

Complete

ENDANGERED SPECIES

Technical Bulletin Department of interior. U.S. Fish and Wildlife Service
Endangered Species Program, Washington, D.C. 20240

Review Initiated for Species Listed in 1978

In order to ensure that the U.S. List of Endangered and Threatened Wildlife and Plants reflects the true biological status of these species, the Endangered Species Act requires the Fish and Wildlife Service to conduct a review of all listed species at least once every 5 years. Accordingly, the Service has published a notice (F.R. 12/8/83) announcing the initiation of a review on all plants and animals added to the list in 1978. Any information that might document the need to change the classification under the Act of any of these species is requested, and should be sent to the appropriate office by April 6, 1984 (see BULLETIN page 2 for addresses). The names of those species under current review are included in the notice.



Photo by C. Kenneth Dodd, Jr.

The Mona ground iguana (Cyclura stejnegeri) and Texas wild-rice (Zizania texana) are among the 21 animals and 18 plants whose listed status is now under review.



Recovery Plans Approved for Five Mullusks

Although mollusks are not the most famous examples of rare wildlife, there are 34 snails and clams on the U.S. List of Endangered and Threatened Species, and many more are candidates for future listing. Among the recovery plans that have been approved during 1983 for listed species are five new plans for mollusks—four snails and one clam or

mussel. A brief summary of each plan follows:

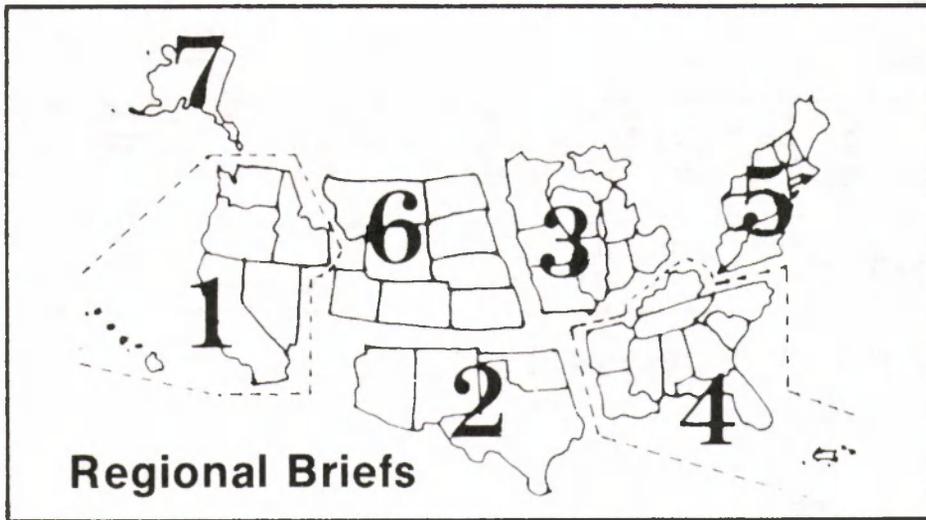
The Chittenango ovate amber snail (*Succinea chittenangoensis*) is a terrestrial mollusk known only from the immediate vicinity of Chittenango Falls in New York State. Its common name refers to its habitat and to its ovate, amber colored shell. *S. chittenangoensis* prefers cool, sunlit areas of lush herbaceous growth within the saturated spray zone of the falls, but it is found also in vegetation occurring in a nearby spring-fed area. As a Pleistocene relict, *S. chittenangoensis* is able to survive within its restricted range at the falls because the paraglacial habitat has characteristics that mimic the cool, moist conditions existing thousands of years ago when the snail was more widespread. It is particularly vulnerable to even subtle modifications in its environment, whether natural or human-related.

S. chittenangoensis was said to be "in great abundance" in 1905 when it was first collected. Although recent surveys have not yielded a firm population estimate, it has apparently experienced a significant decline within its restricted habitat. In 1977, the New York Department of Environmental Conservation reported that the population was "very low." *S. chittenangoensis* is currently listed as endangered. *continued on page 8*



Photo by Patricia Rexinger

Adult specimens of the Chittenango ovate amber snail have shells that are gently convex, laterally compressed, and about 21 mm in length.



Regional Briefs

Endangered Species Program regional staffers have reported the following activities for the month of December:

Region 1—Biologists at San Francisco Bay National Wildlife Refuge, in cooperation with the San Francisco Bay Bird Observatory, have initiated a long-term color banding study of the California clapper rail (*Rallus longirostris*

obsoletus) in San Francisco Bay. The objectives of this study are to determine to what extent rails move between various marshes around the bay and to better define population trends of this subspecies. Clapper rails are being captured from airboats with long-handled nets during daytime high tides. Once captured, each rail is fitted with a unique

combination of color bands and a variety of physical measurements are taken. A total of 95 individuals have been captured in 5 days afield from a total estimated population of 4,000-6,000.

A peregrine falcon (*Falco peregrinus*) which landed on a fishing boat 1,000 miles southeast of Hawai'i recently had apparently been blown out to sea by a storm. It was cared for at the Honolulu Zoo and subsequently shipped to California for release by a member of the Peregrine Falcon Recovery Team.

National fish and wildlife refuge staff members participated in regulated AMTRACK (armored mechanized troop carrier) maneuvers at Kaneohe Marine Corps Air Station, O'ahu, Hawai'i, on November 7, 1983. The purpose of the exercise was to improve nesting habitat for Hawaiian stilts (*Himantopus himantopus knudseni*) in the Nuupia ponds complex. Four AMTRACKS were used to open dense vegetation and get water to nesting areas.

A subject of an investigation that originated in San Francisco regarding the take of an Endangered San Francisco garter snake has agreed to pay fines totalling \$2,000.

Last October, a cooperative 3-year life history study of the Moapa dace (*Moapa coriacea*) was initiated with the Seattle Research Laboratory. Research efforts are aimed at providing essential information for carrying out the Moapa Dace Recovery Plan. This month, we established a field station at the Moapa National Wildlife Refuge in southern Nevada and completed a detailed study plan. We will compare the aquatic habitat that supports few dace to that habitat which supports a higher number. Our objective is to determine the environmental conditions that may restrict Moapa dace proliferation on the refuge.

Region 2—On July 15, 1983, Region 2 issued a jeopardy biological opinion to the Federal Highway Administration regarding the impacts of the State highway expansion project in Brazos County, Texas, on an Endangered orchid, the Navasota ladies'-tresses (*Spiranthes parksii*). The findings of that opinion were that the proposed expansion would add to the already perilous conditions faced by the plant. At that time, only about 150 individuals were known, all in areas threatened by various types of development. Last autumn, the Service contracted with Dr. Hugh Wilson, of Texas A & M University, to conduct a new survey for the species, and personnel from the Texas Department of Highways participated. The surveys resulted in the discovery of a new large population and several smaller

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Region 1: California, Hawaii, Idaho, Nevada, Oregon, Washington, and Pacific Trust Territories. **Region 2:** Arizona, New Mexico, Oklahoma, and Texas. **Region 3:** Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin. **Region 4:** Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Puerto Rico, and the Virgin Islands. **Region 5:** Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia, and West Virginia. **Region 6:** Colorado, Kansas, Montana, Nebraska, North Dakota, South Dakota, Utah, and Wyoming. **Region 7:** Alaska.

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populations within a 20-mile radius of the original population.

Based on these findings, the Service reevaluated the jeopardy opinion. The new data indicate that the species is more abundant and widely distributed than previously known. Increased abundance does not itself reduce the threat to the species, but it does indicate that additional genetic material is available to the population, and it implies that the species may be more successful in existing habitats than earlier believed. A more widespread distribution indicates a more tolerant species, allows additional options for habitat protection, and reduces the chances of a single catastrophic event eliminating the species. Because of the new data, on September 9, 1983, Region 2 issued a new opinion stating that the proposed action is not likely to jeopardize the survival of the species.

The Attwater's Greater Prairie Chicken Recovery Plan has been approved by the Regional Director. Recovery tasks are directed toward implementing intensive management of coastal prairie habitat for this prairie chicken (*Tympanuchus cupido attwateri*). Habitat loss continues to be the main threat.

The highest whooping crane (*Grus americana*) count for the current wintering populations in Texas and New Mexico are 75 and 27, respectively. This represents an increase of 2 whoopers for the Wood Buffalo/Aransas population and 13 for the Grays Lake/Bosque del Apache flock over the high count in the winter of 1982/83. (Another 37 whoopers are in captivity, most of them comprising the Service's Patuxent Wildlife Research Center captive propagation flock.)

It appears that one of the wild female ocelots (*Felis pardalis*) being radio-tracked on Laguna Atascosa National Wildlife Refuge may have produced young in early November 1983. If so, this would be her third litter in 13 months. Ocelot #30 (the number of her radio collar) was first captured and radio-collared on October 1, 1982, and was observed to be nursing at the time. The fact that she was caring for young was confirmed when her female kitten was captured 16 days later. Female #30 has been recaptured a number of times and was observed to be nursing again in early June 1983; however, the presence of a kitten was never confirmed. Recaptures in November 1983 showed her to be nursing for yet a third time.

The ongoing endangered feline study on Laguna Atascosa NWR resulted in the capture of another female ocelot on December 11, 1983, bringing the total number of ocelots being radio-tracked on the refuge to three males and five

females. Two additional males have been captured on private lands. As yet, the study has not been able to confirm the presence of jaguarundi (*Felis yagouaroundi cacomitti*) in the area. Innovative means of locating and confirming the presence of jaguarundi are being explored.

Region 3—Regional endangered species staff members met recently with representatives of Minnesota, Wisconsin, Iowa, and the University of Minnesota's raptor rehabilitation project to discuss next year's releases of peregrine falcons. This will be the third year of the peregrine release program in Region 3.

Region 4—Personnel of the Jackson Endangered Species Field Office observed the Alabama cavefish (*Speoplatyrhinus poulsoni*) in a cave in northwestern Alabama on October 26 and November 17, 1983. This species, which had not been sighted since 1970, is the sole representative of its genus and is known from only the one cave. Prior to the recent sightings, concern was developing that chemical pollution of ground water due to spraying of pesticides on cotton fields overlying the cave may have led to the extinction of the species. On the November 17 visit, 10 individuals were observed, but no specimens were collected. No more than four individuals had previously been sighted at any one time.

A Jacksonville Endangered Species Field Office representative attended a symposium on the management of *Torreya taxifolia* (Florida torreya) on November 29. The symposium was sponsored by Florida's Department of Natural Resources (Division of Recreation and Parks). Topics discussed included the plant's current status, propagation techniques, techniques for disease control, Federal protection under the Endangered Species Act, and management procedures.

On November 20, 1983, a manatee (*Trichechus manatus*) was born at the Miami Seaquarium. The male calf was born after 44 hours of labor in the breech position. (In aquatic mammals, the tail normally appears first.) It is the fourth time that this particular manatee, Juliette, has given birth in captivity. The calf weighed in at 75 pounds and was 4 feet, 31 inches long. There are three other lactating female manatees at the Seaquarium with older calves, and they act as nursemaids to the newest addition.

Region 5—The Chesapeake Bay Bald Eagle Recovery Team met recently in Wakefield, Virginia. Among the topics discussed were: the current status of Caledon State Park (Virginia) and its beneficial effects on the bald eagle; the 1983-1984 eagle survey and banding work; the 5-year review on the status of

New Contractor for Fish and Wildlife Reference Service

The Fish and Wildlife Reference Service (FWRS), a private entity that disseminates publications for a number of U.S. Fish and Wildlife Service programs under government contract, is now being operated by a new contractor, Informatics General Corporation. New orders should be addressed to the Fish and Wildlife Reference Service, 1776 E. Jefferson Street, 4th Floor, Rockville, Maryland 20852, or call collect at 301/468-1737. Information on which documents are available and on fees will be included in a quarterly FWRS newsletter, which will be sent free to those requesting it. Orders placed with the previous contractor will be forwarded to the new contractor.

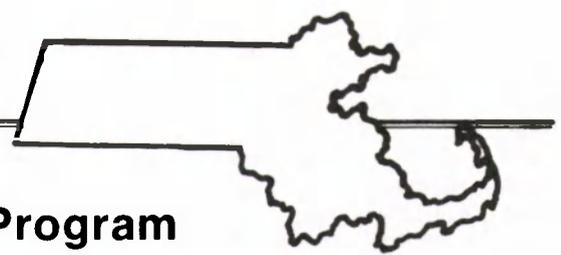
The FWRS information retrieval system selectively covers the published and unpublished research reports resulting from the Endangered Species Program (including recovery plans), Cooperative Fish and Wildlife Research Units, Federal Aid in Fish and Wildlife Restoration Program (Pittman-Robertson and Dingell-Johnson Acts), and Anadromous Sport Fishing Conservation Program.

the bald eagle; and the possibility of using some eagles from the Maryland or Virginia populations for translocating to parts of the country where this Endangered bird is rarer (if not extirpated).

Region 6—The Interagency Grizzly Bear Committee (IGBC) held its third meeting on November 8-9, 1983, in Denver. Major topics of discussion included further research needs, reports from the management subcommittees, and briefings from the U.S. Forest Service on management activities currently underway. A final report of the Grizzly Bear Investigation Team was also provided to the IGBC. This team was formed by the Forest Service to investigate the fatal grizzly (*Ursus arctos horribilis*) attack that occurred last June in the Gallatin National Forest.

On December 5, 1983, the ad hoc Committee to Investigate the Need and Feasibility of the Supplemental Feeding of Yellowstone Grizzly Bears completed its final report. This report will be a topic

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Tax Check-off Funds Massachusetts Non-game and Endangered Species Program

by Bradford G. Blodget,
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The Massachusetts Nongame and Endangered Species Program began in 1977; later, in 1979, the Massachusetts Division of Fisheries and Wildlife signed a Section 6 Cooperative Agreement with the U.S. Fish and Wildlife Service. The program is organized into three major parts: (1) Administration and Coordination, (2) Research and Management, and (3) Information and Education. Part 1 covers species reporting and documentation, permitting operations, monitoring of significant legislation, maintenance of listings on endangered, threatened, and other species for special consideration, and commenting on Federal rulemakings. Part 2 includes studies on recovery of endangered species, bald eagle restoration, Plymouth red-bellied turtle research, and status investigations of State-listed species. Preparation of articles, news releases, and a slide presentation covering the program are included in Part 3.

In July 1983, the Massachusetts Natural Heritage Program, which had been operated since 1978 by The Nature Conservancy under contract to the Massachusetts Department of Environmental Management, was transferred into the Division. The Natural Heritage Program has developed an inventory and data storage system for records of uncommon and rare wildlife and wild plants in Massachusetts. In addition, the program services other agencies, private organizations, and citizens requesting technical assistance in environmental impact studies, assists in the planning stages of greenbelts and parks, and helps develop land management plans. The Natural Heritage Program is a logical extension of our own program, and will now be operated as a unit within it.

The long-term funding outlook for the Massachusetts Nongame and Endangered Species Program brightened on July 26, 1983, when Governor Michael Dukakis signed a law to set up a nongame wildlife income-tax checkoff system. It has been estimated that annual revenues from the checkoff will be about one-half million dollars. The priorities for funding will include bald eagle and Plymouth red-bellied turtle restoration studies, expanded status investigations on State-listed species, addition of a tern management program, and land acquisition.

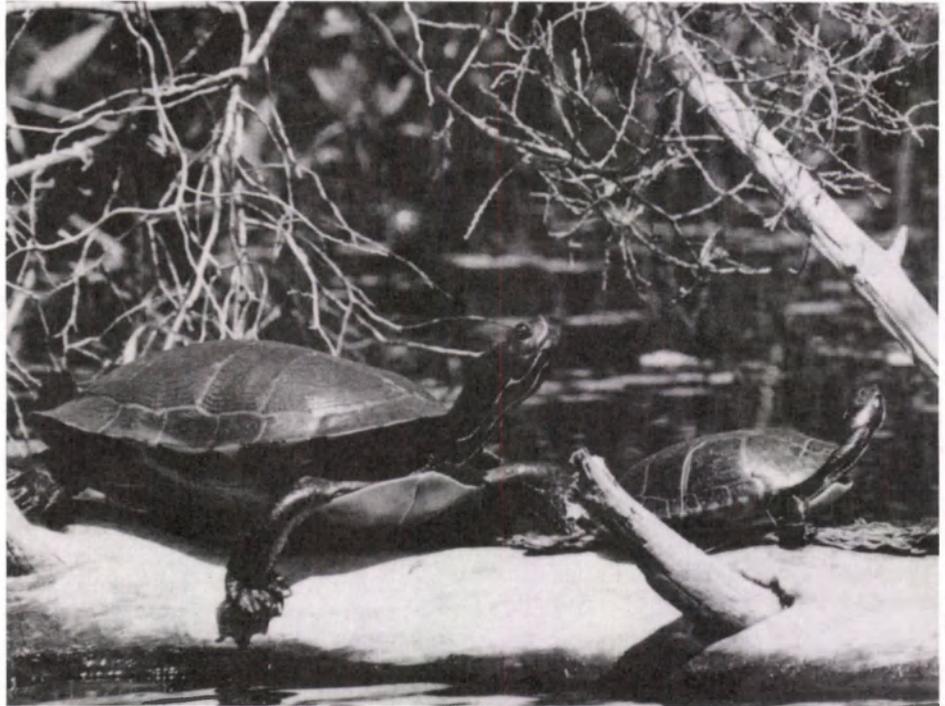


Photo by Bill Byrne
Massachusetts Division of Fisheries and Wildlife

Plymouth red-bellied turtle (left) sunning with eastern painted turtle

Listings

In November 1978, a special advisory listing entitled "Nongame Wildlife for Special Consideration in Massachusetts" was published, primarily to serve as a guideline for identifying species thought to warrant special consideration. In addition, it serves as a reference list for other State and Federal agencies, conservation groups, planners, developers, and the general public. The list, which underwent substantial revision in 1983, contains 91 species broken down as endangered (16), threatened (3), State rare (23), State local (39) and peripheral (15). Massachusetts adopts the Federal definitions for the first two terms, but reserves the right to also list additional species occurring in the Commonwealth of Massachusetts that we believe may properly meet the Federal definitions. The terms "State rare," "State local," and "peripheral" include species that do not appear to meet the Federal definition, but happen to be reduced or declining within the Commonwealth.

Among the endangered and threatened species listed by the State are the shortnose sturgeon (not included in our project agreement), three marine tur-

tles, Plymouth red-bellied turtle, bald eagle, peregrine falcon, Eskimo curlew (possibly extinct, but once a regular migrant in Massachusetts), Indiana bat, six cetaceans, and the small-whorled pogonia. Threatened species include two marine turtles and the silverling. A companion listing, "Native Wild Plants for Special Consideration," was published in 1983. The Natural Heritage Program staff of five includes a botanist who worked with many groups since 1978 in the preparation of this list. Over 200 native plant species thought to be rare and/or severely declining in the Commonwealth are listed for advisory purposes.

Plymouth Red-bellied Turtle

Investigations into the distribution and the life history of the endemic Plymouth red-bellied turtle (*Pseudemys rubriventris bangsi*) have been conducted under contract since 1979. To date, 64 ponds have been checked for the presence of this chelonian with 15, all in Plymouth County, found to contain the species.

The total current population of the Plymouth red-bellied turtle is not believed to exceed 250 animals. From 1979

to 1982, 202 specimens were marked by marginal notching of the shields and, more recently, by yellow disc tags. The largest population in any pond contains about 135 animals with a sex ratio skewed 2:1 in favor of females. Only 40 percent of the females appear to produce eggs in a given year, and the clutch sizes ranged from 10 to 18. The fertility rate is about 83 percent, and about 87 percent of those eggs have been hatching. Most nests are in sandy areas within 200 feet of a pond, often in or along a road. Predation at known nests appears to be a factor, with fox and raccoon implicated as major predators. Recently, a bullfrog was found that had eaten two young turtles approximately 30 mm in width. The turtle's diet, on the other hand, consists of plant material with the aquatic *Myriophyllum* most frequently encountered.

A fifth year of basic data collection is planned, to be followed by implementation of management efforts, which may include land acquisition, predator control, public education, translocations, and artificial creation and management of nesting substrate. Also possible are more manipulative techniques of producing eggs, along with the trapping and moving of gravid females to penned laying areas. Nests may then be protected by predator enclosures. Eggs may be collected for laboratory hatching and overwintering for the purpose of "headstarting."

Bald Eagle

The Nongame and Endangered Species Program has coordinated the annual Massachusetts midwinter bald eagle (*Haliaeetus leucocephalus*) survey since 1977, with statewide totals since 1977 of 13, 15, 7, 26, 19, 13, and 23 recorded. Most wintering eagles in Massachusetts are concentrated about the 25,000-acre Quabbin Reservoir in west-central Massachusetts.

Formal plans for hacking bald eagles were developed in late 1980 with cooperation from the New York Department of Environmental Conservation, but implementation of the project was delayed until 1982. In June 1982, two eaglets were secured from Michigan, with the assistance of the Michigan Department of Natural Resources, and were flown to the hack site. These birds fledged in late July 1982. In 1983, following complex negotiations with the States of New Jersey and Pennsylvania, the Manitoba Department of Natural Resources (Canada), the Canadian Wildlife Service, and the U.S. Fish and Wildlife Service (FWS), four eaglets were gathered in Manitoba and raised at the Quabbin Reservoir hack site. Funding for this project is partially provided by a grant from the Bank of Boston and the Massachusetts Audubon Society, and grant money is held by the Commonwealth of Massachusetts in a special trust. The hack site attendant is a



Photo by Jack Swedberg Massachusetts Division of Fisheries and Wildlife

Collecting bald eaglets in Manitoba, Canada, for release in Massachusetts



Photo by Bill Byrne Massachusetts Division of Fisheries and Wildlife

Twelve week old bald eaglets exercising at Quabbin Reservoir hacking site

graduate student from the University of Massachusetts Cooperative Wildlife Research Unit.

Immediate plans call for the continued hacking of eaglets annually through 1986. The current capacity of six birds per year has never been attained due to the difficulty in securing an adequate supply of birds. It is hoped that with increasing production of bald eagle eggs at the FWS Patuxent Wildlife Research Center in Laurel, Maryland, we will eventually handle six or more birds per year.

Special Species Investigations

Bats—A literature survey on the Indiana bat (*Myotis sodalis*) in Massachusetts yielded 10 references. The major reported hibernaculum in Massachusetts was a complex of abandoned emery mines in Chester, Hampshire County, where a maximum of 60 bats was recorded during a visit in 1936. The Division obtained this property in 1974 as a gift, and has established restrictions on entry to the mines. In 1979-1982, late winter checks at this site resulted in an average capture of 177 bats of four species, and two summer checks averaged 422 bats of three species. The most frequent species has been the little brown bat (*Myotis lucifugus*). Investigations to



Adult great blue herons, a species of State interest

date have not revealed any Indiana bats. Small numbers of the small-footed bat (*Myotis leibii leibii*), listed as "State rare" for advisory purposes, have been encountered.

Amphibians and Reptiles—The Division is actively participating in a coordinated "Salamander Watch" for collection of data on ambystomatid salamanders. These data are being stored in the Natural Heritage Program computerized inventory system. Ongoing field investigations are also being operated in the hope of locating the bog turtle (*Clemmys muhlenbergi*), a State rare species.

Great Blue Herons—A statewide inventory of reported great blue heron (*Ardea herodias*) colonies was initiated in June 1979. During the remainder of that year, 28 active nests were confirmed at six heronries that ranged in size from one to eight nests. Known colonies and active nests have steadily increased through 1983, when 191 active nests were confirmed at 13 heronries that ranged in size from one to 40. Known production was at least 489 young, with a productivity mean of 2.9 young per nest. This startling increase seems to be accountable both to improved knowledge of remote heronries and actual growth of known heronries.

Seabirds—Annually, the Division coordinates a meeting of the Massachusetts Tern-Monitoring Network, a group of individuals and organizations bound together by their concern for colonial-nesting seabirds. Data are collected by the Nongame and Endangered Species Program on colony locations, numbers of pairs at each colony, and general information on production. Data compilation sheets are provided to all participants, who are then mailed the tabulated results. Population data are collected from the network for the common tern (*Sterna hirundo hirundo*), least tern (*Sterna albifrons*), roseate tern (*Sterna dougallii dougallii*), Arctic tern (*Sterna paradisaea*), and laughing gull (*Larus atricilla*), although only the last three are State-listed species. In 1983, data have been collected on the piping plover (*Charadrius melodus*) from the same network. Although funds are not currently available to actively manage these species, the Nongame and Endangered Species Program seeks to maintain up-to-date data for use should funding become available. Since the early 1970s, private interests have voluntarily taken it upon themselves to post tern colonies, and this involvement has been a credit to the citizens of Massachusetts as well as a great benefit to the seabirds.

The results in 1983 included 7,909 pairs of common terns, 2,112 pairs of least terns, 1,502 pairs of roseate terns, and 18 pairs of Arctic terns. Numbers of both the Arctic and roseate terns have

Photo by Bill Byrne Massachusetts Division of Fisheries and Wildlife



Least tern nesting area near Newbury, Massachusetts

Photo by Bill B. r.n. Massachusetts Division of Fisheries and Wildlife

pared to 14 in 1982 (human-related losses).

* * *

State and Federal biologists met on December 20, 1983, in Casper, Wyoming, to review the draft Recommended Criteria and Procedures for Black-footed Ferret Surveys, and to develop acceptable survey standards. These survey standards, when completed, will be used for Section 7 clearance of Federally authorized or funded activities that may affect black-footed ferrets (*Mustela nigripes*) or their primary habitat, prairie dog towns.

Region 7—Although the short-tailed albatross (*Diomedea albatrus*) is listed as an Endangered foreign species, it once numbered in the millions and was so abundant in Alaskan waters that it was a common food item in the diet of native Aleut Indians. Plundered by plumage hunters on Torishima, its primary breeding island off Japan, the species was nearly extinct by the time World War II began. Torishima has been declared a nature reserve and national monument by the Japanese government, and the short-tailed albatross is staging a slow comeback. Until recently, sightings in Alaskan waters of this, one of the world's rarest albatross species, have been few. This summer and fall, however, U.S. observers aboard foreign fishing vessels recorded nearly 30 observations of *D. albatrus* in the waters of the western Aleutian Islands and Gulf of Alaska. In comparison, only six observations were recorded in Alaskan waters in the preceding 6-year period (1976-1982).

remained generally stable since 1974; however, the concentrated distribution of the roseate tern is of management concern since 90 percent of the population is concentrated at a single colony. While tern numbers have remained generally stable, the laughing gull population has increased from 140 pairs in 1974 to 930 pairs in 1983. Piping plover survey results were 70+ pairs in 1983. The actual number of pairs is probably higher since the piping plover survey was conducted incidental to the tern survey work. A significant portion of the habitat for colonial beach-nesting seabirds is in public ownership and protected in one fashion or another from development, but pollution, human disturbance, huge gull populations, and other problems are of continuing concern.

* * *

The Massachusetts Nongame and Endangered Species Program has developed slowly over the years, but appears to have a bright future role in the conservation of our rich wildlife and plant heritage. We look forward to working with the many fine private conservation organizations here in the

Commonwealth that have already established exemplary conservation records.

Regional Briefs

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of discussion at the special IGBC meeting scheduled for February 14, 1983.

Since July 15, 1983, 7100 hours have been expended by Federal and State law enforcement officers patrolling backcountry areas in grizzly habitat. During this time, they have contacted 1,940 backcountry users. Numerous warnings and citations have been issued for such violations as dirty camps, unattended fires, hunting in parks, and trespassing in national parks. As a result, some camps have improved and many backcountry users seem to be getting the message about how to behave in grizzly country. These law enforcement patrols, coupled with States restricting black bear seasons, better prosecutions in the courts, and increased public awareness, have begun to show some success. To date, only 6 losses have been recorded in the Yellowstone Ecosystem, com-

* * *

Culminating 3 years of correspondence and difficult telephone communications, 18 Aleutian Canada geese (*Branta canadensis leucopareia*) were shipped last month to their new homes at the Yagiyama and Tama Zoos in Japan. The Japanese hope to breed Aleutian geese in captivity and release their progeny among wild white-fronted geese that winter in the Lake Izunuma area. Aleutian Canada geese formerly wintered in Japan, but this population has recently dwindled to a single individual.

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—The Editor

Five Mullusks

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ment of Environmental Conservation listed *S. chittenangoensis* as an endangered species, and the U.S. Fish and Wildlife Service gave the snail Federal protection the next year when it was listed as Threatened. The three major factors implicated in the decline are degradation of water quality, direct human impacts, and biological vulnerability.

Water of good quality, free from toxicants and other pollutants, is essential to the survival of *S. chittenangoensis*. The water quality at the falls deteriorated in the late 1800s when a nearby community began to discharge raw sewage into Chittenango Creek, but it has contained fewer organic wastes since 1977, when a secondary-level sewage treatment facility became operational. Currently, the impact of chemical contaminants is of more concern. Most of Chittenango Creek's watershed is used for agriculture, and pesticides, herbicides, and fertilizers readily enter the drainage. Salt applied to nearby roads during winter months may also affect the creek's salinity.

Human activity at Chittenango Falls is another threat to the snail. Since 1928, the falls have been part of a State park, and over 125,000 people visited during 1982-1983. Fishing and hiking brings many of these visitors to the immediate vicinity of the falls, where trampling of the snail habitat (along with the snails themselves) has been identified as a major potential threat. It has been estimated that most of the vital habitat is vulnerable to disturbance by humans.

The Chittenango Ovate Amber Snail Recovery Plan (approved March 24, 1983) was developed by the New York DEC's Endangered Species Unit, which has taken the initiative for recovering this species. Ensuring the survival of a self-sustaining snail population at the falls is the plan's primary objective. However, due to the vulnerability of the snail's extremely limited and unusual habitat, the plan recommends against a complete delisting from its current Threatened status unless at least five additional, self-sustaining geographically isolated populations are discovered. While the various recovery tasks are being carried out, checks of succineid shell collections in museums and surveys of potential habitat within the Pleistocene range of *S. chittenangoensis* may result in discoveries of additional populations. As is the case with all recovery plans, the specified goals will be reassessed continually as additional data on the species become available.

One of the first recovery tasks is to

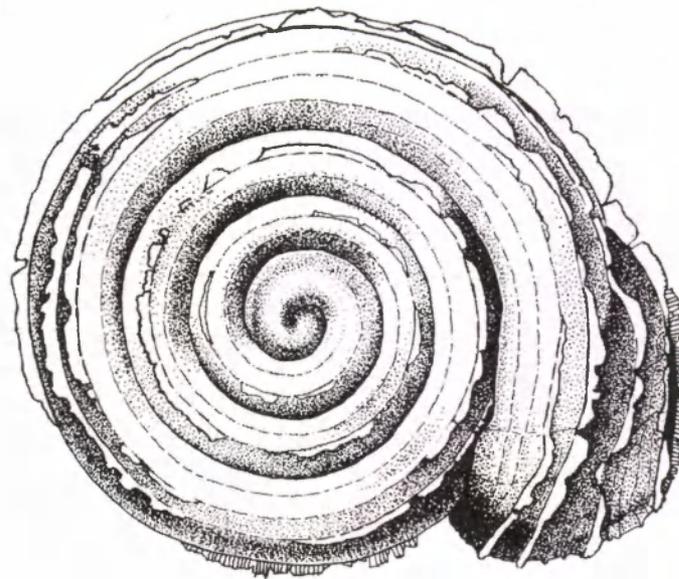
conduct additional research in order to better determine the size and status of the population at Chittenango Falls. This information will serve as an index against which to measure future changes in the snail's status. The studies will also address the snail's specific ecological requirements to help prevent future adverse alterations of the habitat. Water quality problems could be addressed by minimizing non-point source pollution, monitoring the creek and sewage treatment plant effluent for contaminant levels, and measuring toxicants present in selected invertebrates that serve as environmental indicators.

Because trampling of the snails and their habitat by visitors in the immediate area of the falls could be having a significant impact on the species, the recovery plan recommends channelling human use to nearby, but less sensitive, areas. It specifies a low-key approach that would not detract from the enjoyment of park visitors. For example, reconstructing several damaged footbridges would make it unnecessary for hikers to wander through the snail habitat while looking for a place to cross the water. Installing two short sections (15 and 46 meters) of unobtrusive fencing also would help to prevent habitat disturbance, and would be consistent with the current park management policy of controlling access to potentially dangerous points for visitor safety. An information

and education program at the park could be initiated to gain public cooperation in the conservation effort. State parks personnel are active in efforts to prevent damage from visitor use of fragile habitat areas.

The Virginia fringed mountain snail (*Polygyriscus virginianus*) is listed by the Service as an Endangered species, and is considered one of the rarest and most unusual land snails in North America. *Polygyriscus* is a monotypic genus in the family Helicodiscidae, all of which are burrowers or troglodytes. They occupy caves or lower layers of leaf litter, loose surface soil, or talus. Most, if not all, North American helicodiscids (including *Polygyriscus*) are without pigment and probably blind.

The entire known range of *P. virginianus* consists of a 2.5 km strip of embankment, bluff, and limestone talus along the New River in Pulaski County, Virginia. Live individuals have been observed at only one site, in permanently damp ground at least 25 cm beneath the surface, which is shaded and overgrown with vines. Almost nothing is known about the numbers, population dynamics, or reproduction of *P. virginianus*, largely because of the difficulty inherent in conducting research on a burrowing snail. Further, the very act of surveying for living specimens can result in severe



The Virginia fringed mountain snail has a shell that is small, only 3.9 to 4.5 mm in diameter, with comb-like fringes.

Drawing courtesy of Dr. G. A. An Solem

disturbance of the species' habitat. Based on the limited surveys in the past, the snail is thought to be very rare and low in population density.

An organism with such a restricted distribution is seriously vulnerable and can be jeopardized by many activities that may have little apparent influence on other animals or plants. *P. virginianus* does not appear to be en route to extinction through any known natural process, but several potential human-related threats have been identified. Much of the habitat is near a local road and an inactive quarry. Reactivating the quarry or widening the road without incorporating plans for habitat conservation could be major potential threats. Other possible threatening factors include roadside herbicide spraying and habitat damage caused by fires or collecting.

The recovery plan (approved May 9, 1983) names three conditions that should be met before the status of the Virginia fringed mountain snail can be considered secure. They include: 1) habitat conservation, 2) establishment of a management and monitoring plan, and 3) a finding that there is no continued downward trend in distribution or habitat quality.

1) All of the species' known habitat, which constitutes a very small area, should be given protection by negotiating cooperative agreements, conservation easements, management plans, or acquisition. This objective could be accomplished through a combination of approaches, and could involve State or private conservation agencies as well as the Fish and Wildlife Service. The plan also calls for a systematic survey of potential *P. virginianus* populations within about a 16-km radius of the known site, searching for "recently dead" shells that have been washed to the surface, followed-up by careful, selective sampling for live specimens. Habitat protection for any additional populations discovered would then be addressed.

2) The recovery plan also calls for periodically monitoring the *P. virginianus* distribution and habitat, along with developing a long-term management plan. Extensive research would be needed to better define the snail's habitat requirements. One question in particular that needs to be answered is whether or not *P. virginianus* ever comes to the ground surface, since this factor could have major implications for proper habitat management. The cooperation of the Virginia Department of Highways and Transportation will be sought in controlling the use of herbicides and in the careful design of any road projects that may affect the species. Any potential for reactivating the quarry also will be evaluated. Another

element of the recovery plan is to identify those types of human activities within the range of *P. virginianus* that may be compatible with habitat conservation as alternatives to more destructive uses. For example, it has been suggested that the base of the inactive quarry could be developed as a parking or picnic area for people fishing in the river.

3) Once the first two conditions have been met and the monitoring program shows there is no downward trend in distribution or habitat quality, the Virginia fringed mountain snail can be proposed for downlisting or delisting.

The flat-spined three-toothed snail (*Triodopsis platysayoides*) is a geographically restricted terrestrial mollusk known only from a small area adjacent to the Cheat River Canyon in Monongahela County, West Virginia. Most of its apparent range is within West Virginia's most heavily used State forest, and the species was listed by the Service as Threatened because of the potential impacts to the limited habitat from recreation.

During periods of dry weather, the snails retreat into crevices within exposed sandstone boulders and talus. When the weather turns cool and damp, however, they venture out into the isolated patches of deep, shaded leaf litter at the base of the rock outcroppings.

Heavy trampling of this leaf litter by some of the nearly 450,000 annual visitors to Cooper's Rock State Forest is reducing the snail's cover and feeding habitat. Heavy damage to the habitat also could result if the highly combustible leaf litter were ignited by an unextinguished cigarette or match.

The recovery plan (approved May 9, 1983) identifies two options, either of which could return the flat-spined three-toothed snail to a secure status. Each option addresses a different set of circumstances that may arise as additional field surveys are conducted. Potential *T. platysayoides* habitat within about a 16-km radius of Cooper's Rock will be surveyed in an effort to discover additional populations of the snail. The number of other colonies, if any, will determine which recovery option is pursued.

Recovery Option A—if *T. platysayoides* is found at fewer than three additional sites:

- 1) At least 80 percent of each known habitat site supporting the snail should be protected from human impacts by cooperative agreements, management plans, conservation easements, and/or acquisition. Microhabitats used by the species throughout active and inactive periods need to be located, and more data are required on the extent of adverse impacts from recreational use of the State forest. Information should also be col-



The shell of the flat-spined three-toothed snail is flattened, light brown or reddish-brown, and 18 to 27 mm in diameter.

Photo by S. M. Chambers

lected on potential threats from various forest management practices, general land use changes, collection, predation, pollution, and other factors. Acid precipitation could have an effect on the lichens upon which *T. platysayoides* is thought to feed, especially since the environment is low in calcium carbonate, the natural acid buffer.

- 2) Once this research is conducted, a long-term management and monitoring program can be established for the snail.
- 3) If the monitoring program shows no downward trend in distribution or habitat quality during a 10-year period, *T. platysayoides* can be proposed for delisting.

Recovery Option B—if three or more additional populations of *T. platysayoides* are discovered, all located at least a mile from each other and from the known sites:

Under this option, at least 60 percent of these sites would receive protection through cooperative agreements, management plans, conservation easements, and/or acquisition. Since a larger number of snail populations would indicate less vulnerability to extinction, less modification of current recreational use patterns at the State forest would be recommended, provided that the other sites receive adequate protection. As in Option A, a long-term management plan and monitoring program would be established, followed by a proposal to delist if the

species or its habitat does not show a downward trend for a 10-year period.

The Stock Island tree snail (*Orthalicus reses reses*) is an arboreal hermaphroditic subspecies currently confined to a small site on Stock Island in Monroe County, Florida. Historically, this snail also occupied nearby Key West, but it has been extirpated from that island and other parts of its former range by real estate development in the Florida Keys. Because of its reduced population size, the potential threats from further habitat loss, the effects of hurricanes, and the possibility of overcollecting, *O. r. reses* was listed by the Service in 1978 as Threatened.

Although information on this snail's ecology and life history is scant, preliminary investigations indicate that it inhabits a variety of trees, both native species and introduced ornamentals. It feeds on lichens, fungi, and algae, and forages mainly at night during the rainy season. The snail estivates during drier months. Due to habitat loss, *O. r. reses* is confined to a 4.8 acre patch of hammock on a municipal golf course/botanical garden and on immediately adjacent private properties. A rough estimate puts the population at 200-800 individuals of all age classes. These numbers are presumed to have been relatively steady in the recent past because the snail's habitat has been stable in area and composition over the past 40 years; however, developments and renovations on the golf course are eliminating 1.6 acres of

the 4.8 acres of essential habitat. Approximately 1,000 new hardwood trees were planted around the greens to offset this loss. (The work was completed by the developer, who has leased the golf course from the City of Key West.) But while the snail has been reduced in range to such a small area, a single natural or manmade disaster could result in its extinction.

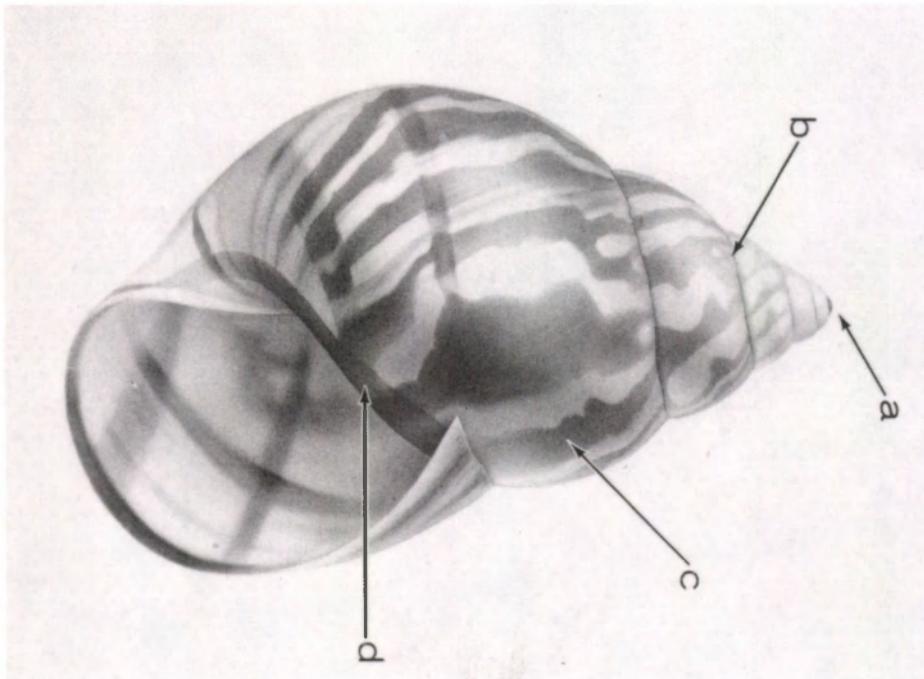
O. r. reses can be considered recovered when:

- 1) the Stock Island snail population exists in a normal, healthy density throughout at least 20 acres of protected habitat on the golf course; and
- 2) the population shows no consistent downward trend in more than 2 consecutive years of a monitoring program that would run at least 10 years; and
- 3) administrative agreements on habitat conservation are put in place to secure the cooperation of the Fish and Wildlife Service, the Florida Game and Fresh Water Fish Commission, the golf-course managers, and any other involved landowners or management agencies; and
- 4) a minimum of 30 additional stable populations within the snail's historic range on Key West are established, which may allow the snail to reoccupy other suitable parts of its former habitat.

The first three objectives involve protecting and monitoring the snails and their habitat on Stock Island. An evaluation of what constitutes a normal, healthy snail population density would be a major part of an overall research effort on the species and its ecological needs. The plan emphasizes working with the landowners, particularly the operators of the golf course, to seek ways of conserving the snails while maintaining compatible land uses. One potential problem that requires monitoring is the possible use of pesticides or herbicides on the golf course and the effect of these chemicals on the snails.

Overcollecting, another potential threat, could be addressed through public education, and the possible need for predator (rat) control would be studied.

A prerequisite to reestablishing *O. r. reses* on Key West is a thorough evaluation of the currently occupied habitat on Stock Island in order to determine the optimum conditions for the snail. A better knowledge of the reproductive biology of *O. r. reses* would be helpful in selecting the number and age-class of individuals for reintroduction, as well as in minimizing the impact of removals from the current population. Since many of the snails would be translocated to privately owned properties on Key West, subject to landowner approval, a public education effort might be valuable in gaining greater acceptance. However,



Drawing by Lauren Keswick

The Stock Island tree snail has a relatively large (45 to 55 mm long) conical shell distinguished from those of similar snails by its weak translucence and unique color pattern. (Letters refer to text in another report)

since recent surveys indicate a considerable decline in the Stock Island population, with malicious intent suspected, the plan states that it may be prudent to proceed with initiating at least one trial reintroduction based on the existing data alone. Some suitable habitat is available on Federal property on Key West.

Higgins' Eye Pearly Mussel

North America contains the richest and most diverse freshwater bivalve fauna in the world, much of it centered in the vast Mississippi River Basin. One of these mollusks, the Higgins' eye pearly mussel (*Lampsilis higginsii*), is an Endangered clam known to occur in the Upper Mississippi River and several of its larger tributaries. Degradation of its natural riverine habitat led to a serious decline in its distribution, and the Higgins' Eye Mussel Recovery Plan (approved July 29, 1983) describes the actions necessary to return this species to a secure status.

L. higginsii apparently was never abundant, and data currently available indicate a 53 percent reduction from its historical range. This mussel is now found at sites in the Upper Mississippi River from Brownsville, Minnesota, to Burlington, Iowa, and in the St. Croix River (Minnesota) between Prescott and Hudson. Its decline parallels that of a number of other clams found throughout the region. It is unlikely that any single factor is responsible for the decline,

but rather a combination of factors.

Although the specific habitat requirements of *L. higginsii* are well known, the general alteration of the Upper Mississippi River has dramatically altered the ecosystem from a riverine to an impounded system and may have had an impact on this species.

Channel dredging to enhance navigation has been identified as a specific problem; not only are mussels physically removed from the river bottom by dredging, but the substrate is disrupted and the resulting increase in sedimentation can smother the mussel beds. It is also possible that the excessive commercial harvest of mussels in the Upper Mississippi River for mother-of-pearl during 1890-1920 could be responsible for reducing *L. higginsii*, which was already a comparatively rare species, below the levels necessary to maintain stable populations. Since mussels are filter feeders, they are affected by accumulations of pesticides, heavy metals, and other pollutants in their tissues. Additional factors, such as disease, changes in host fish distribution or density, or reductions in nutrients also may be responsible, at least in part, for the decline.

The Higgins' Eye Mussel Recovery Plan was developed to return this mollusk to a secure status by using two concurrent approaches: 1) maintaining the existing viable mussel populations (with their currently occupied habitat) and 2) enhancing and/or restoring viable populations to suitable habitat within the

species' historical range. In order to adequately evaluate the success of the recovery effort, it is essential to determine what constitutes a "viable reproduction level" and "suitable habitat" for *L. higginsii*. Several of the proposed field and laboratory studies could accomplish this task, and are an integral part of the plan.

Once more is learned about the habitat requirements and reproductive biology of *L. higginsii*, the adverse impacts from human-related activities can be minimized. Among the management recommendations that may be implemented are measures to: control detrimental commercial clamming methods and sources of water pollution; develop nondetrimental navigational and channel dredging alternatives; and carry out a long-term monitoring program. Any relocation of mussels facing extirpation within their original habitat is to be considered only as a last resort.

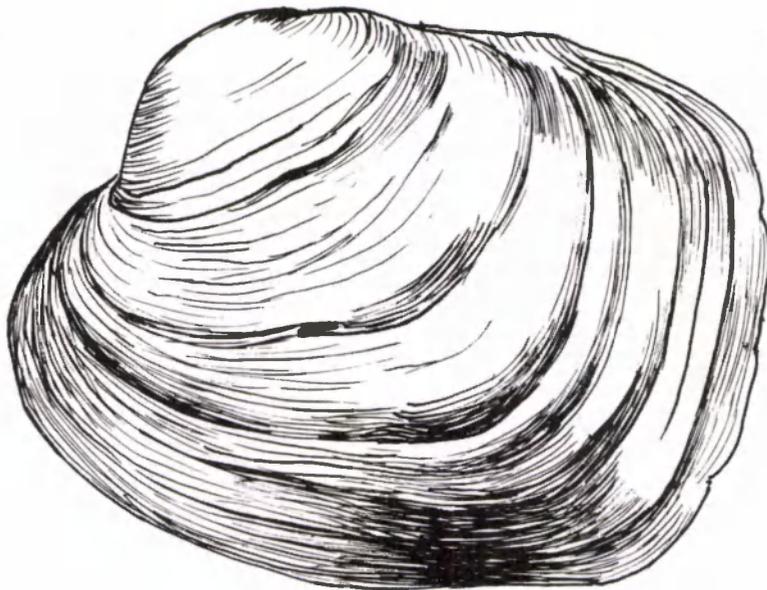
The restoration of existing mussel colonies that are not known to constitute stable, viable reproductive populations is the second major approach. Large-scale rehabilitation of altered or destroyed historical habitat was discussed in the recovery plan but deemed impractical. However, once more information on mussel biology and limiting factors becomes available, it may be possible to enhance marginal populations by habitat management, transplanting additional specimens, or controlling competing species.

L. higginsii will be considered secure enough to propose for delisting when two criteria are met:

- 1) The existence of at least five distinct, viable reproductive populations should be established. This may be accomplished by verifying that such populations already exist, but it could require some translocation and/or artificial propagation. Each population shall then be monitored for a minimum of 10 years to ensure stability.
- 2) The five populations should be maintained in five separate navigation pools because intensive human use of the Upper Mississippi River, with the inevitable result of further impacts on the environment, will likely continue for the indefinite future. Having five separate populations will minimize the impact of any detrimental activity on the survival of the species as a whole.

Copies of these recovery plans, and all other approved plans, will be made available for purchase from the Fish and Wildlife Reference Service (FWRS). See page 3 of this BULLETIN for the address of the new FWRS contractor. A 4-6

continued on page 12



The Higgins' eye pearly mussel is a medium-to-large species; adults can exceed 100 mm in shell length. Shells range in color from yellow to brown, sometimes with green rays.

Fish and Wildlife Service drawing

Five Mullusks

continued from page 11

month printing time should be allowed following the date a recovery plan is approved and signed before copies are available. A delay should be expected when ordering newly approved plans.

New Publications

Two new reports are now available from TRAFFIC (U.S.A.). *1980 U.S. Imports of African Mammal Trophies and Skins*, developed by Nancy J. Roeper, may be purchased for \$6.00. *CITES Appendix I Species in Captivity, 1977-1981*, by Lynn Gray-Schofield, contains maintenance and breeding data on captive mammals, birds, reptiles, and amphibians, and it costs \$7.50. Orders for these reports should be addressed to TRAFFIC (U.S.A.), World Wildlife Fund-U.S., 1601 Connecticut Avenue, N.W., Washington, D.C. 20009.

The National Marine Fisheries Service also has published two new publications. *A Manual of Sea Turtle Research and Conservation Techniques, Edition II*, is available in either English or Spanish (please specify in order) for \$10.00. *Proceedings of the Western Atlantic Sea Turtle Symposium*, also in English or Spanish, is available for \$20.00. Orders should be addressed to F.H. Berry, WATS, National Marine Fisheries Service, 75 Virginia Beach Drive, Miami, Florida 33149 USA.

BOX SCORE OF LISTINGS/RECOVERY PLANS

Category	ENDANGERED			THREATENED			SPECIES* TOTAL	SPECIES HAVING PLANS
	U.S. Only	U.S. & Foreign	Foreign Only	U.S. Only	U.S. & Foreign	Foreign Only		
Mammals	15	18	223	3	0	22	281	19
Birds	51	14	144	3	0	0	212	42
Reptiles	8	6	60	8	4	12	98	6
Amphibians	4	0	8	3	0	0	15	4
Fishes	30	3	11	12	1	0	57	23
Snails	3	0	1	5	0	0	9	5
Clams	23	0	2	0	0	0	25	1
Crustaceans	3	0	0	1	0	0	4	1
Insects	7	0	0	4	2	0	13	3
Plants	56	2	0	10	1	2	71	10
TOTAL	200	43	449	49	8	36	785	124**

*Separate populations of species, listed both as Endangered and Threatened, are tallied twice. Species which are thus accounted for are the gray wolf, bald eagle, American alligator, green sea turtle, Olive ridley sea turtle, and leopard.

**More than one species may be covered by some plans.

Number of species currently proposed for listing: 34 animals
26 plants

Number of Species with Critical Habitats determined: 59

Number of Recovery Plans approved: 110

Number of Cooperative Agreements signed with States: 38 fish & wildlife
11 plants

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