently as 1990, Japan had been importing about 20 metric tons of hawksbill shell per year, representing approximately 19,000 turtles. As a result of international pressure and trade sanctions, Japan withdrew its reservations for sea turtles under CITES in 1992.

SPECIES BIOLOGY

The hawksbill is a small to medium-sized sea turtle. In the U.S. Caribbean, nesting females average about 62-91cm in straight carapace length. Weight is typically to 80 kg in the wider Caribbean, with a record weight of 127 kg. Hatchlings average about 42 mm straight carapace length and range in weight from 13.5-19.5 g. The following characteristics distinguish the hawksbill from other sea turtles: two pairs of prefrontal scales; thick, posteriorly overlapping scutes on the carapace; four pairs of costal scutes; two claws on each flipper; and a beak-like mouth. The carapace is heart-shaped in very young turtles, and becomes more elongate with maturity. Its lateral and posterior margins are sharply serrated in all but very old individuals. The epidermal scutes that overlay the bones of the shell are the tortoiseshell of commerce. They are unusually thick, overlap posteriorly on the carapace, and are richly patterned with irregularly radiating streaks of brown or black on an amber background. The scutes of the plastron of Atlantic hawksbills are usually clear yellow, with little or no dark pigmentation. The soft skin on the ventral side is cream or yellow, and may be pinkish-orange in mature individuals. The scales of the head and forelimbs are dark brown or black with sharply defined yellow borders. The head is elongate and tapers sharply to a point. The lower jaw is V-shaped.

Hawksbills utilize different habitats at different stages of their life cycle. Post-hatchling hawksbills occupy the pelagic environment, taking shelter in weedlines that accumulate at convergence points. Hawksbills re-enter coastal waters when they reach approximately 20-25 cm carapace length. Coral reefs are widely recognized as the resident foraging habitat of juveniles, subadults and adults. This habitat association is undoubtedly related to their diet of sponges, which need solid substrate for attachment. The ledges and caves of the reef provide shelter for resting both during the day and night. Hawksbills are also found around rocky outcrops and high energy shoals, which are also optimum sites for sponge growth. Hawksbills are also known to inhabit mangrove-fringed bays and estuaries, particularly along the eastern shore of continents where coral reefs are absent. In Texas, juvenile hawksbills are associated with stone jetties.

Hawksbills utilize both low- and high-energy nesting beaches in tropical oceans of the world. Both insular and mainland nesting sites are known. Hawksbills will nest on small pocket beaches, and, because of their small body size and great agility, can traverse fringing reefs that limit access by other species. They exhibit a wide tolerance for nesting substrate type and nests are typically placed under vegetation. Age at sexual maturity is not known; however, it is generally believed that hawksbills mature slowly over several decades.

SPECIES DISTRIBUTION

The hawksbill occurs in tropical and subtropical waters of the Atlantic, Pacific and Indian Oceans. The species is widely distributed in the Caribbean Sea and western Atlantic Ocean, with representatives of at least some life history stages regularly occurring in southern Florida and the northern Gulf of Mexico (especially Texas); in the Greater and Lesser Antilles; and along the Central American mainland south to Brazil. Within the United States, hawksbills are most common in Puerto Rico and its associated islands, in the U.S. Virgin Islands, and in Florida. In the continental U.S., the species has been recorded in all of the Gulf states and along the eastern seaboard as far north as Massachusetts, with the exception of Connecticut, but sightings north of Florida are rare.

Hawksbills are observed in Florida with some regularity on the reefs off Palm Beach County, where the warm Gulf Stream current passes close to shore, and in the Florida Keys. Texas is the only other state where hawksbills are sighted with any regularity. Most sightings involve posthatchlings and juveniles. These small turtles are believed to originate from nesting beaches in Mexico.

Nesting within the southeastern United States occurs principally in Puerto Rico and the U.S. Virgin Islands, the most important sites being Mona Island and Buck Island. Nesting also occurs on other beaches of St. Croix, and on Culebra Island, Vieques Island, mainland Puerto Rico, St. John and St. Thomas. Within the continental United States, nesting is restricted to the southeast coast of Florida and Florida Keys.

In the U.S. Pacific, there have been no hawksbills recorded along the west coast. Hawksbills have been observed in the Gulf of California as far as 29°N, throughout the northwestern states of Mexico, and south along the Central and South American coasts to Columbia and Ecuador. In the Hawaiian Islands, nesting occurs in the main islands, primarily on several small sand beaches on the Islands of Hawaii and Molokai.

MAJOR IMPACTS

Impacts in the nesting environment

The greatest threats on nesting beaches are the harvesting of nesting females and egg poaching. Domestic harvest is a persistent problem for hawksbills throughout their range and international commerce in hawksbill shell (tortoiseshell or bekko) is considered the most significant factor endangering hawksbill populations around the world. Poaching of hawksbill eggs is a serious problem in Puerto Rico and Mexico, and also occurs at lower levels in St. Thomas and St. Croix. Egg poaching is also widespread in the Pacific. In Palau, egg poaching claims greater than 75% of all nests.

Artificial lighting can cause disorientation or misorientation of both adults and hatchlings. Hawksbill hatchlings are attracted to artificial light, which disrupts their natural sea-finding behavior and can result in increased predation and mortality. In addition, adult females are discouraged from nesting in highly developed areas with intense artificial lighting.

Beach armoring (seawalls, revetments, riprap, sandbags and sand fences) to protect property from erosion can cause the loss of dry nesting beach and/or interference with access to suitable nesting sites.

Beach nourishment results in heavy machinery, pipelines, increased human activity and artificial lighting on a project beach, and can cause the burial of nests and disturbance of nesting turtles.

Removal of sand (sand mining) for construction aggregate or nourishment of other beaches is a serious threat throughout the Caribbean. Sand removed from above the tide line is replaced very slowly from subtidal areas, a process which can take decades. Subtidal sand removal results in beach sand moving offshore.

Development and landscaping of nesting beaches can create impediments for nesting turtles. In addition, exotic plants can damage or destroy nests by root invasion.

Erosion of nesting beaches can result in loss of nesting habitat. However, natural processes of beach erosion are not generally a significant threat.

Repeated mechanical raking of nesting beaches by heavy machinery can result in compacting sand and cause tire ruts which may hinder or trap hatchlings. Rakes can penetrate the surface and disturb or uncover a nest. Disposing of the raked debris on the high beach can cover nests and may alter nest temperature affecting temperature dependent sex determination mechanisms.

Human disturbance of nesting females is a serious concern. Also, heavy utilization of nesting beaches by humans may result in lowered hatchling success due to sand compaction.

The use of off-road vehicles on beaches is a serious problem in certain areas. It may result in decreased hatchling success due to sand compaction, or directly kill hatchlings and adults. Tire ruts may also interfere with the ability of hatchlings to get to the ocean.

A variety of natural and introduced predators such as hogs, mongooses, ghost crabs and ants prey on hawksbill eggs and hatchlings.

Impacts in the marine environment

International commerce in hawksbill shell (bekko) is considered the most significant factor endangering hawksbill populations around the world. Japanese imports of raw bekko between 1970 and 1989 totaled 713,850 kg, representing more than 670,000 turtles; more than half the imports originated in the Caribbean and Latin America. While hawksbills are protected under

CITES, trade continues for several reasons: not all countries have ratified CITES; some treaty signatories participate in trade by falsifying documents of origin; some treaty signatories ignore the treaty and trade openly in hawksbills and hawksbill products; and some treaty signatories have exercised their right to take exemption to treaty provisions as they affect sea turtles. The illegal take of hawksbills at sea has not yet been fully quantified, but it is a continuing and serious problem.

Incidental catch during fishing operations is an unquantified and potentially significant source of mortality. Gill nets, longlines and shrimp trawls all take turtles in Gulf of Mexico and Atlantic waters. In Puerto Rico, hawksbills are captured by a variety of fishing gear, including driftnets, gillnets and seines, and are also killed by spearguns. Gillnets and seines are widely deployed and are a particularly serious problem; these nets are sometimes set specifically (and illegally) for turtles.

Marine debris: The extent to which hawksbills are killed or debilitated after becoming entangled in marine debris is unknown, but it is believed to be a serious and growing problem. Hawksbills have been reported entangled in monofilament gill nets, fishing line and rope. Hawksbill turtles eat a wide variety of debris such as plastic bags, plastic and styrofoam pieces, tar balls, balloons and plastic pellets. Effects of consumption include interference in metabolism or gut function, even at low levels of ingestion, as well as absorption of toxic byproducts.

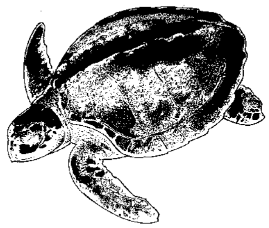
In areas where recreational boating and ship traffic is intense, propeller and collision injuries are common and likely play a significant role in hampering recovery.

The hawksbill's dependence on coral reefs for shelter and food link its well-being to the condition of reefs. Destruction of reefs from vessels anchoring, striking or grounding is a growing problem. Cruiseships and yachts are destroying portions of coral reefs with their anchors and anchor chains in the US Virgin Islands, Puerto Rico, the British Virgin Islands, Belize and elsewhere. There is also damage from recreational, diving and fishing boats anchoring indiscriminately on reefs. In Puerto Rico, damage to coral reefs and other shallow water benthic systems from sedimentation and siltation has not been assessed as yet, but it is known to be a serious problem with some coral reefs completely destroyed by siltation.

Marine pollution: Raw sewage in Puerto Rico and the U.S. Virgin Islands has been released directly into nearshore waters. While a regional treatment plant has just been completed in Puerto Rico, monitoring has not been initiated. Pesticides, heavy metals and PCB's have been detected in turtles and eggs, but the effect is unknown. Marine turtles are at risk when encountering an oil spill. Respiration, skin, blood chemistry and salt gland functions are affected.

In nearshore waters, hawksbills are periodically captured in the cooling water intakes of industrial facilities. In addition, illegal use of explosives for fishing is a concern, especially off the southeast coast of Puerto Rico.

KEMP’S RIDLEY TURTLE (ATLANTIC)



Common Name: KEMP’S RIDLEY TURTLE
Scientific Name: *Lepidochelys kempii*

Listing Date: 12/02/70
Species Status: Endangered
Species Trend: Stable
Current Estimated Population: 400-600

SPECIES POPULATION STATUS

The Kemp's ridley was listed as endangered throughout its range on December 2, 1970. This species is the most endangered of all sea turtle species. The current population of Kemp’s ridleys is a mere fraction of historical levels when an estimated 40,000 females nested in one day in 1947. Abundance of adults declined from a population that produced 6,000 nests in 1966 to a population that produced 924 nests in 1978 and continued to decline through the mid 1980's. The decline of this species was most likely caused by human impacts at sea and at the primary nesting beach near Rancho Nuevo, in the state of Tamaulipas, Mexico. The Mexican government began protecting the Rancho Nuevo nesting beach from poachers in 1966, and in 1978, the U.S. Fish and Wildlife Service and Mexico’s Instituto Nacional de Pesca began a cooperative program to increase the nest protection and relocation program at Rancho Nuevo.

Current estimates of adult population show the species appears to be in an early stage of exponential expansion. Over the period 1987-1995, the rate of increase in the annual number of nests accelerated. Adult Kemp’s ridley numbers have grown from a low of approximately 1,050 adults producing 702 nests in 1985, to a 1995 estimate of 3,000 adults producing 1,940 nests. This upward trend should continue with continued increased hatchling production and continuation of protection at sea with the use of turtle excluder devices (TEDs); however, the species cannot be considered stable because it remains well below historical levels.

SPECIES BIOLOGY

Kemp's ridley is one of the smallest of all marine turtles. Adult females measure 58-80 cm in straight carapace length and weigh 40-50 kg. Kemp's ridleys' shells are usually as wide as they are long. Coloration changes significantly during development from the grey-black carapace and plastron of hatchlings to the lighter grey-olive carapace and cream-white or yellowish plastron of adults. There are two pairs of prefrontal scales on the head, five vertebral scutes, five pairs of costal scutes and generally twelve pairs of marginals on the carapace. In each bridge adjoining the plastron to the carapace, there are four scutes, each of which is perforated by a pore. This is the external opening of Rathke's gland which secretes a substance of unknown (possibly a pheromone) function. Males resemble the females in size and coloration. Secondary sexual characteristics of male sea turtles include a longer tail, more distal vent, recurved claws and, during breeding, a softened mid-plastron. Eggs are 34-45 mm in diameter and 24-40 g in weight. Hatchlings range from 42-48 mm in straight line carapace length, 32-44 mm in width and 15-20 g in weight.

Post-hatchling Kemp's ridleys most likely associate with the sargassum community and feed on associated infauna or other epipelagic species found in the Gulf of Mexico and Atlantic. Kemp’s ridleys become benthic feeders at approximately 20-25 cm carapace length when they return to inshore and nearshore waters. Favored areas are seagrass beds or mud bottoms from Long Island Sound to the Western Gulf of Mexico. Kemp’s ridleys feed primarily on crabs. Age at sexual maturity is not known, but recent estimates suggest that female Kemp’s ridleys may reach maturity within 11-12 years, although other estimates of age at maturity range from 12 to 35 years. Unlike sea turtles of other genera, Kemp’s ridleys emerge synchronously during the day to nest in aggregations called “arribadas” meaning “arrival” in Spanish. Nesting occurs between April and mid-August and adult females lay an average of 3 nests per season.

SPECIES DISTRIBUTION

Kemp’s ridleys occur mainly in coastal areas of the Gulf of Mexico and the northwestern Atlantic Ocean. Adults of this species are usually confined to the Gulf of Mexico. Unlike most sea turtles, Kemp’s ridleys have a very restricted nesting range. The principal nesting beach is located near Rancho Nuevo in the state of Tamaulipas, Mexico where 95% of the nests are laid along 60 km of beach. Nesting also occurs sporadically at other beaches in Mexico and Texas, and in recent years, there have been a few instances of Kemp’s ridleys nesting on Florida’s Gulf and Atlantic coasts and on the coasts of North and South Carolina.

MAJOR IMPACTS

Impacts in the nesting environment

Threats to the nesting beach in Mexico are presently few, but potentially serious. Human population growth and increasing developmental pressure will result in increased threats to the nesting beach. Only the central part of the prime nesting area is protected by Mexican presidential decree. A primary concern is human encroachment and access along the entire nesting area. However, the wording of the Mexican decree is vague and construction of commercial fishing facilities proceeded in 1987 immediately adjacent to the main turtle camp at Rancho Nuevo. Plans for development of La Pesca (just to the north of the nesting area) as a fishing center and dredging of the Gulf Intracoastal Waterway from Brownsville, Texas to Barra del Tordo (in the south part of the nesting beach) are under discussion. These plans are alarming because of the assuredly detrimental and possibly disastrous effects that they could have on the nesting population if they were to be carried out.

A threat resulting from management practices at Ranch Nuevo is the relocation of all of the nests in one corral to prevent poaching and predation. While this ensures the safety of nests from poaching and animal predation, the concentration makes the eggs more susceptible to reduced viability from manipulation, disease vectors, tidal inundation, and catastrophic loss.

Impacts in the marine environment

It is estimated that before the implementation of TEDs, the U.S. commercial shrimp fleet killed between 500 and 5,000 Kemp's ridleys each year. This compares to 75-750 estimated mortalities due to all other known human causes. TED regulations have been in place in the U.S. and in Mexico for several years; however, shrimp trawling still poses a threat, although this threat is reduced from pre-TED regulatory years. Kemp's ridleys have also been taken in pound nets, trawls, gill nets, hook and line, crab traps, and longlines. Several commercial fishing camps are established along the nesting beach at Rancho Nuevo. While the fishing is of a nature not likely to have severe impacts on turtles, (small boats, small-mesh gill nets) accidental take of reproductively active adults cannot be ruled out and the proximity of the fishing facilities increases the likelihood of take. More importantly, there has been minimal enforcement of the fishing ban during the nesting season. Some trawling by Mexican vessels and some illegal trawling by U.S. vessels regularly occurs within and adjacent to the protected zone.

The Gulf of Mexico is an area of high density offshore oil extraction with chronic low-level spills and occasional massive spills. The primary feeding grounds for adult Kemp's ridley turtles in the Gulf of Mexico are near major areas of near shore and offshore oil exploration and production. The nesting beach at Rancho Nuevo is also vulnerable and has been affected by oil spills.

The vast amount of floating debris in the Gulf of Mexico constitutes an increasingly serious threat to Kemp's ridley turtles of all ages. Plastics, monofilament, discarded netting and many other waste items can be ingested and can also cause mortality through entanglement. Ingestion of plastic, rubber, fishing line and hooks, tar, cellophane, rope and string, wax, Styrofoam, charcoal, aluminum cans and cigarette filters has been documented in sea turtles.

Dredging operations can affect Kemp's ridley turtles through incidental take and by degrading the habitat. Incidental take of ridleys has been documented with hopper dredges. In addition to direct take, channelization of inshore and nearshore areas can degrade foraging and migratory habitat through spoil dumping, degraded water quality/clarity and altered current flow.

Point and non-point source discharges of agricultural and industrial chemicals, and domestic sewage may have indirect effects on Kemp’s ridleys by depleting food sources through degradation of the habitat of prey species. Direct effects may include reduced health and fitness through the disruption of physiological functions.

LEATHERBACK TURTLE

Common Name: LEATHERBACK TURTLE
Scientific Name: *Dermochelys coriacea*

Listing Date: 06/02/70
Species Status: Endangered
Species Trend: See Species Population Status
Current Estimated Population: 20,000-30,000 female leatherbacks worldwide
Critical Habitat: Designated

SPECIES POPULATION STATUS

The leatherback turtle was listed as endangered throughout its range on June 2, 1970. Nesting populations of leatherback turtles are especially difficult to discern because the females frequently change beaches. Current population estimates ranges from 20,000 to 30,000 female leatherbacks worldwide. Current trends in leatherback populations in the U.S. are unknown; however, some nesting populations including populations on St. John and St. Thomas in the U.S. Virgin Islands have been virtually extirpated.

Elsewhere, populations continue to decline. Declining populations of leatherbacks have been documented in Malaysia, India, Sri Lanka, Thailand, Trinidad and Tobago. Nesting activity has also declined in French Guiana due to erosion of nesting beaches. The population in that area has shifted to Surinam, where annual numbers of nests have risen from less than 100 in 1967 to 5,565 in 1977 and 9,816 in 1987. Habitat destruction, incidental catch in commercial fisheries, and the harvest of eggs and flesh are the greatest threats to the survival of the leatherback turtle.

SPECIES BIOLOGY

The leatherback is the largest living turtle, and is so distinctive as to be placed in a separate taxonomic family, Dermochelyidae. The carapace is distinguished by a rubber-like texture, about 4 cm thick, and made primarily of tough, oil-saturated connective tissue raised into seven prominent ridges an tapered to a blunt point posteriorly. The carapace is strengthened by a nearly continuous layer of small dermal bones that lie just below the leathery outer skin. No sharp angle is formed between the carapace and the plastron, resulting in the animal being somewhat barrel-shaped.

The average curved carapace length for nesting female leatherbacks is 155 cm and weights of 262-506 kg have been recorded. The epidermis is black, with varying degrees of pale spotting, and is scaleless. The undersurface is mottled pinkish-white and black. The front flippers are proportionally longer than in any other sea turtle, and may span 270 cm in an adult. Adult males are distinguished by a long, thick tail that extends well beyond the posterior carapace margin.

The leatherbacks diet consists of soft-bodied animals such as cnidarians, tunicates and jellyfish. In both adults and hatchlings, the upper jaw bears two tooth-like projections at the premaxillary-maxillary sutures. Hatchlings are dorsally mostly black and are covered with tiny scales; the flippers are margined in white, and rows of white scales appear as stripes along the length of the back. Hatchlings average 61.3 mm long and 45.8 g in weight.

Leatherbacks have the most extensive range of any reptile and exhibit broad thermal tolerances. Preferred nesting beaches have deep and unobstructed offshore access. Nesting is generally nocturnal and mating typically occurs prior to or during migration to the nesting ground. The nesting season commences in March and continues into July. Females renest on average every 9 to 10 days and deposit an average of 5 to 7 nests per annum. Age at sexual maturity is unknown.

SPECIES DISTRIBUTION

The leatherback is found throughout the Atlantic, Pacific and Indian Oceans, from s far north as Labrador and Alaska to as far south as Chile, the Cape of Good Hope, and the southern end of New Zealand. In the western north Atlantic, the leatherback's range extends from Cape Sable, Nova Scotia, south to Puerto Rico and the U.S. Virgin Islands. Adults engage in routine migrations as far as 5,000 kilometers between temperate and tropical waters, presumably to optimize both foraging and nesting opportunities.

Nesting grounds are distributed circumglobally, with the Pacific coast of Mexico supporting the world's largest known colony of nesting leatherbacks. In the U.S., St. Croix, U.S. Virgin Islands and Culebra, Puerto Rico support the largest nesting colonies.

Leatherbacks are commonly seen by fishermen in Hawaiian offshore waters, generally beyond the 100-fathom curve but within sight of land. Sightings often take place off the north coast of Oahu and the Kona coast of Hawaii. North of the Hawaiian Islands, a high seas aggregation of leatherbacks is known to occur at 35°-45°N, 175°-180°W. Nesting occurs along the Atlantic coast of Florida, but nesting north of Florida is rare. No nesting is reported from areas under U.S. jurisdiction in the Pacific.

Critical Habitat

Critical habitat for the leatherback includes the waters adjacent to Sandy Point, St. Croix, U.S. Virgin Islands, up to and inclusive of the waters from the hundred fathom curve shoreward to the level of mean high tide with boundaries at 17°42'12" N and 64°50'00" W.

MAJOR IMPACTS

Impacts in the nesting environment

There is virtually no international commerce in leatherback turtle products. Nonetheless, local commercial and subsistence exploitation is heavy in many parts of the world. In the western Atlantic, leatherbacks are occasionally taken for both meat and oil. In addition, the poaching of eggs from nests continues at low levels in the U.S. Virgin Islands and in Puerto Rico.

Leatherback turtles prefer to nest on beaches that have deep water and unobstructed offshore access. These high energy beaches are prone to erosion, causing egg loss. Nests are also lost to hurricanes.

Artificial lighting can cause disorientation or misorientation of both adults and hatchlings. Leatherback turtle hatchlings are attracted to artificial light, which disrupts their natural sea-finding behavior and can result in increased predation and mortality. In addition, adult females are discouraged from nesting in highly developed areas with intense artificial lighting.

Beach armoring (seawalls, revetments, riprap, sandbags and sand fences) to protect property from erosion can cause the loss of dry nesting beach and/or interference with access to suitable nesting sites.

Beach nourishment results in heavy machinery, pipelines, increased human activity and artificial lighting on a project beach, and can cause the burial of nests and disturbance of nesting turtles.

Repeated mechanical raking of nesting beaches by heavy machinery can result in compacting sand and cause tire ruts which may hinder or trap hatchlings. Rakes can penetrate the surface and disturb or uncover a nest. Disposing of the raked debris on the high beach can cover nests and may alter nest temperature affecting temperature dependent sex determination mechanisms.

Human disturbance of nesting females is a serious concern. Also, heavy utilization of nesting beaches by humans may result in lowered hatchling success due to sand compaction.

The placement of physical obstacles on a beach can hamper or deter nesting attempts as well as interfere with the incubation of eggs and the emergence of hatchlings.

The use of off-road vehicles on beaches is a serious problem in certain areas. It may result in decreased hatchling success due to sand compaction, or directly kill hatchlings and adults. Tire ruts may also interfere with the ability of hatchlings to get to the ocean.

Impacts in the marine environment

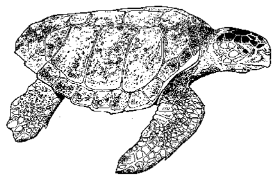
Commercial fisheries: It is estimated that before the implementation of turtle excluder devices (TEDs), the U.S. commercial shrimp fleet captured approximately 640 leatherbacks each year. Approximately 160 of those captures were fatal. The use of TEDs is not expected to reduce leatherback captures and mortality significantly, because TEDs are generally incapable of passing adult leatherbacks through the exit opening. Leatherbacks can also become entangled in longlines, drift/gill nets, fish traps, buoy anchor lines and other ropes and cables. This can lead to serious injuries and/or death by drowning.

Marine debris: Entanglement in discarded monofilament fishing line and abandoned netting presents serious problems for leatherbacks worldwide causing injury and/or death. Leatherbacks eat a wide variety of debris such as plastic bags, plastic and Styrofoam pieces, tar balls, balloons and plastic pellets. Effects of consumption can be fatal and include interference in metabolism or gut function, even at low levels of ingestion, as well as absorption of toxic byproducts.

Leatherbacks are vulnerable to boat collisions and strikes, particularly when in waters near shore. It is not known if open ocean collisions with large ships occur.

Marine turtles are at risk when encountering an oil spill. Respiration, skin, blood chemistry and salt gland functions may be affected.

LOGGERHEAD TURTLE



Common Name: LOGGERHEAD TURTLE
Scientific Name: *Caretta caretta*

Listing Date: 06/02/70
Species Status: Threatened
Species Trend: Decreasing
Current Estimated Population: 20,000-28,000 nesting females in the southeastern U.S.

SPECIES POPULATION STATUS

The loggerhead turtle was listed as threatened throughout its range on July 28, 1978, and its status has not changed. The species is considered Endangered by the IUCN (the World Conservation Union) and is listed in Appendix I of CITES (Convention on International Trade in Endangered Flora and Fauna). Recently, four loggerhead nesting subpopulations separated genetically have been identified in the western North Atlantic: the northern nesting subpopulation, occurring from North Carolina to northeast Florida; the south Florida nesting subpopulation, occurring from the central Atlantic coast of Florida at 29 degrees north latitude south and around the peninsula to Naples; the Florida panhandle nesting subpopulation, occurring at Eglin Air Force Base and the beaches near Panama City; and the Yucatán nesting subpopulation, occurring on the northern and eastern Yucatán Peninsula, Mexico.

Recent trends in abundance can be assessed only for adults of the northern and south Florida subpopulations. Nesting surveys in the Florida panhandle and Yucatán Peninsula have been too irregular to allow a meaningful analysis of trends. The northern subpopulation has declined substantially in the last 23 years, but may have stabilized in recent years. The south Florida subpopulation has shown significant increases over the last 25 years; however, the numbers of immatures in the same area have not increased. If these data are indicative of loggerhead abundance elsewhere, limited recruitment to adulthood can be expected to slow the recovery of the south Florida subpopulation measured at the nesting beach.

The incidence of raccoon depredation of nests in Brevard County, Florida, which supports the highest density of loggerheads nests of any U.S. beach, almost tripled between 1985 and 1988, indicating that although numbers of nests may be remaining fairly stable, the numbers of hatchlings emerging from those nests may be declining. Nesting data collected on index nesting beaches between 1989 and 1995 represent the best data set available to estimate the population size of adult female loggerhead turtles. Based on these data the adult female population nesting along the U.S. Atlantic and Gulf coasts is estimated to be 43,060 turtles.

The loggerheads reported from the insular Pacific, including states and territories under U.S. jurisdiction, probably derive largely from populations genetically affiliated with nesting beaches in Japan, Indonesia, or eastern Australia. These stocks are threatened mostly by incidental catch in various fisheries and general habitat degradation. There are no historical data from which to determine with certainty the past distribution and abundance of loggerhead turtles in the Pacific Ocean, but contemporary field studies in Australia clearly show that populations in that area are declining.

In general, the loggerhead recovery team concluded that nesting populations are declining worldwide. The most significant threats to loggerheads include coastal development/loss of habitat, incidental take in commercial fisheries, boat/vessel strikes, and pollution.

SPECIES BIOLOGY

Adult and sub-adult loggerhead turtles have a reddish-brown carapace and medium-yellow plastron. Scales on the top and sides of the head and top of the flippers are reddish-brown with yellow borders. The loggerhead is named for its large head, which can reach 25 cm wide in adults. Adult average size is 92 cm straight carapace length and average weight is 115 kg. Mature males have comparatively narrow shells gradually tapering posteriorly, and long, thick tails extending well beyond the edge of the carapace.

Hatchlings are dull brown in color and their average size and weight at hatching is 45 mm long and 20 g, respectively. Post-hatchling and juveniles spend an undetermined number of years inhabiting the open ocean (pelagic) environment. At approximately 40-60 cm carapace length, loggerheads begin recruiting to coastal areas where they become benthic feeders. Loggerheads reach maturity at between 16 and 40 years and mating takes place in late March to early June. The nesting season occurs in the spring and summer and most females nest from 3 to 5 times in a single season. Females return to nest at two or three year intervals.

SPECIES DISTRIBUTION

The loggerhead turtle is circumglobal, occurring throughout the temperate and tropical regions of the Atlantic, Pacific and Indian Oceans. Its range of habitat includes open ocean waters, continental shelves, bays, lagoons, and estuaries. The largest nesting aggregation worldwide occurs on Masirah Island, Oman, where approximately 30,000 females nest per year. In the U.S., loggerheads nest primarily from North Carolina to the southwest Florida coast and constitute the second largest worldwide nesting assemblage. The greatest concentration of nesting occurs along the central and south-central Atlantic coast of Florida.

In the eastern Pacific, loggerheads are reported as far north as Alaska and as far south as Chile. Occasional sightings are also reported from the coast of Washington, but most records are of juveniles off the coast of California. Nesting in the Pacific is restricted to the western region, primarily in Japan and Australia; no loggerhead nesting occurs in the Pacific U.S.

MAJOR IMPACTS

Impacts in the nesting environment

In the United States, harvesting of nesting loggerhead turtles and egg poaching is infrequent. However, in other parts of the world, harvesting of nesting turtles and egg poaching is a serious threat. Animal predation of eggs and hatchlings is also a concern.

Artificial lighting can cause disorientation or misorientation of both adults and hatchlings. Loggerhead turtle hatchlings are attracted to artificial light, which disrupts their natural sea-finding behavior and can result in increased predation and mortality. In addition, adult females are discouraged from nesting in highly developed areas with intense artificial lighting.

Erosion of nesting beaches can result in loss of nesting habitat and incubating nests. However, natural processes of beach erosion are not generally a significant threat.

Beach armoring (seawalls, revetments, riprap, sandbags and sand fences) to protect property from erosion can cause the loss of dry nesting beach and/or interference with access to suitable nesting sites.

Beach nourishment results in heavy machinery, pipelines, increased human activity and artificial lighting on a project beach, and can cause the burial of nests and disturbance of nesting turtles.

Repeated mechanical raking of nesting beaches by heavy machinery can result in compacting sand and cause tire ruts which may hinder or trap hatchlings. Rakes can penetrate the surface and disturb or uncover a nest. Disposing of the raked debris on the high beach can cover nests and may alter nest temperature affecting temperature dependent sex determination mechanisms.

Human disturbance of nesting females is a serious concern. Also, heavy utilization of nesting beaches by humans may result in lowered hatchling success due to sand compaction.

The placement of physical obstacles on a beach can hamper or deter nesting attempts as well as interfere with the incubation of eggs and the emergence of hatchlings.

The use of off-road vehicles on beaches is a serious problem in certain areas. It may result in decreased hatchling success due to sand compaction, or directly kill hatchlings and adults. Tire ruts may also interfere with the ability of hatchlings to get to the ocean.

The invasion of nesting sites by non-native beach vegetation can lead to increased erosion and degradation of nesting habitat. Trees shading a beach can also change nest temperatures, altering the natural sex ratio of the hatchlings.

Impacts in the marine environment

Commercial fishing: It is estimated that before the implementation of turtle excluder devices (TEDs), the U.S. commercial shrimp fleet killed between 5,000 and 50,000 loggerheads each year. TED regulations have been in place in the U.S. and in Mexico for several years, however, shrimp trawling still poses a threat. Although, recent data indicates that since the implementation of TED requirements lethal takes of loggerheads have been reduced by approximately 54%. Mid-water and other bottom trawl fishing gear are also serious threats. Turtles are taken by purse seine fisheries in the Atlantic and Gulf of Mexico, but the magnitude of take is currently not known. Several thousand commercial vessels and an extensive recreational fishery are involved in hook and line fishing for various coastal species. The capture of turtles in this fishery is common, but the number is not known.

Significant numbers of loggerhead turtles were killed by gill and trammel net fisheries off the eastern coast of central Florida. However, in 1995, gill and trammel net fisheries were banned from operating in Florida state waters. Pound net fisheries are primarily a problem in waters off Virginia and North Carolina, where turtles become entangled in the gear and drown. Loggerhead turtles are incidentally taken by the U.S. pelagic longline fisheries in the western North Atlantic and in the Pacific when they are hooked and/or become entangled with the mainline or buoy line. Traps, commonly used to capture crabs, lobster and reef fish result in incidental takes of loggerhead turtles when they become entangled in the trap lines and drown. The impact of this gear on loggerhead turtle populations has not been quantified.

Marine debris: Loggerhead turtles eat a wide variety of marine debris such as plastic bags, plastic and Styrofoam pieces, tar balls, balloons and plastic pellets. Effects of consumption include interference in metabolism or gut function, even at low levels of ingestion, as well as absorption of toxic byproducts. Discarded monofilament fishing line and abandoned netting can entangle turtles, causing injury and/or death.

Marine pollution: Loggerhead turtles are at risk when encountering an oil spill. Respiration, skin, blood chemistry and salt gland functions may be affected. Pesticides, heavy metals and PCB's have been detected in turtles and eggs, but the effect is unknown.

Dredging can result in habitat destruction by disrupting nesting or foraging grounds. Hopper dredges can also kill turtles caught in dragheads.

Directed, illegal harvesting of loggerhead turtles is uncommon in the U.S.

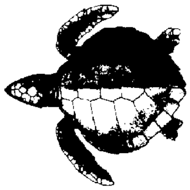
In areas where recreational boating and ship traffic is intense, propeller and collision injuries are common and likely play a significant role in hampering recovery.

Marina and dock construction result in a loss of loggerhead turtle foraging habitat. This development also leads to increased boat traffic, increasing the risk of turtle/vessel collisions.

Turtles have been caught in saltwater intake systems of coastal power plants. The mortality rate of the turtles involved is estimated at 7%.

Underwater explosions (e.g. gas and oil structure removal and testing using explosives) can kill or injure turtles, and may destroy or damage habitat.

OLIVE RIDLEY TURTLE



Common Name: OLIVE RIDLEY TURTLE
Scientific Name: *Lepidochelys olivacea*

Listing Date: 07/28/78
Species Status: Endangered
Species Trend: Decreasing
Current Estimated Population: Unknown

SPECIES POPULATION STATUS

Because of the continued existence of several large nesting aggregations or "arribadas", it is probable that the olive ridley is, in terms of absolute numbers of adult individuals in existence, the most abundant sea turtle species in the world. Nevertheless, there is evidence of downward trends at several arribada beaches. The various populations are under considerable stress, and the concentration of such a large proportion of the reproductive animals into a few arribadas may be a liability, not only in that such aggregation facilitates industrial-scale exploitation, as it has in Mexico as well as on the feeding grounds in Ecuador, but also because arribadas do not seem to be an efficient method of guaranteeing maximum reproductive efficiency. Indeed, at the relatively undisturbed arribada beach of Nancite, within Santa Rosa National Park, Costa Rica, it has been estimated that only about 5 % of eggs laid actually produce hatchlings.

Because nesting in successive years is commonplace for olive ridleys, and may well be the norm for the species, the erratic nesting population trend lines often shown by loggerhead or green turtle populations, that very rarely nest in successive years, are not shown by olive ridley populations. It is thus much easier and more justified to draw conclusions about overall ridley population trends from a few years of comprehensive nest counts than it is for those species with multi-year nesting cycles.

Olive ridley populations in the western Atlantic are very low and continue to decline, almost certainly as a result of long-standing incidental capture in shrimp trawls. Available data are too few to assess the survival status of the species in the eastern Atlantic and northern Indian Oceans; however, these populations appear to be stressed. In the eastern Pacific, data indicate that some nesting aggregations are in decline, while others appear relatively stable.

SPECIES BIOLOGY

The olive ridley is the smallest of the sea turtles and named for the olive color of its heart-shaped shell. The species may be identified by the uniquely high and variable numbers of vertebral and costal scutes. Nesting females range from 58 to 78 cm in carapace length and have a relatively large head, although smaller than that of the loggerhead turtle.

Geographic variation in olive ridleys is subtle, and no subspecies are currently recognized. However, the number of costal scutes apparently varies from one area to another, specimens with only five pairs of costals being somewhat more abundant in the eastern Pacific than elsewhere. In addition, overall carapace coloration is typically somewhat lighter in the western Atlantic than in the eastern Pacific and the shell is typically more elevated in the eastern Pacific than elsewhere.

The most dramatic aspect of the life history of the olive ridley is the habit of forming great nesting aggregations, generally known as "arribadas". Although not every adult olive ridley participates in these arribadas, the vast majority of them do. Arribadas may be precipitated by such climatic events as a strong offshore wind, or by certain phases of the moon and tide, but there is a major element of unpredictability at all arribada sites. This unpredictability, and the apparent ability of gravid females to wait for weeks while holding fully-shelled eggs, may be an important aspect of the survival advantage of arribada-formation, a phenomenon usually interpreted as one that evolved as a predator-saturation device.

Individual olive ridleys may nest one, two or three times per season, typically producing 100-110 eggs on each occasion. The internesting interval is variable, but for most localities it is approximately 14 days for solitary nesters and 28 days for arribada nesters.

The olive ridley occupies oceanic habitats and nests primarily on Pacific shores of the American tropics and in the Guianas, in moderate numbers in tropical West Africa, and in relatively small numbers elsewhere. Olive ridelys are extremely rare throughout Australia and Pacific oceanic islands.

Despite its local abundance, there are surprisingly few data relating to the feeding habits of the olive ridley. However, those reports that do exist suggest that the diet in the western Atlantic and eastern Pacific includes crabs, shrimp, rock lobsters, jellyfish, and tunicates. In some parts of the world, it has been reported that the principal food is algae.

SPECIES DISTRIBUTION

The olive ridley is found in the tropical waters of the northern Indian, eastern Pacific and eastern Atlantic Oceans. In the eastern Pacific nesting takes place from southern Sonora, Mexico, south at least to Colombia. Non-nesting individuals occasionally are found in waters of the southwestern United States. They occur abundantly in Pacific Colombia and Ecuador, but only in small numbers in Peru and Chile. In Costa Rica, a major nesting aggregation is found at Ostional, on the Nicoya Peninsula, and smaller arribadas occur at Nancite, in the Santa Rosa National Park. Smaller arribadas also occur in Nicaragua at La Flor and Chacocente and at several localities in Panama.

The olive ridley has been recorded occasionally in Galapagos waters, but it is essentially very rare throughout the islands of the Pacific. In the Indian Ocean it only achieves abundance in eastern India and Sri Lanka, although minor nesting occurs alongside the green turtles at Hawke's Bay, Pakistan, and some nesting also occurs in New Britain, Mozambique, Madagascar, peninsular Malaysia, and various other localities. Four arribada sites have been reported in the Indian State of Orissa, the most important being Gahirmatha Beach.

In the Atlantic Ocean, the olive ridley occurs widely, but probably not in great abundance, in waters of West Africa, from about Mauritania southward at least to the Congo. In the western Atlantic, nesting occurs in eastern Surinam, as well as in western French Guiana and northwestern Guyana. Non-nesting individuals occur regularly as far west as Isla Margarita and Trinidad, but they rarely penetrate any further into the Caribbean. The olive ridley has never been reported in Florida. The species also occurs in Brazil, and nests in the states of Bahia and Sergipe, but it seems to be rare.

MAJOR IMPACTS

Incidental capture in shrimp trawls is thought to be the primary cause of the progressive depletion of the olive ridley. In addition, long-line and gillnet fisheries take significant numbers of olive ridleys each year.

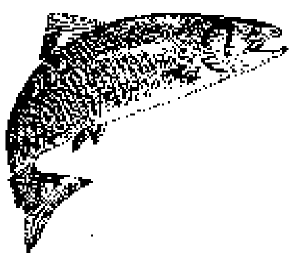
Olive ridley turtles eat a wide variety of marine debris such as plastic bags, plastic and Styrofoam pieces, tar balls, balloons and raw plastic pellets. Effects of consumption can be fatal and include interference in metabolism or gut function, even at low levels of ingestion, as well as absorption of toxic byproducts.

Marine turtles are at risk when encountering an oil spill. Respiration, skin, blood chemistry and salt gland function may be affected. Pesticides, heavy metals and PCB's have been detected in turtles and eggs, but the effect is unknown.

In areas where recreational boating and ship traffic is intense, propeller and collision injuries are common.

Fish

ATLANTIC SALMON



Common Name: ATLANTIC SALMON
Scientific Name: *Salmo salar*

Species Status: Proposed as Threatened
Species Trend: Decreasing
Current Estimated Population: Approximately 160 adult returns in 1996

SPECIES POPULATION STATUS

One distinct population segment composed of seven river populations of Atlantic salmon were proposed for listing as threatened on September 29, 1995. The seven Maine rivers are the following: Sheepscot, Ducktrap, Narraguagus, Pleasant, Machias, East Machias, and Dennys rivers.

NMFS and USFWS determined that the Atlantic salmon populations in these seven rivers are, as a group, reproductively isolated and discrete. Naturally-reproducing Atlantic salmon in U.S. rivers are substantially reproductively isolated form those in Canada. A critical factor in determining the significance of the river populations of U.S. Atlantic salmon was the continuous persistence of a substantial component of native stock reproduction. The continuous presence of U.S. Atlantic salmon in indigenous habitat provides evidence that important local adaptations have persisted. At present, differences are subtle and difficult to assess due to low abundance. Within the U.S., Atlantic salmon populations exhibit strong fidelity to natal streams. An examination of U.S. populations of Atlantic salmon provides evidence of their distinctness from stocks in Canada and northern Europe.

The original range of Atlantic salmon in the United States was from the Housatonic River in Connecticut, north to U.S. tributaries of the St. John River in New Brunswick, Canada. The historic Atlantic salmon run in the United States has been estimated to have approached 500,000 fish. The species began to disappear from U.S. rivers 150 years ago and currently, only remnant populations occur in a limited number of rivers in Maine. Throughout the past 24 years, the Dennys and Narraguagus rivers have had returns that averaged 20 percent of the escapement goal, and the Pleasant, Sheepscot, and Machias rivers have had returns that averaged between 10 and 12 percent of their escapement goals. However, recent downward trends in abundance have put most of these seven rivers at less than 10 percent of their respective escapement goals. The combination of low relative abundance and low numbers relative to spawning requirements demonstrates that the distinct population segment may warrant protection under the ESA.

SPECIES BIOLOGY

Anadromous Atlantic salmon have a relatively complex life history that extends from spawning and juvenile rearing in freshwater rivers to extensive feeding migration in the high seas. Adult Atlantic salmon ascend the rivers of New England beginning in spring, a migration that peaks in June and continues into the fall. Juvenile salmon feed and grow in the rivers from one to three years before undergoing smoltification and migrating to the ocean. Atlantic salmon of U.S. origin are highly migratory, undertaking long marine migrations between the mouths of U.S. rivers and the northwest Atlantic Ocean where they are widely distributed seasonally over much of the region. Most Atlantic salmon of U.S. origin spend two winters in the ocean before returning to freshwater for spawning. Those that return after only one year are called grilse.

SPECIES DISTRIBUTION

The populations of anadromous Atlantic salmon present in the Sheepscot, Ducktrap, Narraguagus, Pleasant, Machias, East Machias, and Dennys rivers represent the last wild remnant of U.S. Atlantic salmon. Restoration efforts for Atlantic salmon are ongoing in other watersheds where the locally-adapted stock has been extirpated.

MAJOR IMPACTS

The construction of hydropower dams with either inefficient or non-existent fishways was a major cause for the decline of U.S. Atlantic salmon. Dams adversely impact Atlantic salmon by impeding both their upstream and downstream migration, increasing predation, altering the chemistry and flow pattern of rivers, increasing water temperature, and reducing available flow downstream. Currently there are no hydropower dams on the seven rivers that have the potential to adversely impact the species. Beaver and debris dams have been documented on these river and may partially obstruct passage.

One of the predominant land uses of the central and northern coastal Maine watersheds is the growth and harvest of forest products. Forest management practices can cause numerous short- and long-term negative impacts to Atlantic salmon, including siltation, shade reduction, and increased water temperature. Another significant land use in eastern Maine watersheds is lowbush blueberry agriculture. In addition, interest in cranberry cultivation is increasing . These agricultural activities can impact Atlantic salmon through water extractions and diversions and pesticide application. Currently regulatory mechanisms are in place such that forest practices and agricultural practices are not considered a major threat to Atlantic salmon.

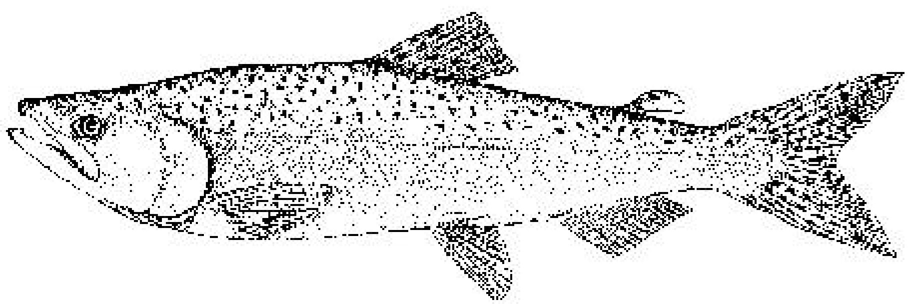
Historically, the marine exploitation of U.S. origin Atlantic salmon occurred primarily in foreign fisheries. U.S. origin Atlantic salmon have been documented in the harvests of West Greenland, New Brunswick, Nova Scotia, Newfoundland, and Labrador. The U.S. is a party to the North Atlantic Salmon Conservation Organization (NASCO) which was formed for the purpose of managing salmon through a cooperative program of conservation, restoration and enhancement of North Atlantic stocks. Since 1987 there has been a FMP in place which prohibits the possession of Atlantic salmon in the EEZ. There is currently a limited catch and release fishery for Atlantic salmon in these seven Maine rivers.

Aquaculture facilities raising Atlantic salmon in net pens are located within 20 km of the mouths of five of the rivers within the DPS. Atlantic salmon that have escaped from aquaculture pens are known to have entered some of these rivers. The escape of fish from Atlantic salmon aquaculture operations could pose a threat to the genetic integrity of Atlantic salmon within the DPS. In addition, concentrations of aquaculture salmon could increase the vulnerability of wild stocks to disease.

Scientific evidence suggests that low natural survival in the marine environment is a major factor contributing to the decline of Atlantic salmon throughout North America. It appears that survival of the North American stock complex of Atlantic salmon is at least partly explained by sea surface water temperature, during the period when Atlantic salmon are concentrated in winter months in habitat at the mouth of the Labrador Sea and east of Greenland.
NMFS and USFWS outlined the above factors for decline in a Status Review prepared to support the proposed rule. The proposed rule contained a special provision pursuant to section 4(d) of the ESA to invite the State of Maine to prepare a Conservation Plan for Atlantic salmon and

therefore remain as the lead manager of the species. In order to draft that Conservation Plan, the Governor of Maine convened a Task Force composed of state agency representatives, private industry, conservation groups, and concerned stakeholders. That Conservation Plan, which is currently in draft form, contains a number of actions and measures to reduce any potential impact to Atlantic salmon from recreational fishing, agriculture, aquaculture, and forestry.

CHINOOK SALMON (SACRAMENTO RIVER WINTER-RUN)



Common Name: CHINOOK SALMON
Scientific Name: *Oncorhynchus tshawytscha*

Listing Date: 11/30/90
Species Status: Endangered
Species Trend: Unknown
Current Estimated Population: Unknown
Critical Habitat: Designated

SPECIES POPULATION STATUS

Winter-run chinook salmon in the Sacramento River, California, are unique and distinguishable from the other three runs of chinook salmon in the river based on the timing of their upstream migration and spawning season. For the most part, the winter-run chinook salmon population is comprised of three year-classes that return to spawn as 3-year-old fish. NMFS determined that the winter-run chinook salmon should be listed as threatened under the ESA because the run has declined more than 97% over a period of less than 20 years. From 1967 through 1969, average run size was about 84,000 fish; in 1982 through 1984, the average was about 2,000 fish. Salmon returns to the river were 550 In 1989, around 450 in 1990, 191 in 1991, 1180 in 1992, 341 in 1993, 189 in 1994, and 1,361 in 1995.

The winter-run chinook has declined in the Sacramento River primarily due to water management projects which have modified the river and taken away spawning habitat in the upper Sacramento

River. Water deliveries for agriculture in early summer deplete the storage of cold water in Shasta Reservoir and raise the temperature to a level that is lethal to salmon eggs. Winter-run chinook spawn from mid April to mid August with a peak in May and June. The eggs incubate and hatch in about 2 months. If the water temperature is too high (especially during the peak incubation and hatching months of July through September), the eggs do not hatch. Juveniles migrate to the sea from August into the spring months. Water diversions and other water management actions such as inadequate fish screens at diversion facilities can be lethal to migrating juveniles. Adult fish begin returning from the sea during the winter. While at sea, they may be taken incidentally to commercial and recreational fishing for other species of salmon.

On January 4, 1994, NMFS issued a determination that the Sacramento River winter-run chinook salmon should be reclassified from threatened to endangered. This determination was based on the continued decline and increased variability of run sizes since its first listing as threatened in 1989, the expectation of weak returns in certain years as the result of two small year classes (1993 and 1994) and continuing threats to the population.

SPECIES BIOLOGY

The chinook salmon is noted for the black spotting on back, dorsal fin, and both lobes of caudal fin, black pigment along the bases of the teeth and loose conical teeth in mature individuals. Salmon over 14 kg are likely to be chinooks.

The Sacramento River winter-run chinook salmon spawns in the upper Sacramento River primarily between Red Bluff Diversion Dam and Keswick Dam from late April to mid-August. The juveniles emerge in late June through September, beginning their downstream migration within several weeks of hatching.

SPECIES DISTRIBUTION

The distribution of Sacramento River winter-run chinook salmon has been dramatically reduced to a portion of its former range. The construction of Shasta and Keswick Dams blocked access to all of the winter-run's historic spawning grounds in the McCloud, Pit and Little Sacramento rivers. Current spawning takes place primarily between Red Bluff Diversion Dam and Keswick Dam. During migration, Sacramento River winter chinook migrate from the Sacramento-San Joaquin Delta up to the Upper Sacramento River.

Critical Habitat

Critical habitat for Sacramento River winter-run chinook salmon includes: The Sacramento River from Keswick Dam, Shasta County (River Mile 302) to Chipps Island (River Mile 0) at the westward margin of the Sacramento-San Joaquin Delta; all waters from Chipps Island westward to Carquinez Bridge, including Honker Bay, Grizzly Bay, Suisun Bay, and Carquinez Strait; all waters of San Pablo Bay westward of the Carquinez Bridge; and all waters of San Francisco Bay (north of the San Francisco/Oakland Bay Bridge) from San Pablo to the Golden Gate Bridge.

MAJOR IMPACTS

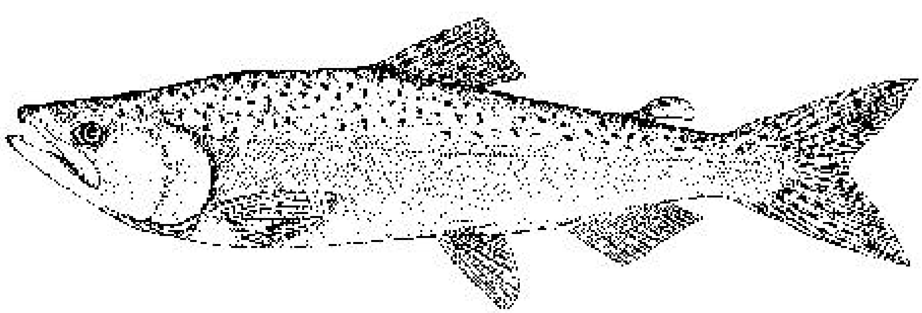
Water development has blocked and inundated habitat; increased delay of juvenile migration through the Sacramento River; and increased delay of adults on their way to spawning grounds. Water withdrawal and storage, irrigation diversions, siltation and pollution from sewage, farming, grazing, logging, and mining have also degraded the Sacramento River salmon habitat.

Although winter-run chinook are subjected to a lower harvest rate than other Sacramento River chinook salmon, due to the timing of their run compared to the timing of the chinook salmon fishery, over-utilization continues to threaten this species.

The impacts of numerous bacterial, protozoan, viral, and parasitic organisms on Sacramento River winter-run chinook salmon are largely unknown. Predators include squawfish and striped bass. The extent to which predation is a factor causing the decline of the winter-run chinook salmon is unknown.

There are numerous unscreened or inadequately screened diversions on the Sacramento River. These result in an unknown loss of outmigrating juvenile salmon as a result of entrainment in unscreened diversions or impingement on inadequately designed diversions. NMFS has initiated a rule making process to require screens on all diversions.

CHINOOK SALMON (SNAKE RIVER FALL)



Common Name: CHINOOK SALMON
Scientific Name: *Oncorhynchus tshawytscha*

Listing Date: 04/22/92
Species Status: Threatened
Species Trend: Unknown
Current Estimated Population: See Species Population Status
Critical Habitat: Designated

SPECIES POPULATION STATUS

Returns of adult fall chinook salmon to the Snake River have declined to very low numbers in recent years. Yearly adult counts at the uppermost Snake River main-stem project affording fish passage averaged 12,720 from 1964 through 1968, 3,416 from 1969 through 1974, and 610 from 1975 through 1980. Estimates of wild Snake River fall chinook salmon escapement to Lower Granite Dam have varied as follows: 428 adults in 1983, 295 in 1989, 78 in 1990, 318 in 1991, 533 in 1992, 742 in 1993, 405 in 1994, and 350 in 1995. The number of fall chinook salmon redds observed over the remaining 102 miles (165 km) of the Snake River available to fall chinook salmon for the period 1987 through 1995 were 66, 57, 58, 37, 41, 47, 60, 53, and 41 respectively. However, methods of counting after 1990 differed from those before 1990, so numbers are not entirely comparable. Overall, they show a low, relatively stable number of naturally spawning fish.

SPECIES BIOLOGY

The chinook salmon is noted for the black spotting on its back, dorsal fin, and both caudal fin lobes, black pigment along the bases of the teeth and loose conical teeth in mature individuals. Salmon over 14 kg are likely to be chinook.
The Snake River fall chinook salmon spawns in October and November in the mainstem Snake River from the upper limit of the Lower Granite Dam Reservoir to Hells Canyon Dam (about 165 km) and the lower reaches of the Imnaha, Grande Ronde, Clearwater, and Tucannon Rivers or the lower parts of tributaries in October and November. Research in progress has identified some chinook redds below Lower Granite Dam that may be Snake River fall chinook. The juveniles emerge in March and April, beginning their downstream migration within several weeks of emergence. They move seaward slowly as subyearlings. Adults return from the ocean to the Snake River at ages 2-5, with age 4 the most common age at spawning.

SPECIES DISTRIBUTION

The distribution of Snake River fall chinook salmon has been dramatically reduced to a portion of its former range. The construction of Brownlee (1958), Oxbow (1961), and Hells Canyon (1967) Dams inundated spawning habitat and prevented access to the primary production areas of Snake River fall chinook salmon.

Critical Habitat

Critical habitat for Snake River fall chinook salmon consists of river reaches of the Columbia, Snake, and Salmon Rivers, and all tributaries of the Snake and Salmon Rivers presently or historically accessible to Snake River fall chinook salmon (except reaches above impassable natural falls, and Dworshak and Hells Canyon Dams).

MAJOR IMPACTS

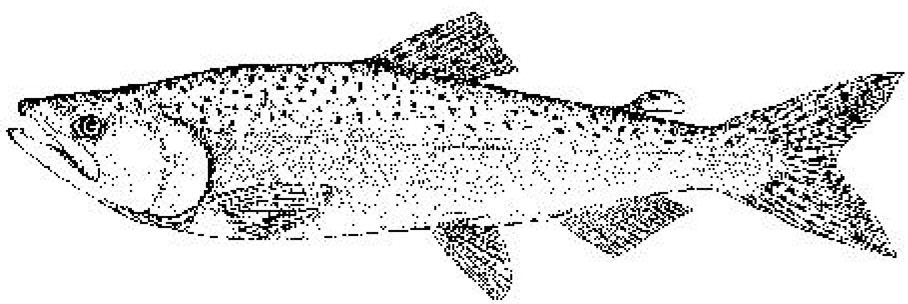
Hydropower development has resulted in the following: blockage and inundation of habitat; turbine-related mortality of juvenile fish; delay of juvenile migration through the Snake and Columbia Rivers; predation on juvenile salmon in reservoirs; and increased delay of adults on their way to spawning grounds. Water withdrawal and storage, irrigation diversions, siltation and pollution from sewage, farming, grazing, logging, and mining have also degraded the Snake River salmon habitat.

Current ocean and river harvest levels have been reduced in the commercial, recreational, and tribal fisheries due to low escapements and efforts to protect these runs.

The impacts of potential bacterial, protozoan, viral, and parasitic organisms on Snake River fall chinook salmon are largely unknown. Predators include the northern squawfish and marine mammals such as harbor seals and California sea lions. The extent to which predation is a factor causing the decline of fall chinook salmon is unknown.

Drought and poor ocean survival are the principal natural factors that may have contributed to reduced fall chinook salmon production. The recent straying of fall chinook salmon from other areas into the Snake River threatens the genetic integrity of wild Snake River fall chinook salmon.

CHINOOK SALMON (SNAKE RIVER SPRING/SUMMER)



Common Name: CHINOOK SALMON
Scientific Name: *Oncorhynchus tshawytscha*

Listing Date: 04/22/92
Species Status: Threatened
Species Trend: Unknown
Current Estimated Population: See Species Population Status
Critical Habitat: Designated

SPECIES POPULATION STATUS

Production in the Snake River probably exceeded 1.5 million spring/summer chinook salmon for some years during the late 1800's. By the early-1900's, production severely declined. An estimate of the average number of adults returning from 1950 to 1960 is 125,000. Using an expansion factor method (adult counts vs. number of redds), the estimated number of adult wild fish at Lower Granite Dam averaged 8,731 from 1980 to 1990 (low of 5,379 in 1989, high of 11,269 in 1981). Estimated naturally-produced fish returns were 5,020 in 1991, 12,433 in 1992, 9,967 in 1993, 1,721 in 1994, 1,116 in 1995, and 3,487 in 1996. Adult returns in 1994 and 1995 were record lows, as a result of drought and poor ocean conditions related to the 1992-1993 El Niño. Returns are expected to have improved somewhat in 1996 and improve substantially in 1997 and 1998.

SPECIES BIOLOGY

The chinook salmon is noted for the black spotting on its back, dorsal fin, and both caudal fin lobes, black pigment along the bases of the teeth and loose conical teeth in mature individuals. Salmon over 14 kg are likely to be chinook.

Snake River spring/summer chinook use small, higher elevation streams for spawning and early juvenile rearing. They migrate to sea as yearling smolts (stream-type). Detailed life history data are limited for wild populations. Age at spawning and associated fecundity differ between the adults returning to the Middle Fork and main Salmon Rivers and all other areas for which information is available. In these two areas, 3-ocean adults (salmon that spend three years maturing in the ocean) with higher fecundity predominate, whereas 2-ocean adults (salmon that spend two years maturing in the ocean) with lower fecundity predominate in other areas. Adult spring chinook enter the Columbia River in spring, as early as February, reach the Snake River by late April, arrive in natal tributaries in May and June, hold in deep pools, and spawn in late August. Adult summer chinook reach the Snake River in June and July, arrive in natal tributaries by early July, and spawn in early September.

SPECIES DISTRIBUTION

Snake River spring/summer chinook spawn in the many streams associated with the large, complex Clearwater, Grande Ronde, and Salmon Rivers and in the mainstem of the Tucannon and Imnaha Rivers, as well as in Asotin, Granite, and Sheep Creeks (between Lower Granite and Hells Canyon Dams).

Critical Habitat

Critical habitat for Snake River spring/summer chinook salmon includes river reaches of the Columbia, Snake, and Salmon Rivers, and all tributaries of the Snake and Salmon rivers (except the Clearwater River) presently or historically accessible to Snake River spring/summer chinook salmon (except reaches above natural falls and Hells Canyon Dam).

MAJOR IMPACTS

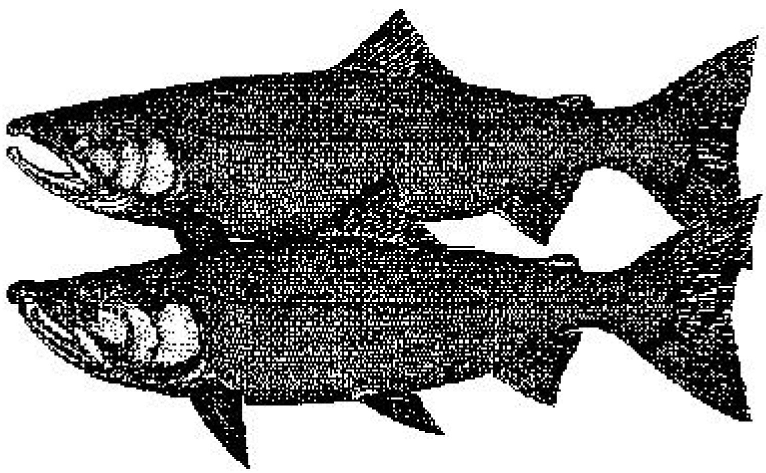
Overfishing has contributed significantly to the population decline of chinook salmon.

Hydropower development has resulted in the following: blockage and inundation of habitat; turbine-related mortality of juvenile fish; increased delay of juvenile migration through the Snake and Columbia rivers; increased predation on juvenile salmon in reservoirs; and increased delay of adults migrating to spawning grounds. Water withdrawal and storage, irrigation diversions, siltation and pollution from sewage, farming, grazing, logging, and mining have also degraded the Snake River spring/summer chinook salmon habitat.

Snake River spring/summer chinook are rarely taken in ocean fisheries. Small numbers of spring/summer chinook are incidentally harvested in Columbia River Indian and non-Indian fisheries directed at other species. Fisheries for Snake River spring/summer chinook have been closed for more than 20 years.

Hatchery programs may have contributed to the further decline of wild Snake River spring/summer chinook salmon through the taking of fish for broodstock purposes, behavioral and genetic interactions between wild and hatchery reared salmon, competition, predation and the spread of disease.

COHO SALMON



Common Name: COHO SALMON
Scientific Name: *Oncorhynchus kisutch*

Listing Date: 10/31/96
Species Status: Threatened
Species Trend: Unknown
Current Estimated Population: <6,000

SPECIES POPULATION STATUS

In the 1940s, estimated abundance of coho salmon in the Central California Coast ESU ranged from 50,000 to 125,000 natural spawning adults. Today, it is estimated that there are probably less than 6,000 naturally-reproducing coho salmon, and the vast majority of these fish are considered to be of non-native origin (either hatchery fish or from streams stocked with hatchery fish).

Two additional ESUs of coho are were proposed along with Central California coast coho on July 25, 1995: Northern California/Southern Oregon, and Oregon Coast. A determination on these ESUs is expected in early 1997.

SPECIES BIOLOGY

The coho salmon (Oncorhynchus kisutch) is an anadromous salmonid species that was historically distributed throughout the North Pacific Ocean from central California to Point Hope, Alaska, through the Aleutian Islands, and from the Anadyr River, Russia, south to Hokkaido, Japan. Historically, this species probably inhabited most coastal streams in Washington, Oregon, and northern and central California. Some populations, now considered extinct, are believed to have migrated hundreds of miles inland to spawn in tributaries of the upper Columbia River in Washington, and the Snake River in Idaho.

In contrast to the life history patterns of other anadromous salmonids, coho salmon on the west coast of North America generally exhibit a relatively simple 3-year life cycle. Adults typically begin their freshwater spawning migration in the late summer and fall, spawn by mid-winter, and then die. Run and spawn timing of adult coho salmon vary between and within coastal and Columbia River Basin populations. Depending on river temperatures, eggs incubate in "redds" (gravel nests excavated by spawning females) for 1.5 to 4 months before hatching as "alevins" (a larval life stage dependent on food stored in a yolk sac). Following yolk sac absorption, alevins emerge from the gravel as young juveniles, or "fry," and begin actively feeding. Juveniles rear in fresh water for up to 15 months, then migrate to the ocean as "smolts" in the spring. Coho salmon typically spend two growing seasons in the ocean before returning to their natal streams to spawn as 3 year-olds. Some precocious males, called "jacks," return to spawn after only 6 months at sea.

SPECIES DISTRIBUTION

During this century, indigenous, naturally-reproducing populations of coho salmon are believed to have been eliminated in nearly all Columbia River tributaries and to be in decline in numerous coastal streams in Washington, Oregon, and California. Coho in at least 33 stream/river systems have been identified by agencies and conservation groups as being at moderate or high risk of extinction. In general, there is a geographic trend in the status of west coast coho salmon stocks, with the southernmost and easternmost stocks in the worst condition.

MAJOR IMPACTS

Logging, agricultural and mining activities, urbanization, stream channelization, dams, wetland loss, water withdrawals, and unscreened diversions for irrigation have contributed to the decline of the Central California coast coho ESU.

Long-term trends in rainfall and marine productivity associated with atmospheric conditions in the North Pacific Ocean may have a major influence on coho salmon production as well. Much of the Pacific coast has experienced drought conditions during the past 8 years, a situation which has undoubtedly contributed to the decline of many salmonid populations. El Niño ocean conditions cause decreases in primary and secondary productivity and changes in prey and predator species distributions.

Potential problems associated with non-native coho salmon stocks that have been introduced as broodstock in hatcheries and widely transplanted in many coastal rivers and streams in central California include genetic impacts on indigenous, naturally-reproducing populations, disease transmission, predation of wild fish, difficulty in determining wild stock status due to incomplete marking of hatchery fish, depletion of wild stock to increase brood stock, and replacement rather than supplementation of wild stocks through competition and continued annual introduction of hatchery fish.

Marine harvest of coho salmon occurs primarily in nearshore waters off British Columbia, Washington, Oregon, and California. Recreational fishing for coho salmon is pursued in numerous streams throughout the central California coast when adults return on their fall spawning migration. The confounding effects of habitat deterioration, drought, and poor ocean conditions make it difficult to assess the degree to which recreational and commercial harvest have contributed to the overall decline of coho salmon in West Coast rivers.

CUTTHROAT TROUT (UMPQUA RIVER)

Common Name: CUTTHROAT TROUT
Scientific Name: *Oncorhynchus clarki*

Listing Date: 08/09/96
Species Status: Endangered
Species Trend: Unknown
Current Estimated Population: Unknown

SPECIES POPULATION STATUS

Umpqua River cutthroat trout was proposed for listing on July 8, 1994.

SPECIES BIOLOGY

Coastal cutthroat trout differ from all other trout by their profusion of small to medium-size spots of irregular shape. In addition, they do not develop the brilliant colors associated with inland cutthroat trout (a separate subspecies). In the sea-run (anadromous) form of the coastal cutthroat trout, spots and colors are further obscured by the silvery skin deposit common to anadromous salmonids. Non-anadromous (resident) fish tend to be darker, with a "coppery or brassy" sheen.

The life history of this subspecies is probably the most complex and flexible of any Pacific salmonid. Unlike other anadromous salmonids, sea-run forms of the coastal cutthroat trout do not overwinter in the ocean and only rarely make long extended migrations across large bodies of water. They migrate in the nearshore marine habitat and usually remain within 10 km of land. While most anadromous cutthroat trout enter seawater as 2- or 3- year olds, some may remain in fresh water up to 5 years before entering the sea. Other cutthroat trout may never outmigrate at all, but remain as residents of small headwater tributaries. Still other cutthroat trout may migrate only into rivers and lakes, even when they have access to the ocean. In the Umpqua River, anadromous, resident, and potamodromous (river-migrating) life-history forms have been reported. Details of the coastal cutthroat trout life history and ecology, including aspects particular to the various life forms, can be found in published reviews.

SPECIES DISTRIBUTION

The Umpqua River cutthroat trout is a "distinct population segment" under the ESA (hereinafter referred to as an Evolutionarily Significant Unit or ESU (56 FR 58612; November 20, 1991)) of the coastal cutthroat trout (Oncorhynchus clarki clarki). The coastal cutthroat trout subspecies is native to western North America and is found in the coastal temperate rainforests from southeast Alaska to northern California. The Umpqua River cutthroat trout ESU inhabits a large coastal basin (drainage area over 12,200 square km) in the southwestern Oregon coast. Spawning sites are located in the North and South Umpqua Rivers and their tributaries, of which Smith River and Calapooya, Elk, and Scholfield Creeks are major tributaries. The estuary of the Umpqua River is one of the largest on the Oregon coast.

MAJOR IMPACTS

In general, land use practices have reduced salmonid production in Oregon by decreasing habitat diversity and complexity, and accelerating the frequency and magnitude of natural events such as flooding and drought. In addition, dredging, filling, and diking of estuarine areas for agricultural, commercial, or municipal uses have resulted in the loss of many estuarine habitats.

Drought is the principal natural condition that may have contributed to reduced Umpqua River cutthroat trout production. Drought conditions have prevailed in Oregon for the 7 years prior to 1996, leading to decreased streamflows and increased water temperatures during the summer months.

Cutthroat trout are not harvested commercially, and scientific and educational programs have probably had little or no impact on Umpqua River cutthroat trout populations. However, the cutthroat trout is a popular gamefish throughout the Pacific Northwest and available information indicates that recreational fishing has likely contributed to the general decline in Umpqua River cutthroat trout populations. Given the susceptibility of cutthroat trout to angling and the potential impacts of recreational fishing to native fish stocks, it is likely that a long standing fishery in the lower mainstem Umpqua River aimed at hatchery-reared cutthroat trout also promoted an incidental harvest of native Umpqua River cutthroat trout. In response to NMFS' concern regarding harvest mortalities, ODFW has closed the Umpqua River to cutthroat trout fishing effective January 1, 1995. However, undocumented illegal harvest is believed to occur on Umpqua River cutthroat trout. While the severity of this source of mortality is unclear, it may pose a significant threat to depressed populations of cutthroat trout in the Umpqua River.

The significant decline in numbers of cutthroat trout passing Winchester Dam suggests that management plans and practices followed by various state and Federal agencies have not provided adequate protection for this species.

GULF STURGEON

Common Name: GULF STURGEON
Scientific Name: *Acipenser oxyrynchus*

Listing Date: 09/30/91
Species Status: Threatened
Species Trend: Unknown
Current Estimated Population: Unknown

SPECIES BIOLOGY

The Gulf sturgeon, also known as the Gulf of Mexico sturgeon, is a subspecies of the Atlantic sturgeon. It is a large fish with an extended snout, vertical mouth, chin barbels, and with the upper lobe of the tail longer than the lower. Adults are 180 to 240 cm in length, with adult females larger than adult males. The skin is scaleless, brown dorsally and pale ventrally and imbedded with 5 rows of bony plates.

Adult fish are bottom feeders, eating primarily invertebrates, including brachiopods, insect larvae, mollusks, worms and crustaceans. Gulf sturgeon are anadromous, with reproduction occurring in fresh water. Most adult feeding takes place in the Gulf of Mexico and its estuaries.

The fish return to breed in the river system in which they hatched. Spawning is believed to occur in areas of deep water with clean (rock, gravel or sand) bottoms. The eggs are sticky and adhere in clumps or strings to snags, outcroppings, or other clean surfaces. Sexual maturity is reached between the ages of 8 and 12 years for females and 7 and 10 years for males.

SPECIES DISTRIBUTION

Historically, the Gulf sturgeon occurred from the Mississippi River to Tampa Bay, Florida. It still occurs, at least occasionally, throughout this range, but in greatly reduced numbers. The fish is essentially confined to the Gulf of Mexico, possibly because this portion of the Gulf has predominantly hard bottoms that are better suited to the Gulf sturgeon's feeding habitat. Breeding takes place in the Appalachicola and Suwannee River systems, with adults returning to the same river systems in which they hatched in order to breed.

MAJOR IMPACTS

The Gulf sturgeon formerly ranged from the Mississippi River eastward to the Tampa Bay area on the west coast of Florida. Three major rivers (the Pearl in Mississippi, the Alabama in Alabama, and the Appalachicola in Florida) within the range of the Gulf sturgeon have been dammed, preventing use of upstream areas for spawning. The Gulf sturgeon is apparently unable to pass through dam systems.

In addition to the structures preventing Gulf sturgeon from reaching spawning areas, dredging, desnagging, and spoil deposition carried out in connection with channel improvement and maintenance represent a threat to the Gulf sturgeon. Although precise spawning areas are not known, indications are that deep holes and rock surfaces are important for spawning. Modification of such features, especially in rivers in which upstream migration is limited by dams, could further jeopardize the reduced stocks of the Gulf sturgeon.

SHORTNOSE STURGEON

Common Name: SHORTNOSE STURGEON
Scientific Name: *Acipenser brevirostrum*

Listing Date: 03/11/67
Species Status: Endangered
Species Trend: Unknown
Current Estimated Population: Unknown

SPECIES POPULATION STATUS

The shortnose sturgeon was listed as endangered throughout its range on March 11, 1967. It is an anadromous fish that spawns in the coastal rivers along the east coast of North America from the St. John River in Canada to the St. Johns River in Florida. It prefers the nearshore marine, estuarine and riverine habitat of large river systems. The extent of marine migrations or between-population straying rates are not well-known for shortnose sturgeon.

No estimate of the historical population size of shortnose sturgeon is available. While the shortnose sturgeon was rarely the target of a commercial fishery, it often was taken incidentally in the commercial fishery for Atlantic sturgeon. In the 1950s, sturgeon fisheries declined on the east coast and with them the documentation of shortnose sturgeon populations that was provided through the analysis of catch data. The Fish and Wildlife Service (FWS) made a determination that shortnose sturgeon were endangered over their range and perhaps eliminated from many river systems altogether. The FWS attributed the decline of both northern and southern populations to pollution and overfishing, both directly and incidentally in shad gillnet fisheries.

Placing shortnose sturgeon on the endangered species list led to numerous investigations that expanded our knowledge of the species' life history, distribution, and abundance. By the mid-1980s, NMFS had enough information on population levels in one mid-Atlantic and four northern rivers to consider changes in their listing status. Although no action was taken as a result of the 1987 status review, NMFS did recommend listing the species according to river-specific populations rather than as a single species. NMFS recently received a petition to delist the shortnose sturgeon population in the Kennebec River. Following review of the petition and a status review of the species in that river system, NMFS concluded that the was not warranted at that time. Available population size data, as compared to interim listing criteria, did not support a delisting. Further, information on population dynamics (e.g., natality, natural mortality, age or size structure) that could be used to assess population growth and recruitment were lacking. Threats to the habitat occupied by Androscoggin and Kennebec Rivers shortnose sturgeon persist and have the potential to cause substantial declines in abundance.

As part of the response to this petition, the NMFS also conducted a status review of shortnose sturgeon in the Androscoggin and Kennebec Rivers to determine whether populations in the two rivers were distinct population segments. Although available data indicate that the populations are likely to be reproductively isolated, there was insufficient data to justify separate distinct population segment listings at that time. Therefore, until data supports splitting the population segment, NMFS considers shortnose sturgeon within the Androscoggin River and Kennebec Rivers to belong to a single distinct population segment composed of at least two breeding populations. Justification for this determination is based on the 1987 shortnose sturgeon status review and the recent joint USFWS/NMFS policy on distinct population segments (February 7, 1996).

SPECIES BIOLOGY

The sturgeon family is among the most primitive of the bony fishes. The shortnose sturgeon shares the same general external morphology of all sturgeon. Its elongated fusiform body is moderately depressed, and its protractable subterminal mouth with barbels is well suited for bottom feeding and a generally benthic existence. The body surface contains five rows of bony plates or scutes. Shortnose sturgeon are relatively large, long-lived fish that utilize estuarine habitats for feeding and freshwater habitats for spawning. The species is encountered less frequently in marine habitats than the closely-related Atlantic sturgeon, suggesting that little population mixing occurs.

The shortnose sturgeon is the smallest of the three sturgeon species that occur in eastern North America, having a maximum known total length of 143 cm and weight of 23 kg. Growth rate and maximum size vary with latitude, with the fastest growth occurring among southern populations. Maximum known age is 67 years for females, but males seldom exceed 30 years of age. Sex ratio among young adults is 1:1 but changes to a predominance of females (4:1) for fish larger than 90 cm fork length.

Males and females mature at the same length (45 to 55 cm fork length) throughout their range. However, age of maturation varies from north to south due to a slower growth rate in the north. Males may mature at 2 to 3 years of age in Georgia, at age 3 to 5 from South Carolina to New York, and at age 10 to 11 in the St. John River, Canada. Females exhibit a similar trend and mature at age 6 or younger in Georgia, at age 6 to 7 from South Carolina to New York, and at age 13 in the St. John River. Age of first spawning in males occurs 1 to 2 years after maturity, but among females is delayed for up to 5 years. Approximate age of a female at first spawning is 15 years in the St. John River, 11 years in the Hudson and Delaware Rivers, 7 to 14 years in the South Carolina rivers, and 6 years or less in the Altamaha River, Georgia. Generally, females spawn every three years, although males may spawn every year.

Shortnose sturgeon are benthic feeders. Juveniles are believed to feed on benthic insects and crustaceans. Mollusks and large crustaceans are the primary food of adult shortnose sturgeon.

SPECIES DISTRIBUTION

The shortnose sturgeon is anadromous, living mainly in the slower moving riverine waters or nearshore marine waters, and migrating periodically into faster moving fresh water areas to spawn. One partially landlocked population is known in the Holyoke Pool, Connecticut River, and another landlocked group may exist in Lake Marion on the Santee River in South Carolina.

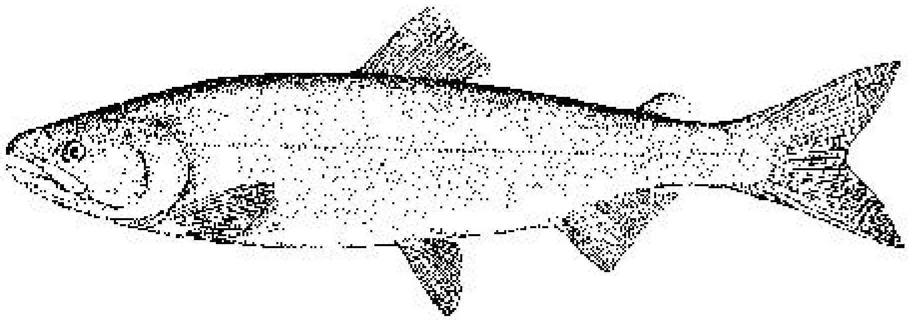
Shortnose sturgeon occur in most major river systems along the eastern seaboard of the United States. In the southern portion of the range, they are found in the St. Johns River in Florida; the Altamaha, Ogeechee, and Savannah Rivers in Georgia; and, in South Carolina, the river systems that empty into Winyah Bay and the Santee/Cooper River complex that forms Lake Marion. Shortnose sturgeon have been documented in the Cape Fear River, North Carolina. In the northern portion of the range, shortnose sturgeon are found in the Delaware River from Philadelphia, Pennsylvania to Trenton, New Jersey; the Hudson River in New York state; the Connecticut River and the lower Merrimack River in Massachusetts; the Kennebec River in Maine; and the St. John River in New Brunswick, Canada. Shortnose sturgeon are collected occasionally in the upper portions of the Chesapeake Bay. It is unclear whether these fish belong to a Chesapeake Bay population or are strays from the Delaware River. The distribution and abundance of shortnose sturgeon in the Chesapeake is not well-known.

MAJOR IMPACTS

Construction of dams and pollution of many large northeastern river systems during the period of industrial growth in the late 1800's and early 1900's may have resulted in substantial loss of suitable habitat. In addition, habitat alterations from discharges, dredging or disposal of material into rivers, or related development activities involving estuarine/riverine mudflats and marshes, remain constant threats.

Commercial exploitation of shortnose sturgeon occurred throughout its range starting in colonial times and continued periodically into the 1950's. The bycatch of shortnose sturgeon in Southeast coastal shad fisheries may be a continuing substantial source of mortality for southern populations.

SOCKEYE SALMON (SNAKE RIVER)



Common Name: SOCKEYE SALMON
Scientific Name: *Oncorhynchus nerka*

Listing Date: 11/20/91
Species Status: Endangered
Species Trend: Unknown
Current Estimated Population: <10 ADULTS/YEAR
Critical Habitat: Designated

SPECIES POPULATION STATUS

Adult returns to Redfish Lake were 1, 0, 4, 1, 8, 1, 0, and 1 in 1989, 1990, 1991, 1992, 1993, 1994, 1995, and 1996 respectively. NMFS has determined that a second population, residual sockeye salmon, resides in Redfish Lake and is part of the Snake River sockeye salmon population listed as endangered. This residual population shares the same spatial and temporal spawning distribution, and is genetically very closely linked to the anadromous sockeye gene pool.

SPECIES BIOLOGY

The sockeye salmon (anadromous) and kokanee (non-anadromous) are distinguished from other Pacific salmon by the 28 to 40 long, slender, closely-spaced gill rakers on the first arch, by the few pyloric caeca, and the fine black speckling on the back. Taxonomically, the kokanee and sockeye salmon do not differ. Mature kokanee are generally smaller than sockeye salmon; the usual length is 20 to 23 cm, although individuals as large as 53 cm have been reported for some productive lakes. A typical 4-year-old Columbia River sockeye is 51 cm long and weighs 1.7 kg. Fork length of most sockeye salmon measured at Redfish Lake Creek Weir ranged from 48 to 64 cm.

Adult sockeye arrive at Redfish Lake, Idaho in July and August, and they spawn on the beach areas during October and November, and then die. Fecundity in sockeye depends upon the size of the female, ranging from about 1,500 to 4,500 eggs per female. Sockeye fry emerge from the gravel in early spring (April and May). Most sockeye in Redfish Lake remain in the lake for one or two years, migrate out to sea, and reside in the ocean for two to three years before returning to spawn.

SPECIES DISTRIBUTION

Sockeye salmon are found along the North American coastline from the Seschutes River in Oregon to the Yukon in Alaska but occur in considerable numbers only from the Columbia River north to Bristol Bay in Alaska. Along the coast of the eastern Pacific they are reported from Cape Chaplina in the northern part of the Bering Sea southward around the Kamchatka peninsula to the northern shore of the Okhotsk Sea. The only remaining population of Snake River sockeye salmon spawns in Redfish Lake, Idaho, which is located near the head of the middle fork of the Salmon River. Adults of this population travel a greater distance from the sea (almost 900 miles) and to a higher elevation (6,500 feet) than adults of any other population.

Critical Habitat

Critical habitat for Snake River sockeye salmon consists of river reaches of the Columbia, Snake, and Salmon Rivers; Alturas Lake Creek and Valley Creek; and Stanley, Redfish, Yellow Belly, Pettit, and Alturas Lakes, including their inlet and outlet creeks.

MAJOR IMPACTS

Hydropower development has resulted in blockage of habitat, turbine-related mortality of juvenile fish, delay of juvenile migration through the Snake and Columbia rivers, increased predation on juvenile salmon due to residualism in reservoirs and increased predator populations due to ideal foraging areas created by impoundments, and delay of adults on their way to spawning grounds.

Water withdrawal and storage and irrigation diversions and blockage of habitat for purposes such as agriculture have also contributed to the destruction of Snake River sockeye salmon habitat.

Available information indicates that commercial fisheries in the lower Columbia River and harvest on the spawning grounds were primary factors in the decline of Snake River sockeye salmon. Commercial fisheries for sockeye in the Columbia River have been closed since 1988, and recreational harvest of sockeye salmon in the Columbia River is negligible. There is no information available to indicate that ocean harvest of Columbia River (including Snake River) sockeye salmon is significant.

The effect of potential bacterial, protozoan, viral, and parasitic organisms on Snake River sockeye salmon is not documented. Predators include northern squawfish, birds, and marine mammals such as harbor seals and California sea lions. The extent to which predation is a factor causing the decline of Snake River sockeye salmon is unknown.

Drought is the principal natural condition that may have contributed to reduced Snake River sockeye salmon production. There is no direct evidence that artificially propagated fish have compromised the genetic integrity of Stanley Basin sockeye salmon. Artificial production of other species may have an adverse impact on Snake River sockeye salmon as they jointly migrate through the rivers, estuary and ocean, and may compete with sockeye salmon for food.

STEELHEAD

Common Name: STEELHEAD
Scientific Name: *Oncorhynchus mykiss*

Species Status: Proposed as Threatened/Endangered
Species Trend: Unknown
Current Estimated Population: Unknown

SPECIES POPULATION STATUS

10 ESUs of steelhead were proposed on August 9, 1996. Proposed as threatened were: Lower Columbia River, Oregon Coast, Klamath Mountains Province, Northern California, and Snake River Basin ESUs. Proposed as endangered were: Central California Coast, South-Central California Coast, Southern California, Central Valley, and Upper Columbia River ESUs. A final determination on all will be made in late summer, 1997.

NMFS considered available information on the geographic extent and reproductive strategies (e.g., run timing) of the ESU containing the Illinois River winter steelhead. In general, steelhead are believed to have strong tendencies to home to their natal streams, but there are few studies directly relevant to the area under consideration. There is evidence that some adult steelhead move between the Klamath, Rogue, and Smith Rivers. However, it is not clear whether this wandering results in spawning within non-natal streams.

Available genetic information indicates that there is a genetic discontinuity (or at least a transition) between steelhead from coastal streams in southern and northern Oregon. Although the discontinuity/transition appears to be in the vicinity of Cape Blanco, the resolution of genetic sampling does not allow for precise definition of this boundary.

Several genetic samples from northern California steelhead were considered during this status review. Samples from the Klamath River and the Trinity River (a tributary to the Klamath River) do not differ substantially from steelhead populations to the north. However, there are large genetic differences between samples from the Klamath River Basin and those taken from rivers to the south. The differences between steelhead from these two areas are stronger than those between southern and northern Oregon steelhead populations.

Within the area bounded by Cape Blanco and the Klamath River Basin, there is evidence of genetic heterogeneity, suggesting a reasonable degree of reproductive isolation between individual populations. However, the genetic structuring has no clear geographic pattern that would allow identification of major subgroups within this area.

In addition to summer- and winter-run steelhead, there are populations sometimes referred to as fall-run steelhead in the Klamath River Basin. Disagreement exists as to whether these fall-run steelhead should be considered summer-run, winter-run, or a separate entity. During this status review, NMFS considered fall-run steelhead from the Klamath River Basin to be part of the summer run.

Because most summer-run steelhead populations in the Klamath Mountains Province are substantially depressed and difficult to sample, genetic studies during the expanded status review focused on winter-run steelhead. However, other genetic studies that considered both winter and summer steelhead from other areas have failed to find consistent genetic differences between run-types within individual regions. Therefore, NMFS concludes that all runs of steelhead within the Klamath Mountains Province should be considered part of the same ESU.

Patterns of ocean migration of salmon and steelhead may reflect reproductive isolation of spawning populations. Chinook salmon populations from south of Cape Blanco are generally considered south-migrating (e.g., to ocean areas off southern Oregon and California), whereas stocks from north of Cape Blanco are considered north-migrating. Other studies suggest that coho salmon and steelhead from south of Cape Blanco may not be highly migratory, remaining instead in the highly productive oceanic waters off southern Oregon and northern California.

NMFS is not aware of any direct evidence about the relationship between the anadromous and non-anadromous life history forms of O. mykiss within the Klamath Mountains Province. Although it has been reported that these two life history forms within a geographic area may be more genetically similar to each other than either is to the same form from outside the area, other studies have found evidence for reproductive isolation between anadromous and non-anadromous O. mykiss. NMFS' policy contained in "Pacific Salmon and the Definition of Species under the

ESA" states that anadromous and non-anadromous forms should be considered separately if they are reproductively isolated. Reproductive isolation, as previously noted, is a question of degree. NMFS has determined that, until specific information regarding these two life history forms within the Klamath Mountains Province becomes available, non-anadromous fish will not be considered part of the ESU. This determination may be reconsidered if information demonstrating that the two forms share a common gene pool becomes available.

SPECIES BIOLOGY

Steelhead exhibit a wide variety of life history strategies. In general, steelhead migrate to the sea after spending 2 years in fresh water and then spend 2 years in the ocean prior to returning to fresh water to spawn. Variations of this pattern are common. Some spawners survive and return to the ocean for 1 or more years between spawning migrations. Some steelhead return to fresh water after only a few months at sea and are termed "half-pounders," having attained the approximate size that inspired this term. Half-pounders generally spend the winter in fresh water and then return to sea for several months before returning to fresh water to spawn.

Steelhead exhibit several spawning migration strategies. "Summer-run steelhead" enter fresh water between May and October, and begin their spawning migration in a sexually immature state. After several months in fresh water, summer steelhead mature and spawn. "Winter-run steelhead" enter fresh water between November and April with well-developed gonads. In drainages with populations of both summer- and winter-run steelhead, there may or may not be temporal or spatial separation of spawning.

SPECIES DISTRIBUTION

The present endemic distribution of steelhead extends from the Kamchatka Peninsula, Asia, east and south, along the Pacific coast of North America, to Malibu Creek in southern California.

MAJOR IMPACTS

Logging, mining, agricultural activities (e.g., livestock grazing), and water withdrawals have likely contributed to the decline of steelhead populations within the Klamath Mountains Province ESU. In the Klamath and Rogue River Basins, dams without fish passage facilities have decreased the amount of habitat available for steelhead, and may have also contributed to the decrease in Klamath Mountains Province steelhead populations. There are also fish passage concerns regarding dams with inadequate fish passage facilities.

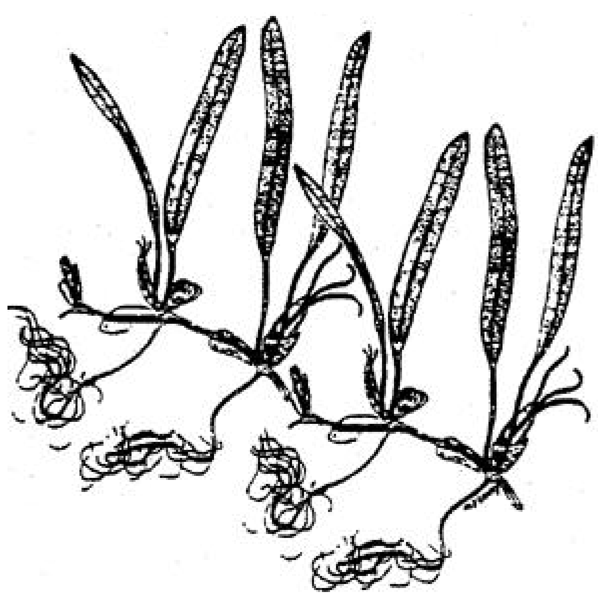
Klamath Mountains Province steelhead are not currently targeted for commercial harvest, and scientific and educational programs have had little or no impact on Klamath Mountains Province steelhead populations. However, steelhead are popular gamefish throughout the Pacific Northwest and, in some locations, recreational fishing may contribute to the general decline of steelhead populations.

Early mechanisms regulating local mining and timber harvest activities in the Klamath Mountains Province clearly were inadequate. Early mining practices were particularly destructive in portions of the Rogue and Trinity River (a tributary of the Klamath River) watersheds. Although most of these particularly destructive mining and timber harvest activities no longer occur, land management activities still contribute to adverse habitat modifications.

Drought conditions contribute to reduced Klamath Mountains Province steelhead production. In general, drought conditions have existed in southern Oregon since 1977. Also, unusually warm ocean surface temperatures and associated changes in coastal currents and upwelling, known as El Niño conditions, have occurred in recent years and resulted in ecosystem alterations such as reductions in primary and secondary productivity and changes in prey and predator species distributions.

Other

JOHNSON'S SEA GRASS



Common Name: JOHNSON'S SEA GRASS
Scientific Name: *Halophila johnsonii*

Species Status: Proposed as Threatened
Species Trend: N/A
Current Estimated Population: N/A

SPECIES POPULATION STATUS

Johnson's seagrass has a very limited distribution and it is the least abundant seagrass within its range. The species is only known to reproduce asexually and may be limited in distribution because of this characteristic. It plays a major role in the viability of benthic resources and has been documented as a food source for endangered West Indian manatees and threatened green sea turtles. NMFS is continuing to conduct ecological research on the species to better understand its life history and to use in conservation decisions affecting the seagrass ecosystems.

SPECIES BIOLOGY

Identifying characteristics of Johnson's seagrass include smooth marginated, spatulate foliage leaves in pairs 0-5-2.5 cm long, a creeping rhizome with petioles, sessile (attached to their bases) female flowers, and longnecked fruits. The male flowers are unknown. Outstanding differences between Johnson's seagrass and other similar species are its distinct asexual reproductive characteristics, and leaf morphology. It has a major role in the viability of benthic resources.

SPECIES DISTRIBUTION

Johnson's seagrass is found in disjunct and patchy distribution along the east coast of Florida from central Biscayne Bay to Sebastian Inlet. The largest patches have been documented inside Lake Worth Inlet. The southernmost distribution is reported to be in the vicinity of Virginia Key in Biscayne Bay. The species has been found in coarse sand and muddy substrates and in areas of turbid waters and high tidal currents.

MAJOR IMPACTS

Johnson's seagrass is the rarest species of its genus, has limited distributional characteristics, restricted reproductive capacity (being asexual), and is dependent on substrate stability. Potential for continued existence and recovery may be limited due to habitat alteration by a number of human and natural perturbations. Such perturbations include (1) prop scoring, (2) dredging, (3) storm action, (4) siltation and (5) altered water quality.

Alteration and subsequent destruction of the benthic community due to boating activities, propeller scoring and anchor mooring has been observed in Johnson's seagrass sites. Such activities result in breaking root systems, severing rhizomes and significantly reducing the physical stability of this ecosystem. Dredging redistributes sediments, buries plants and destroys bottom topography. Some abundant populations are located in close proximity to inlets, and are likely to experience erosional forces and siltation associated with severe storms. During hurricanes, storm surge may scour and redistribute sediments, thereby eroding or burying existing populations.

Siltation due to human disturbance and increased land-use can also threaten viability of the species. Degradation of water quality due to human impact is also a threat to the viability of ecologically important seagrass communities. Nutrient over enrichment, caused by inorganic and organic nitrogen and phosphorus loading via urban and agricultural land run-off, can stimulate increased algal growth that may smother Johnson's seagrass by shading rooted vegetation and diminish the oxygen content of the water.

Appendix - List of ESA Endangered, Threatened, and Proposed Species Under NMFS Jurisdiction

Common Name	Status	Scientific Name
	Mammals	
Guadalupe Fur Seal	T	*Arctocephalus townsendi*
Mediterranean Monk Seal	E	*Monachus monachus*
Hawaiian Monk Seal	E	*Monachus schauinslandi*
Caribbean Monk Seal	E	*Monachus tropicalis*
Saimaa Seal	E	*Phoca hispida saimensis*
Steller Sea Lion	T	*Eumetopias jubatus*
Southern Right Whale	E	*Eubalaena australis*
Northern Right Whale	E	*Eubalaena glacialis*
Bowhead Whale	E	*Balaena mysticetus*
Sei Whale	E	*Balaenoptera borealis*
Blue Whale	E	*Balaenoptera musculus*
Fin Whale	E	*Balaenoptera physalus*
Humpback Whale	E	*Megaptera novaeangliae*
Sperm Whale	E	*Physeter catodon* (=*macrocephalus*)
Gulf of California Harbor Porpoise	E	*Phocoena sinus*
Chinese River Dolphin	E	*Lipotes vexillifer*
Indus River Dolphin	E	*Platanista minor*
Harbor Porpoise	P(T)	*Phocoena phocoena*
	Turtles	
Loggerhead Sea Turtle[1]	T	*Caretta caretta*
Green Sea Turtle[1]	E/T[2]	*Chelonia mydas*
Leatherback Sea Turtle[1]	E	*Dermochelys coriacea*
Hawksbill Sea Turtle[1]	E	*Eretmochelys imbricata*
Kemp's Ridley Sea Turtle[1]	E	*Lepidochelys kempii*
Olive Ridley Sea Turtle[1]	E/T[3]	*Lepidochelys olivacea*
	Fish	
Shortnose Sturgeon	E	*Acipenser brevirostrum*
Gulf Sturgeon[1]	T	*Acipenser oxyrhynchus desotoi*
Sacramento R. Winter-Run Chinook Salmon	E	*Oncorhynchus tshawytscha*
Snake R. Fall Run Chinook Salmon	T	*Oncorhynchus tshawytscha*
Snake R. Spring/Summer Run Chinook Salmon	T	*Oncorhynchus tshawytscha*
Snake R. Sockeye Salmon	E	*Oncorhynchus nerka*
Central California Coast Coho Salmon	T	*Oncorhynchus kisutch*
Coho Salmon[4]	P(T)	*Oncorhynchus kisutch*
Steelhead[5]	P(T/E)	*Oncorhynchus mykiss*
Umpqua River Cutthroat Trout	E	*Oncorhynchus clarki clarki*
Totoaba	E	*Cynoscion macdonaldi*
Atlantic Salmon	P(T)	*Salmo salar*
	Other	
Johnson's Sea Grass	P(T)	*Halophila johnsonii*

E = Endangered, T=Threatened, P(T)=Proposed as threatened, P(T/E)=Proposed as threatened and endangered
[1] = Jurisdiction shared with U. S. Fish and Wildlife Service
[2] = Florida and Pacific Mexico breeding populations of the green sea turtle are listed as Endangered.
[3] = Pacific Mexico breeding population of the olive ridley sea turtle is listed as Endangered.
[4] = Two populations of coho salmon are proposed: Northern California/Southern Oregon and Oregon Coast
[5] = Ten populations of steelhead are proposed. Five as threatened: Lower Columbia River, Oregon Coast, Klamath Mountains Province, Northern California, Snake River Basin; five as endangered: Central California Coast, South-Central California Coast, Southern California, Central Valley, and Upper Columbia River.