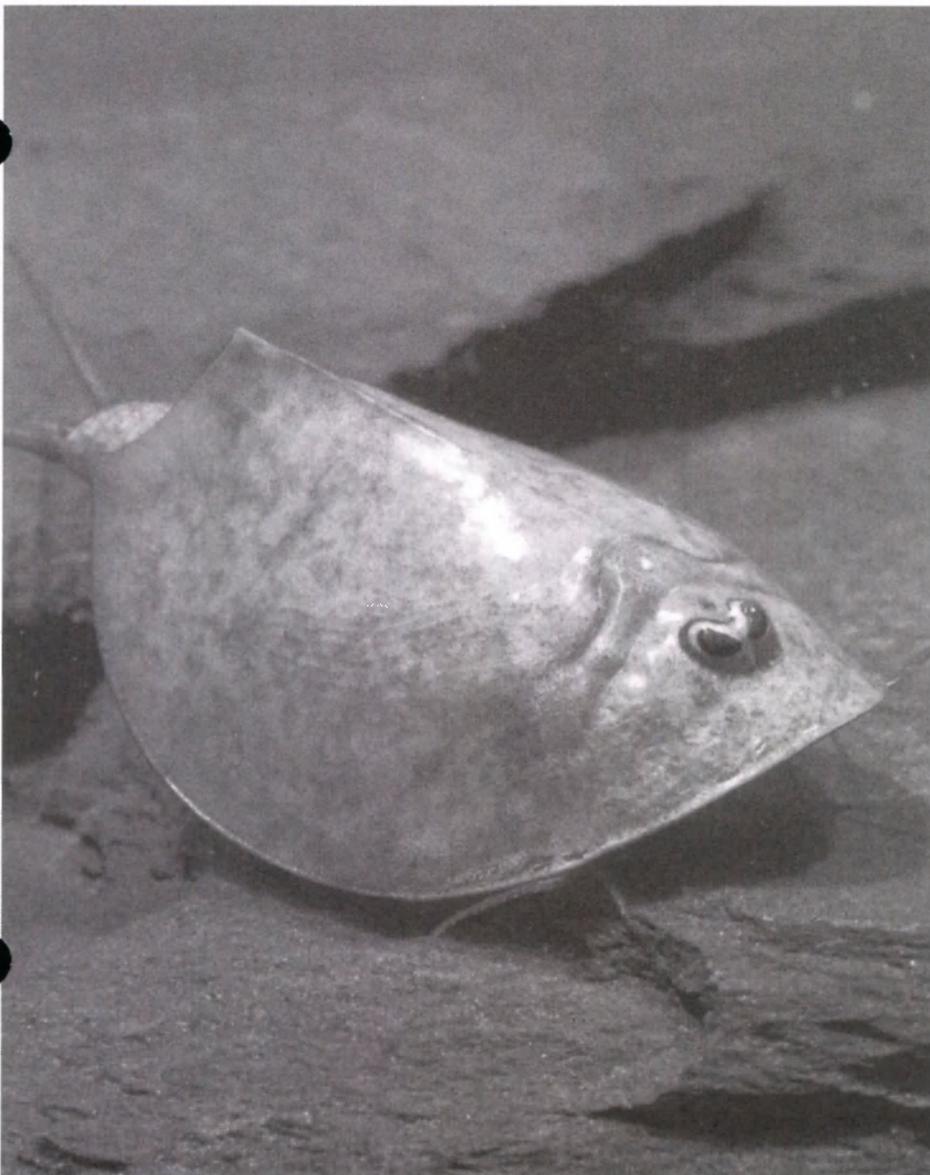


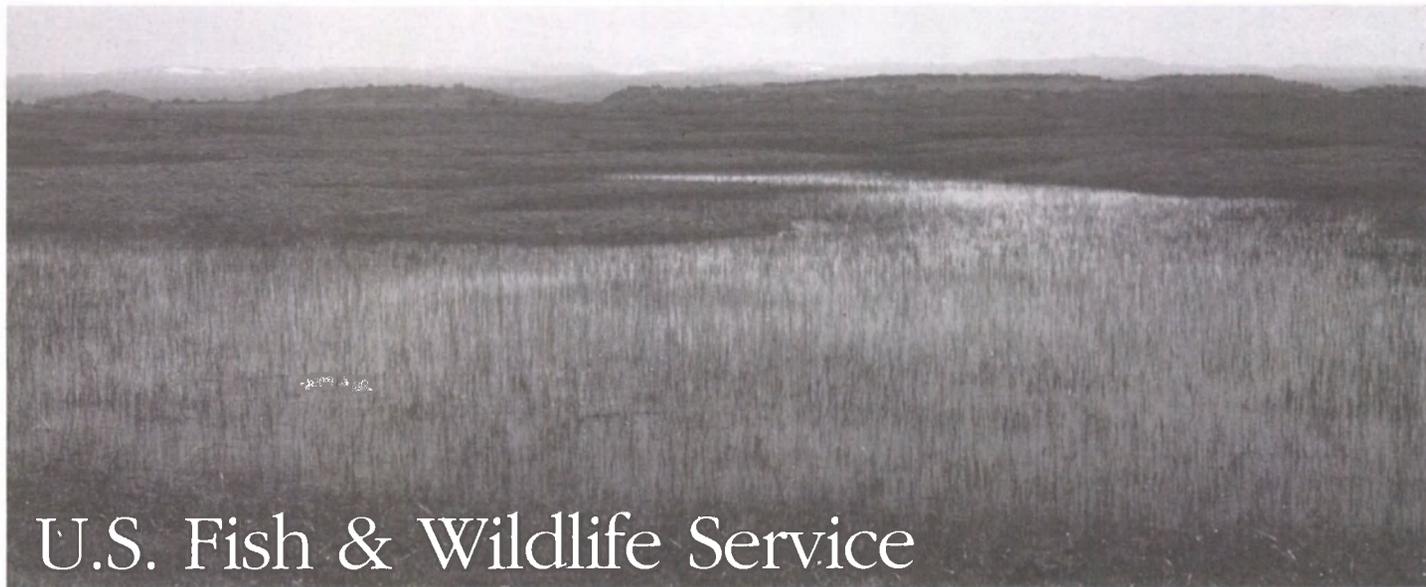
# ENDANGERED *Species* BULLETIN

U.S. DEPARTMENT OF THE INTERIOR  
MAY/JUNE 1997

FISH AND WILDLIFE SERVICE  
VOL. XXII NO. 3



*F*or many people, the term “endangered species” traditionally has conjured up images of bald eagles, grizzly bears, whales, and other charismatic species. To be sure, these magnificent creatures do need help in many parts of their ranges, and protecting their habitat benefits other species at the same time. But as knowledge of ecology and the importance of biodiversity has grown, so has our understanding of the vital roles played by invertebrates, plants, and a host of other lesser-known species. One far-sighted aspect of the Endangered Species Act is that it offers protection to virtually all plant and animal taxa that are in danger of extinction, without regard to their esthetic appeal or utility to people. This edition of the Endangered Species Bulletin provides some examples of lesser-known species, the importance of which might not always be obvious.



Bradley J. Goffe

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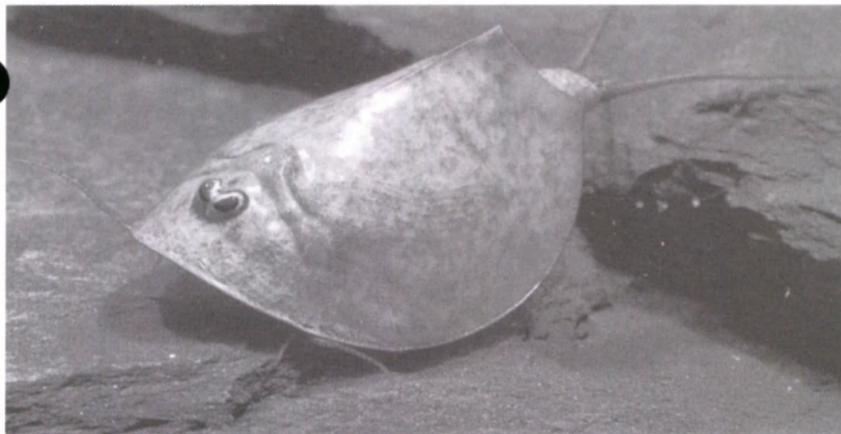
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On the Cover

**With its shield-like shell, dorsally-fused eyes, and twin tail filaments, the vernal pool tadpole shrimp is a fascinating if not widely known creature. It swims the vernal pools (opposite page) of central California.**

Photo by Larry Serpa

The Endangered Species Bulletin welcomes manuscripts on a wide range of topics related to endangered species. We are particularly interested in news about recovery, habitat conservation plans, and cooperative ventures. Please contact the Editor before preparing a manuscript. We cannot guarantee publication.

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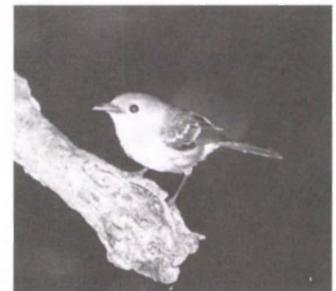


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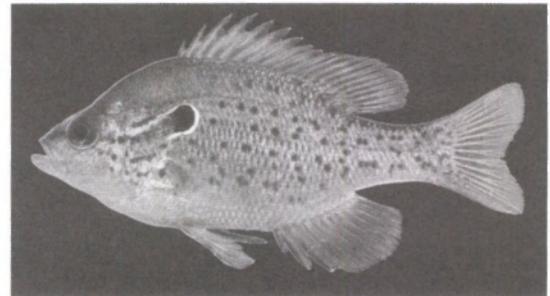


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# A “Living Fossil” in California

*H*ow many “living fossils” can you name? A living fossil is basically an organism living today that appears identical to specimens in the fossil record. The most famous example is probably the coelacanth, a primitive fish known only from fossils until a live individual was recovered by a deep-sea trawler in 1938, virtually unchanged from its fossil ancestors of approximately 70 million years ago. The tadpole shrimp is a present-day example. A freshwater crustacean “living fossil,” it derives its name from looking somewhat like a frog or toad tadpole at first glance.

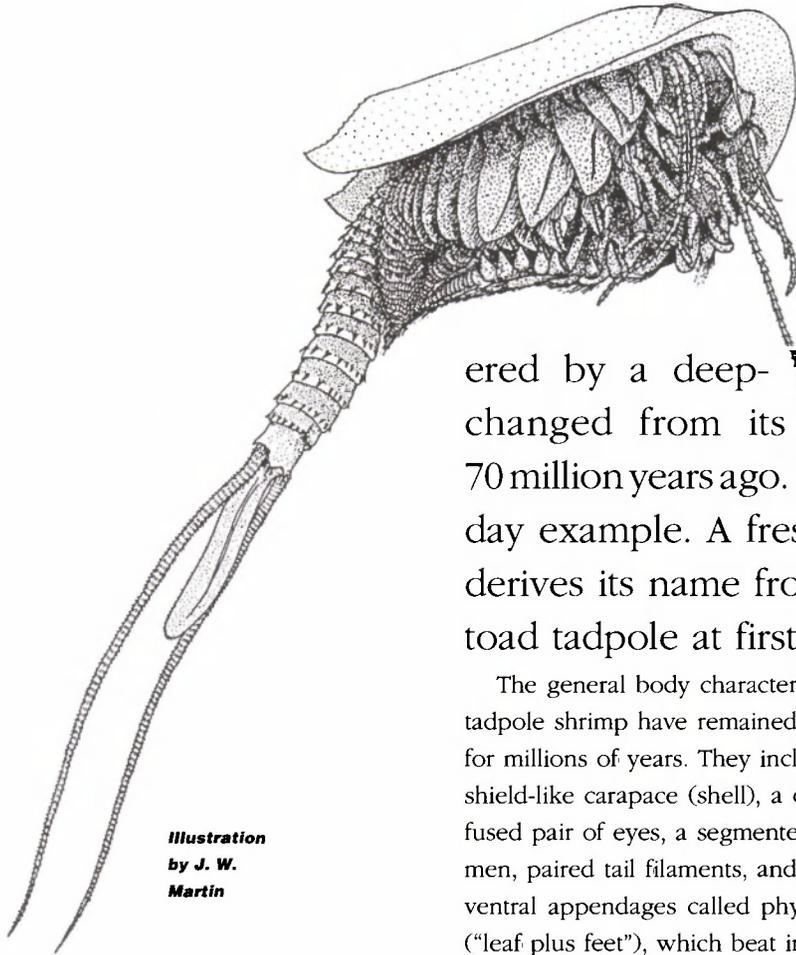


Illustration  
by J. W.  
Martin

**Vernal pool tadpole shrimp may reach an inch and a half in length, are typically olive or grey colored, and swim or scoot along muddy or rocky bottom sediments. This coloration is sometimes mottled and provides good camouflage, helping them blend in with aquatic plants or when they burrow into the muddy bottom sediments.**

The general body characteristics of tadpole shrimp have remained the same for millions of years. They include a shield-like carapace (shell), a dorsally-fused pair of eyes, a segmented abdomen, paired tail filaments, and paired ventral appendages called phyllopods (“leaf plus feet”), which beat in a wavelike motion from front to back. They act as propulsion for the animal and effectively funnel microscopic food particles up to its mouth. The vernal pool tadpole shrimp (*Lepidurus packardii*) is the only species in the genus *Lepidurus* found in the vernal or springtime pools of California’s Central Valley and the San Francisco Bay area.

Vernal pools are ephemeral wetlands, typically clustered into pool “complexes,” which form in areas where a Mediterranean climate (a moderate climate with distinct and regular wet and dry seasonality) combines with

shallow depressions underlain by soil types that restrict the downward percolation of water. In California, ephemeral pools are typically referred to as vernal (spring) pools because the pools are filled and wet during the winter and spring rainy season, and are dry the rest of the year.

Vernal pools, considered highly-unique freshwater ecosystems, are typically dry seven to eight months out of the year. They provide habitat for invertebrate animals such as crustaceans, flatworms, snails, and insects, as well as such vertebrates as amphibians, birds, and even mammals. Vernal pools are important breeding sites for frogs and salamanders, as well as feeding and resting sites for migrating waterfowl. Vernal pool tadpole shrimp (like the related “fairy shrimp” species) only live in these ephemeral freshwater habitats, an environment with few aquatic

predators, especially fish. Tadpole shrimp and fairy shrimp are not found in marine, estuarine, or riverine systems, and they become easy prey if a connection develops between the vernal pool and more permanent waters containing fish.

A key adaptation to this alternately wet and dry environment is the female tadpole shrimp's ability to produce thousands of drought-resistant cysts (encapsulated eggs) during her lifespan, some of which hatch out during the same wet season. However, for reasons that remain unclear, a large portion of the cysts produced in any given wet season will hatch only after the pool dries and subsequently refills, possibly several years later. These cysts can remain dormant and viable while embedded in vernal pool soil sediments for up to 10 years while waiting to hatch. Reaching sexual maturity in as little as three weeks allows the tadpole shrimp to hatch, mature, and produce cysts quickly after the pools refill, using to their advantage a short-lived environment to which few predator species have adapted.

The main threat to the survival of the vernal pool tadpole shrimp, as well as almost all other vernal pool species, is the continuing loss of pools due to residential/commercial development and land conversion to agricultural uses. Vernal pool habitat is rapidly diminishing throughout California. Current estimates of this habitat in California's Central Valley range from 65 to 90 percent of its former extent. This decline is expected to continue because

of the demand for essentially flat lands near metropolitan areas for development. Vernal pools also are subject to such threats as invasions of aggressive non-native plant species, gravel mining, fertilizer and pesticide contamination, overgrazing, off-road vehicle use, and contaminated stormwater runoff.

One way to give these remarkably well-adapted and virtually defenseless animals a chance to survive another million years is through the Habitat Conservation Plan (HCP) approach. An HCP can be designed for a project or a region, such as an entire watershed or a county, and generally can help accommodate the resource needs and economic needs of all interests, including the project proponents, regulatory agencies, and, of course, the wildlife.

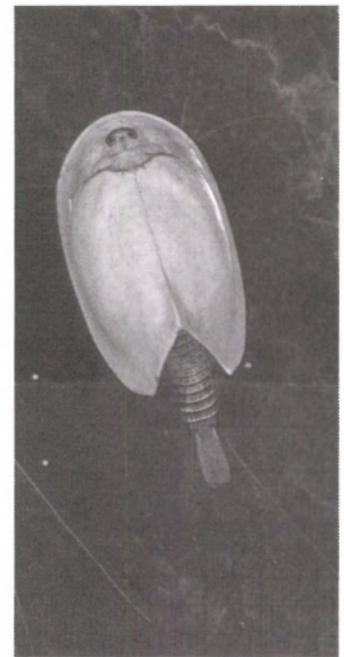
Efforts already underway to help protect vernal pool tadpole shrimp and their habitat include conservation easements with landowners, consultations with Federal agencies to avoid or reduce effects on threatened or endangered species, and research on the rearing and reproduction of this endangered crustacean. Success in these efforts will provide future generations the opportunity to marvel at a remarkable living fossil.

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**A biologist examines tadpole shrimp from a vernal pool on Big Table Mountain in Fresno County.**

*Photo by  
Bradley Goettle*



*Photo by J. L. King*

**The vernal pool tadpole shrimp is a species found only in California. The shrimp ranges in the Central Valley from the Redding area (Shasta County) in the north to around Visalia (Tulare County) in the south. The easternmost known location is around 3,500 feet (1,065 meters) in elevation in the central Sierra Nevada foothills (Merced County), with the westernmost known locations in the San Francisco Bay Area (Alameda County). The two Bay Area locations comprise the only known population of the vernal pool tadpole shrimp outside of the Central Valley. Although the shrimp may be locally abundant in some places, it is globally rare. The vernal pool tadpole shrimp was listed by the FWS as endangered on September 19, 1994, due to its very limited distribution, the small number of remaining populations, and the threats to its survival.**

# Life in a Stone Pool



**The black-spored quillwort, one of the rare granite outcrop plants of Georgia's vernal pools.**

Illustration by Vicky Holifield

Scattered across the Piedmont region of the southeastern United States, from eastern Alabama to North Carolina, lies a plant community that attracts the attention of botanists and ecologists due to its unique flora and high degree of endemism (species not found elsewhere). These communities are found on granite outcrops, unusual structures that occur either as mountains of rock rising high above the surface or as smooth, rolling "flatrocks." The outcrops are best developed in Georgia and range in size from several meters in diameter up to hundreds of acres. They superficially resemble one another, and many have similar vegetation, but they can be geologically distinct in composition. Vegetation at these sites is limited to species that can survive on the bare rock surface or in the small, shallow depressions that dot the granitic outcrops. These depressions, also known as solution pits, weathering pits, or vernal pools, are "islands" of vegetation on the bare rock and are home to the rarest of the granite outcrop plants, the black-spored quillwort (*Isoetes melanospora*), mat-forming quillwort (*Isoetes tegetiformans*), and little amphianthus (*Amphianthus pusillus*).

The geographic center of distribution for these listed species is in Georgia. In fact, the endangered black-spored quillwort and the mat-forming quillwort are only known to occur in Georgia. The black-spored quillwort historically was found in South Carolina as well, but it has not been located in that State in recent years. Currently, there are eight sites known for the black-spored quillwort and nine for the mat-forming quillwort. The little amphianthus, which is listed as threatened, has a wider

range, extending from eastern Alabama through Georgia into South Carolina. There are an estimated 57 populations of this species, most of which occur within Georgia.

The black-spored and mat-forming quillwort are members of the family Isoetaceae, a group of non-flowering plants related to the ferns. As with all quillworts, their leaves are hollow and linear in shape, giving them a grass-like appearance. Quillworts reproduce by specialized spores that are contained in structures at the base of the leaves. The leaves of the black-spored quillwort arise from a short, two-lobed, corm-like stem. They are spirally arranged (in mature plants) and several inches in length. The mat-forming quillwort is perhaps the most distinctive species in the genus. Its leaves are distichously arranged (two-ranked), rather than the usual spiral arrangement, and its mat-forming growth habit is unique among quillworts. During the growing season, the mat-forming quillwort has the appearance of "turf grass" due to this unusual growth habit.

The little amphianthus is a flowering plant in the fig-wort family (Scrophulariaceae). It is a highly specialized species with no close relatives, as evidenced by its monotypic status (a genus with only one species). This small, fibrous-rooted aquatic annual has both floating and submerged leaves that are less than one centimeter (0.4 inch) in length. Diminutive white flowers occur in the axils of both kinds of leaves.

The vernal pools on the outcrops vary in depth and other characteristics, and in turn support various types of vegetation. The three listed species

typically occur in pools with an intact rock rim, which allows the retention of water for several weeks and an accumulation of soil. These pools usually are found on the crests and flatter slopes of the outcrops where surface flow is minimized. Typically circular, these pools can be several meters in diameter or larger where adjoining pits coalesce.

The quillworts typically begin growth in late fall, when the pools are filled with water, and attain maximum growth by May. At this time, the spores mature and are shed. The leaves quickly die once the soil is desiccated. However, the underground stems are perennial and they can endure long periods of drought. Revegetation is stimulated when there is ample moisture in the soil, such as after heavy summer thunderstorms.

The greatest threat to these species is habitat destruction from quarrying. Quarrying destroyed a number of historical populations and continues to pose a threat since most populations are on private land, including several active quarries. Granite outcrops also are popular recreational sites, but overuse of such sites has resulted in damage to the geologic structures and vegetation. Vehicular traffic damages the pools by uprooting and crushing plants and displacing soil from the pools. Pools have been further impacted by excessive foot traffic and such activities as fire building and littering. The outcrops are regarded as "waste places" by many people, and as such have been used as dumping grounds or cow pasture. The concentration of cattle causes direct damage to the plants through trampling, and eutrophication of the pools from animal waste allows more competitive species to become established.

Six of the over 50 granite outcrops, with populations of one or two of the listed species, are afforded some protection due to public ownership (5 sites) or their occurrence on a Nature Conservancy Preserve (1 site). All six sites support populations of the little amphianthus, two of these also have



Photo by Cary Norquist

populations of the black-spored quillwort, and another has a population of the mat-forming quillwort. Five of these six sites are in Georgia. Additional protection is afforded to these sites under State law, which regulates the removal of these plants on State lands and prevents their removal from private land without the owner's permission. Vehicular traffic and other recreational abuses continue to be a problem, however, even at these "protected" sites. In response to such disturbances, the populations of black-spored quillwort and amphianthus were placed behind fences at Stone Mountain State Park. Protection of additional sites is being pursued by Nature Conservancy field offices, in coordination with State heritage programs.

Granitic outcrops provide an excellent opportunity for studying such important ecological principles as speciation, primary succession, and competition. If the true significance of these communities becomes more widely recognized, the notion that outcrops are of no value will become a thing of the past.

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**Few species can withstand the extreme environmental conditions of the outcrop pools. The soils are acidic and low in nutrients. The pools are likely to be filled with ice in winter and completely desiccated by drought in summer, although they fluctuate in moisture many times during late spring to early fall. Species have developed structural and functional adaptations to combat these harsh conditions. The amphianthus survives as an annual, completing its life cycle when moisture conditions are most suitable for growth. It begins germinating with the onset of cooler weather in the fall, and flowering begins in February or March and continues until the plants die with the spring drought. The seeds persist in the soil during the drought-prone summer.**

# The Return of the Riversnails

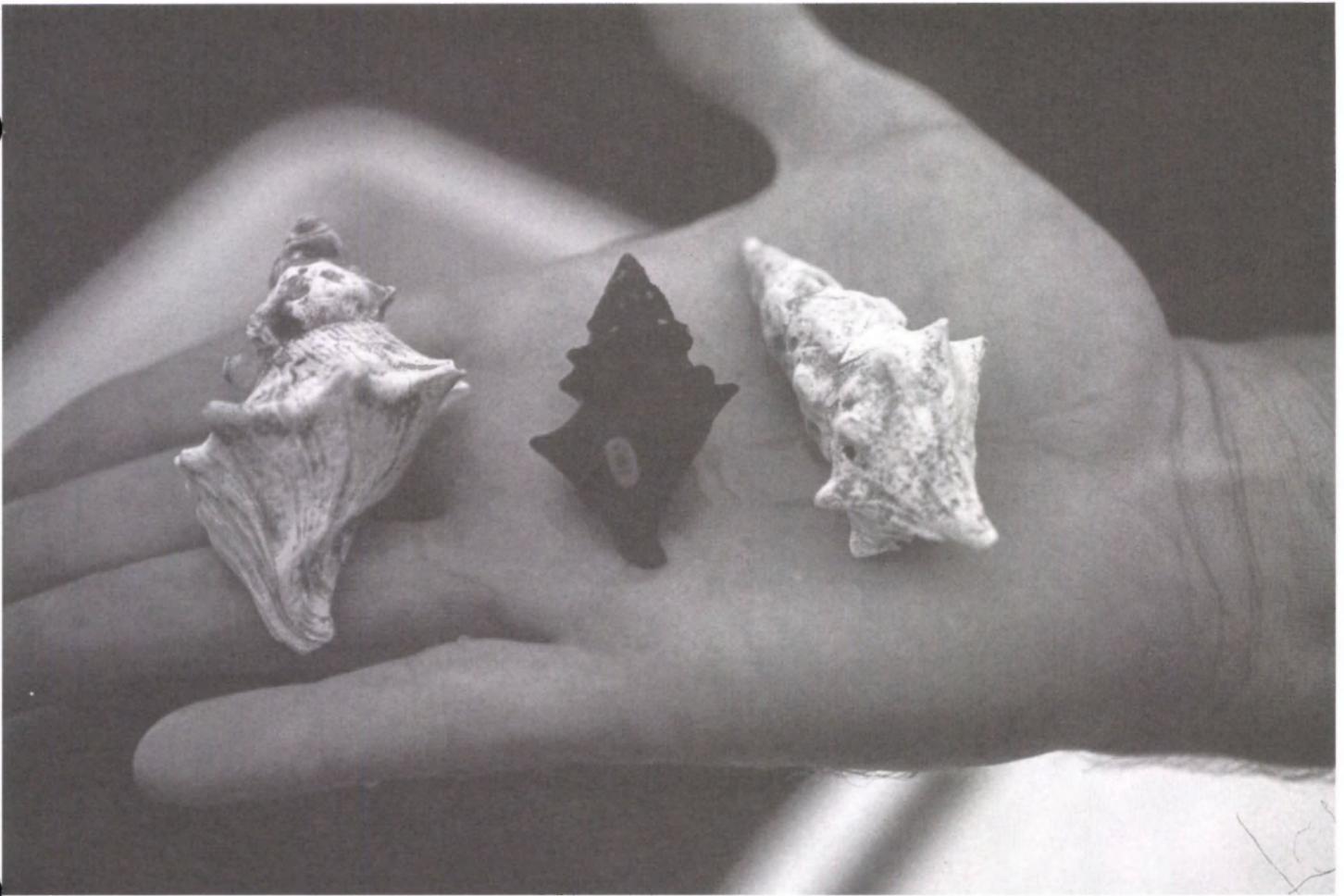
The spiny riversnail (*Iso fluviialis*), which inhabits swift water on shallow shoals, is one of North America's largest freshwater snails, growing to more than 2 inches (5 centimeters) in length. Its shell is long and tapered at both ends, varies in color from dark brown to olive green, and is well armored with spines. Females attach their eggs to smooth rocks and mussel shells from late May to early June. Their slate gray eggs, which are pink when first released, hatch in about 15 days and the snail then lives for more than 10 years. The spiny riversnail feeds by scraping algae and other organic material from rocks.

Historically, the spiny riversnail was distributed throughout much of the upper Tennessee River and its major tributaries, but widespread habitat degradation earlier this century—primarily due to water pollution, siltation, and the conversion of free-flowing streams to impoundments—eliminated the species from much of its former range. The spiny riversnail existed in only three river systems by the mid-1970's, and it was considered for Endangered Species Act protection. But in the late 1970's and mid-1980's, the Tennessee Valley Authority (TVA) and the Fish and Wildlife Service (FWS) reintroduced the species into the North Fork Holston River, Virginia, where it has now established reproducing populations. Based on these successes and the species' improved status, it was withdrawn from consideration for listing.

Another big step forward in the recovery of the spiny riversnail began in August 1996, when the U.S. Geological Survey, with FWS funding and assis-

tance from the TVA, Tennessee Wildlife Resources Agency, and The Nature Conservancy, collected 600 individuals from the Clinch River, an upper Tennessee River tributary in Hancock County, Tennessee. The snails were marked with a permanent numbered tag, measured, and released into two stretches of historic Tennessee River system habitat: the upper Holston River in Hancock County, Tennessee, above the Cherokee Reservoir; and the lower French Broad River in Knox County, Tennessee, below the Douglas Reservoir. Both rivers once supported a diverse freshwater mussel and aquatic snail fauna.

Fortunately, the physical habitat in the unimpounded reaches of these rivers remained intact, and over the last few years, water quality and aquatic biological communities have significantly improved in both rivers. These improvements have primarily resulted from: (1) the efforts of Federal and State agencies, local communities, and industry through Clean Water Act



legislation to reduce toxic discharges; and (2) the efforts of the TVA to modify reservoir discharges to benefit water quality and the rivers' aquatic organisms. Reintroduction of the spiny riversnail is part of a multi-agency cooperative attempt to restore historic biodiversity to these rivers. The techniques learned by reintroducing the spiny riversnail could eventually enable the recovery of a more imperiled species, the endangered Anthony's riversnail (*Atbearnia anthonyi*).

Anthony's riversnail once coexisted with the spiny riversnail in both the Holston and French Broad Rivers. Anthony's riversnail now exists in only a few river reaches in the southern bend area of the Tennessee River in Alabama and Tennessee. This species' recovery will require reestablishing it in other areas within its historic range.

If current reintroduction efforts for the spiny riversnail prove successful over time, credit should go to all of the agencies, industries, and individuals that

have worked to restore the rivers' habitat quality. These rivers now provide better fishing, more recreational opportunities, and the many other benefits of a clean, healthy river.

---

*Richard Biggins is a Wildlife Biologist with the FWS Asheville, North Carolina, Field Office and Steven Ahlstedt is a Biologist with the U.S. Geological Survey in Knoxville, Tennessee.*

**The spiny riversnails at the left and right are dead, bleached shells from the main stem of the Tennessee River. This species grew much larger in the main river than in its tributaries. The live snail in the center was one of the reintroduced snails.**  
Photo by Richard Biggins

By Martha Balis-Larsen and  
Tim Sutterfield

# Navy Protects Island Monarch



**The U.S. Navy leases approximately two-thirds of the island of Tinian for military training exercises. This area supports several species of wildlife that are federally or locally listed as threatened or endangered, many of which are endemic to the area. The Fish and Wildlife Service has completed a 16-month research effort on the threatened and endangered species of Tinian to assist the Navy in minimizing impacts on these species from military activities. Prior to this study, very little was known about the distribution, abundance, nesting, foraging patterns, seasonal movements, and habitat use of these species on Tinian. Results of the study have shown that Navy leasing of the area has been beneficial to most of the species due to regrowth of the native forest canopy.**

By the end of World War II, most of the small Pacific island of Tinian had been bombed, burned, or cleared. But limited military use of the island since the war has allowed for the natural restoration of Tinian flora and fauna. In many ways, this semi-protected environment has become a shelter for many species previously found only within the Marianas, including a little-known bird known as the Tinian monarch (*Monarcha takatsukasae*).

Tinian is one of the 15 islands in the Marianas Islands Archipelago. The northern 14 islands form the Commonwealth of the Northern Mariana Islands (CNMI), which is politically affiliated with the United States, while Guam, the southernmost island, is a U.S. territory. Tinian is a small island, only 20 kilometers (12 miles) long and 8 km (5 miles) at maximum, but it is the second largest island in the CNMI. Nearly the entire population of Tinian, or approximately 2,000 people, live in San Jose Village on the southwest coast. The northern two-thirds is leased to the U.S. Navy from the CNMI government. The Navy does not maintain an active presence on Tinian, but uses the island intermittently.

Between 1900 and 1940, Japanese settlers destroyed much of the native vegetation to develop the island for sugar cane production. Construction of roads, airfields, and other infrastructure to support a military presence during World War II reduced the remaining native limestone forest on Tinian to less than four percent by 1945. The limestone forest community is unique to the Mariana Islands. Once the dominant vegetation type on Tinian, the native woody plants and trees growing on the limestone substrate cover less than five

percent of the island today. Yet this fragment remains the preferred habitat for most endemic species.

## The Tinian Monarch

Probably because of the island's small human population and its geographic isolation, little basic research has been conducted on Tinian's flora and fauna. The Tinian monarch, a flycatcher endemic to the island, is a fine example. While it is considered the second-most abundant bird on Tinian, there is very limited published material on the species. This lack of basic biological information has made it difficult for land and natural resource managers from the Navy, the U.S. Fish and Wildlife Service, and the CNMI's Division of Fish and Wildlife, Department of Land and Natural Resources, and Division of Coastal Resource Management to determine the best policies for use of the land while protecting endemic species.

As a result, in 1994, the Navy established an intensive year-and-a-half survey of five species of concern: the Tinian monarch, Mariana moorhen (*Gallinula chloropus*), Micronesian megapode (*Megapodius laperouse*), green turtle (*Chelonia mydas*), and Marianas fruit bat (*Pteropus mariannus*). The primary goal of the Navy survey was to obtain information on the Tinian monarch. Listed as endangered in 1970 on the basis of a 1945 report that estimated the total population at 40-50 birds, this species was found to have grown much more abundant (over 39,300 birds) during a survey done in 1982. The 1945 survey had been conducted just after much of Tinian's forest had been destroyed.

More recent findings have noted the monarch's adaptability to the recovering forest patches. Following the 1982 survey, the Tinian monarch was reclassified to the less critical status of threatened. In 1994, the FWS, with Navy funding, replicated the 1982 Tinian forest bird survey to determine current population levels. An increase in the population to over 52,000 monarchs was indicated. The survey was repeated again in 1996, but results from this latest study are still being determined. All three studies examined sites in the three major forest types that occur on Tinian: native limestone forest, secondary forest, and tangantangan (*Leucaena leucocephala*) forest.

#### **Reliance on Native Habitat**

A total of 116 Tinian monarch nests were located during the 1994 and 1995 field seasons. Over 60 percent of the nests were found in native tree species. While the Tinian monarch is assumed to breed year round, the research found that there was pronounced seasonality in nesting activity and nesting success. Nest construction demonstrated a direct correlation to the amount of rainfall. Lack of nesting occurred during periods of low rainfall; once the rains resumed, so did nest building.

The study also showed the important role that the native limestone forest plays in the survival of Tinian monarchs. Nesting success in the limestone forest was unrivaled by the other two forest habitats, probably due to the higher availability of insects. Monarchs in non-limestone forest habitats had to travel four to five times as far to obtain prey. Overall, the data indicate that there are more monarchs in the 5 percent of Tinian that is native forest than there are in the 19 percent that is secondary forest, and almost as many as in the 38 percent that is tangantangan forest.

Nests in the remnant limestone forest areas also had higher survival rates against fire and inclement weather. Some nest destruction was attributed to dry-season fires that originated either

naturally or as a result of military training. But researchers found that the main source of nestling mortality was inclement weather. Tropical storms and typhoons were responsible for falling trees and branches, destroying monarch nests. Fire and typhoons caused the most destruction in forest habitat.

This research has revealed the importance of remnant native forest to the Tinian monarch. Preservation of the remaining limestone forest habitat on Tinian should receive high priority as CNMI and Navy resource managers plan for future use of Tinian's land. The recovery of the Tinian monarch suggests that the island's other limestone forest habitat-dependent flora and fauna have also benefited from the Navy/CNMI lease arrangement.

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**Tinian monarch (above and opposite)**

*Photos by Scott Krueger*

**Aerial view of Tinian, the second largest of the Northern Mariana Islands.**

*Photo by Scott Krueger*



By Diane Pupek

# Big-Eared Bat Bounces Back

**The Virginia big-eared bat is restricted to the southern Appalachian Mountains. Populations exist in Virginia, West Virginia, Kentucky, and North Carolina. The bats forage in a variety of habitats, including old fields, hay fields, and forested areas. Radio-telemetry studies in West Virginia have shown that these bats travel up to 10.5 kilometers (6.5 miles) from the cave roost to feed. Individual bats often return to the same feeding area night after night. Like most bats of the United States, the Virginia big-eared bat forages exclusively on insects. Small moths make up the largest part of its diet.**

*T*he future is looking brighter for the endangered Virginia big-eared bat (*Corynorhinus townsendii virginianus*), thanks to the protection of caves it depends on for shelter during winter and summer months. In winter, these bats hibernate in caves that provide cold, but above freezing, temperatures. Most Virginia big-eared bats hibernate in only three caves in West Virginia, Virginia, and Kentucky. During the summer, females congregate in warm maternity caves to raise their young. Some colonies gather in small domes in the cave ceiling where their body heat is trapped, creating a pocket of warm air. Males disperse into smaller groups separate from the females during the summer. The location of most males during the summer is not known.

The number of Virginia big-eared bats declined sharply from the 1950's to the early 1980's, mostly because people disrupted the animals in their cave roosts. These bats are very sensitive to disturbance. In winter, they are easily awakened from hibernation. Because the bats must survive the winter on a limited amount of stored fat, each arousal uses up some of the fat reserve they need to survive. If Virginia big-eared bats are disturbed repeatedly throughout the winter, they starve to death before spring arrives. In summer, disturbance of maternity colonies causes the females to panic. Young bats may drop to the cave floor and not recover, and the site may be abandoned altogether.

Fortunately, the Virginia big-eared bat has slowly increased in numbers since the early 1980's. Populations in some caves in West Virginia grew as much as 350 percent from 1983 to 1995.

However, Endangered Species Act protection is still necessary since the total population is probably less than 20,000 bats. To protect the species, critical caves are now closed to the public while the bats are present. Entrances to several caves have gates or fences to keep people from disturbing the bats.

The full recovery of this species will depend on the continuing protection of roosting caves, including cooperative efforts with private landowners to protect habitats on their property. The increase in the population of the Virginia big-eared bat is encouraging evidence that recovery work is moving forward.

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*Diane Pupek is a Biotechnician in the FWS Northeast Regional Office in Hadley Massachusetts.*

**Photo by Merlin D. Tuttle,  
Bat Conservation International**





By Mike Bender and  
Earl Possardt

# Seeking an Accord With Rattlesnakes



**Timber rattlesnake**  
Photo above and right by  
Earl Possardt

When it comes to animals with a public image problem, snakes are near the top of the list, and the animosity faced by venomous snakes is often fierce. Of course, such attitudes are not new. In 1712, the Royal Society in London received a letter from Cotton Mather, the celebrated witch hunter, that clearly indicated the attitudes of colonizing Europeans towards New England's only resident rattler, the timber rattlesnake (*Crotalus horridus*): "The Rattle-snakes have their Winter-habitations on our Hills, in hideous Caves, and the Clefs of Inaccessible Rocks. In Spring they come forth and lie Sunning themselves, but still in pretty feeble circumstances. Our Trained Bands in some of our Country towns take this time to carry on a War with the Snakes, and make the killing of them a part of their Discipline."



It appears that the war on the timber rattlesnake was well underway soon after the Europeans arrived on the continent. This attitude of fear and intolerance, backed up in many cases by bounties, followed as the Europeans colonized the snake's habitat westward. But although its numbers and habitat have been greatly reduced, the timber rattlesnake can still be found within a large part of the forested uplands of the eastern United States and the forested river bluffs that penetrate the prairies of the upper midwest. Populations now, however, are highly fragmented in the northeast and midwest, although still fairly continuous in the southern and middle Appalachians. Because of their denning requirements, most timber rattlesnakes occur at mountainous sites or along rivers with rock bluffs.

Winter denning requirements, long age to sexual maturity (7-11 years for females in the northern part of its range), long birthing intervals (3-4 years), and small litter size (6-14) make the timber rattlesnake particularly vulnerable to a variety of threats throughout the 27 States it currently inhabits. Persecution, collecting for the live animal trade, exploitation for hides, highway mortality, and habitat loss and fragmentation cumulatively pose serious rangewide threats to the timber rattlesnake. It has been extirpated from Maine, Rhode Island, Michigan, and Canada. Its distribution and numbers have been drastically reduced in at least 20 other States, primarily those in the northeast and midwest.

Due to a growing concern that current levels of awareness, protection, and conservation efforts are not adequate to prevent the eventual extirpation of the timber rattlesnake from much of its range, the U.S. Fish and Wildlife Service--through its Northeast Region's Federal Aid Office--recently sponsored a meeting of concerned Federal and State biologists, university scientists, and other rattlesnake experts at the University of Virginia's Blandy Experimental Farm in



Winchester. This group of rattlesnake experts will develop a Timber Rattlesnake Conservation Action Plan to identify the problems and conservation needs for each of the 27 States with upland timber rattlesnake populations. (The plan does not address the coastal plain canebrake rattlesnake, which is recognized by some scientists as a separate subspecies.) When complete, the plan will provide a guide for specific conservation actions needed at State and regional levels and, we hope, foster increased conservation efforts throughout the species' range. The timber rattlesnake is not considered a candidate for Federal listing under the Endangered Species Act, and successful implementation of this plan will be the best assurance to avoid a need for listing action in the future.

Future editions of the *Endangered Species Bulletin* will provide updates on the Timber Rattlesnake Conservation Action Plan as it develops. For additional information, call Earl Possardt of the Fish and Wildlife Service's Northeast Regional Office at 413-253-8526.

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*Earl Possardt is a Wildlife Biologist in the FWS Northeast Regional Office and Mike Bender is Editor of the Endangered Species Bulletin.*

**Timber rattlesnakes den under large, flat rocks.**

**Photo by Earl Possardt**

**The fear many people have of timber rattlesnakes is simple: it is the fear of being poisoned. But how dangerous is this species to people? Unlike some other rattlesnake species, the timber rattler has a docile manner, and it will seldom strike unless stepped on or directly provoked. When the snakes are encountered in the wild, it is easy to give them the right of way, leave them alone, and keep out of their striking range. The rare deaths attributed to the timber rattlesnake usually have resulted from individuals picking up snakes when intoxicated or handling snakes for religious purposes and refusing treatment for bites. In such cases, death could probably have been avoided if timely medical treatment had been obtained. Like all species, the timber rattlesnake has an ecological role to play, and ensuring the future of this fascinating creature poses little risk to the people who share its remaining range.**

by Linda Andreasen and  
Buddy Jensen



*Gila topminnow*  
Photo by Jim Johnson

# Dexter National Fish Hatchery and Technology Center

The waters of the Southwest have changed dramatically in the past 100 years. Rivers in this arid region have been dammed and diverted extensively to meet the demands of human settlement and development. In the process, scores of unique freshwater ecosystems were altered or destroyed, and many organisms dependent upon them have declined in both numbers and range. A number of others have disappeared forever. From the small, live-bearing fish of the family Poeciliidae to the 80-pound Colorado squawfish, North America's largest minnow, habitat destruction and the introduction of nonnative species has taken a heavy toll on many unique native fishes.

It became apparent from surveys conducted in the 1970's that the Southwest had a significant number of imperiled fishes that needed conservation attention. Of the 107 threatened or endangered fish species found in the United States, approximately one-third occurred in the Southwest. To address this critical issue, Dexter National Fish Hatchery began work on the recovery of listed fish species in 1978, and this effort continues today.

Originally established to meet the demands for warmwater game fish throughout the Southwest, the hatchery began operations in 1932. Since that time, Dexter's role in fishery science and management has changed dramatically from a hatchery that stocked nonnative game fish to a facility that is

working to restore populations of native species (several of which could provide recreational fishing opportunities upon their recovery). Few other facilities in the world house as many rare and endangered fish. On-going research and recovery projects include establishing captive gene pools of imperiled species, developing techniques for the cryopreservation (freezing) of fish sperm, refining spawning and culture methods, conducting diet studies, establishing captive broodstock populations, performing genetic fingerprinting of fish stocks, and producing imperiled fish for reintroduction into the wild.

Dexter National Fish Hatchery and Technology Center is located in the Pecos River Valley of southeastern New Mexico, on the northern fringe of the Chihuahuan Desert. Although Dexter is located within the Pecos River ecosystem, it also has biological and coordination responsibilities for four other ecosystems in the Fish and Wildlife Service's (FWS) Southwest Region: 1) the Upper/Middle Rio Grande; 2) the Lower Rio Grande; 3) the Gila, Salt, and Verde Rivers; and 4) the Lower Colorado River. These 4 ecosystems have shared watersheds and common endangered species concerns with Mexico.

Currently, 15 listed species are held and cultured at Dexter (see table). These fish come from nine different U.S. States (TX, NM, AZ, CA, NV, UT, CO, WY, and OR) and two Mexican States (Chihuahua and Sonora). For most of these species,

## The National Fish Hatchery System and the Recovery of Listed Fishes

**Many of the fishes of North America are moving toward extinction. Over the past decade, the number of federally listed threatened or endangered aquatic species has nearly doubled. There are currently 107 threatened and endangered fish species listed under the Endangered Species Act (ESA), comprising nearly 30 percent of the total animal species listed within the continental United States. If shellfish (i.e., mussels and clams) are included, the overall percentage of aquatic species increases to 46 percent.**

**As the number of listed and imperiled species has grown, so has the search for ways of reversing their decline and ensuring the long-term welfare of our Nation's ecosystems.**

# SPOTLIGHT ON HATCHERIES

conditions in the wild have degraded to the point that their survival is imperiled. Colorado River fishes, which evolved strange humped or ridged backs, winglike fins, and streamlined bodies to swim the once-muddy, turbulent waters, must now compete with over 100 nonnative species that are better adapted to the dammed reservoirs and connecting clear streams that have come to characterize the Colorado River. Fish species that evolved in desert springs are also losing habitat as the pumping of ground water lowers water tables and often dries the springs. In the face of these and other threats, captive fish populations have been established at

Dexter to preserve these species and their genetic diversity. These genetic "refuges" are intended as short-term solutions until habitat restoration and the eradication of non-indigenous species make reintroduction into the wild possible.

For example, the Chihuahua chub was thought to be extirpated in the U.S. until biologists discovered a small remnant population in the Archuleta/Moreno Springs of New Mexico. Through Dexter's captive propagation and stocking efforts, another population of this fish has been reestablished nearby. Meanwhile, the extant population in Chihuahua, Mexico, continues to



**Razorback sucker (above) and bonytail chub**

Illustrations by  
Dr. Robert J. Behnke

## List and status of species held at Dexter NFHTC

Species	Scientific name	Federal status
<b>Family Catostomidae</b>		
Razorback sucker	<i>Xyrauchen texanus</i>	E
Warner sucker	<i>Catostomus wamensis</i>	E
Yaqui sucker	<i>Catostomus bernaldini</i>	*,**
<b>Family Cyprinidae</b>		
Colorado squawfish	<i>Ptychocheilus lucius</i>	E
Bonytail chub	<i>Gila elegans</i>	E
Chihuahua chub	<i>Gila nigrescens</i>	T
Pahrnagat roundtail chub	<i>Gila robusta jordani</i>	E
Virgin River roundtail chub	<i>Gila robusta seminuda</i>	E
Woundfin	<i>Plagopterus argentissimus</i>	E
Guzman beautiful shiner	<i>Cyprineila f. formosa</i>	**
<b>Family Ictaluridae</b>		
Yaqui catfish	<i>Ictalurus pricei</i>	T**
<b>Family Cyprinodontidae</b>		
Leon Springs pupfish	<i>Cyprinodon bovinus</i>	E
Desert pupfish	<i>Cyprinodon macuiarius</i>	E
<b>Family Poeciliidae</b>		
Gila topminnow	<i>Poeciliopsis o. occidentalis</i>	E
Big Bend gambusia	<i>Gambusia galgei</i>	E

E = Endangered  
\* = species of concern

T = Threatened  
\*\* = species extirpated from U.S.

Fishery managers are increasingly being asked to protect and restore depleted fish stocks. The National Fish Hatchery System is working to provide innovative tools for conserving genetic diversity and, ultimately, recovering listed fishes, such as establishing refugia, captive propagation, and cryopreservation (freezing) of fish sperm.

The System is comprised of 65 Hatcheries, 5 Fish Technology Centers, and 9 Fish Health Centers. Thirty-three of these facilities are working on coordinated restoration efforts for 39 imperiled species. Fish Technology Centers and Fish Health Centers play an important role in conservation by providing leadership and technical support to fish hatcheries and other Federal, State, and private sector participants in the recovery of listed fishes.

decline due to habitat loss. Similarly, numerous populations of the desert pupfish and Gila topminnow have been reestablished successfully at sites in Arizona over the last 10 years using fish reared at Dexter. For recovery programs in Colorado and Utah, the FWS and the States have cooperatively established genetically diverse captive broodstocks of Colorado squawfish. Many of the individuals recently stocked into the San Juan River (NM, CO, UT) have successfully overwintered. Monitoring studies carried out by Utah Division of Wildlife Resources have shown greater survival than expected, with the fish eating and growing well. Such introductions hold much promise for the future of these and other imperiled fish species.

Dexter cooperates and coordinates endangered fish recovery with the FWS, other Federal agencies, the States, and, internationally, with the Mexican States of Chihuahua and Sonora. Other partners in recovery and habitat restoration include Tribal, university, and private sector participants. In one example of a cooperative recovery effort, private landowners, an oil company, a gas company, the Natural Resources Conservation Service, the

Texas Parks and Wildlife Department, and the FWS worked together to construct an earthen dam around a headspring containing the last wild population of the Leon Springs pupfish. The dam was intended to protect this population, located in the middle of an active oil and gas production field, from oil spills. Dexter also established a refugia population to ensure the species' survival in case something were to happen to the wild population in its limited habitat. In 1995, the wild population of Leon Springs pupfish was hybridized when someone illegally introduced the nonnative sheepshead minnow (*Cyprinodon variegatus*). The Dexter facility now maintains the last remaining population of pure Leon Springs pupfish.

As human activities continue to have an enormous impact on the aquatic ecosystems of the Southwest, future success in the recovery of this region's native fishes depends on attaining a balance between the human demands for water and the habitat needs of fish and wildlife. Through public outreach and partnerships, support is increasing for the work at Dexter. While the southwest is the focus of the Dexter facility, this program has broad implications for endangered fishes management and recovery throughout the United States.

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*Linda Andreasen is a Fisheries Biologist with the FWS Division of Fish Hatcheries in Washington, D.C., and Buddy Jensen is Manager of the Dexter National Fish Hatchery and Fish Technology Center.*

*Dexter's visitor's center is open to the public, and tours can be arranged by calling the facility at (505) 734-5910.*

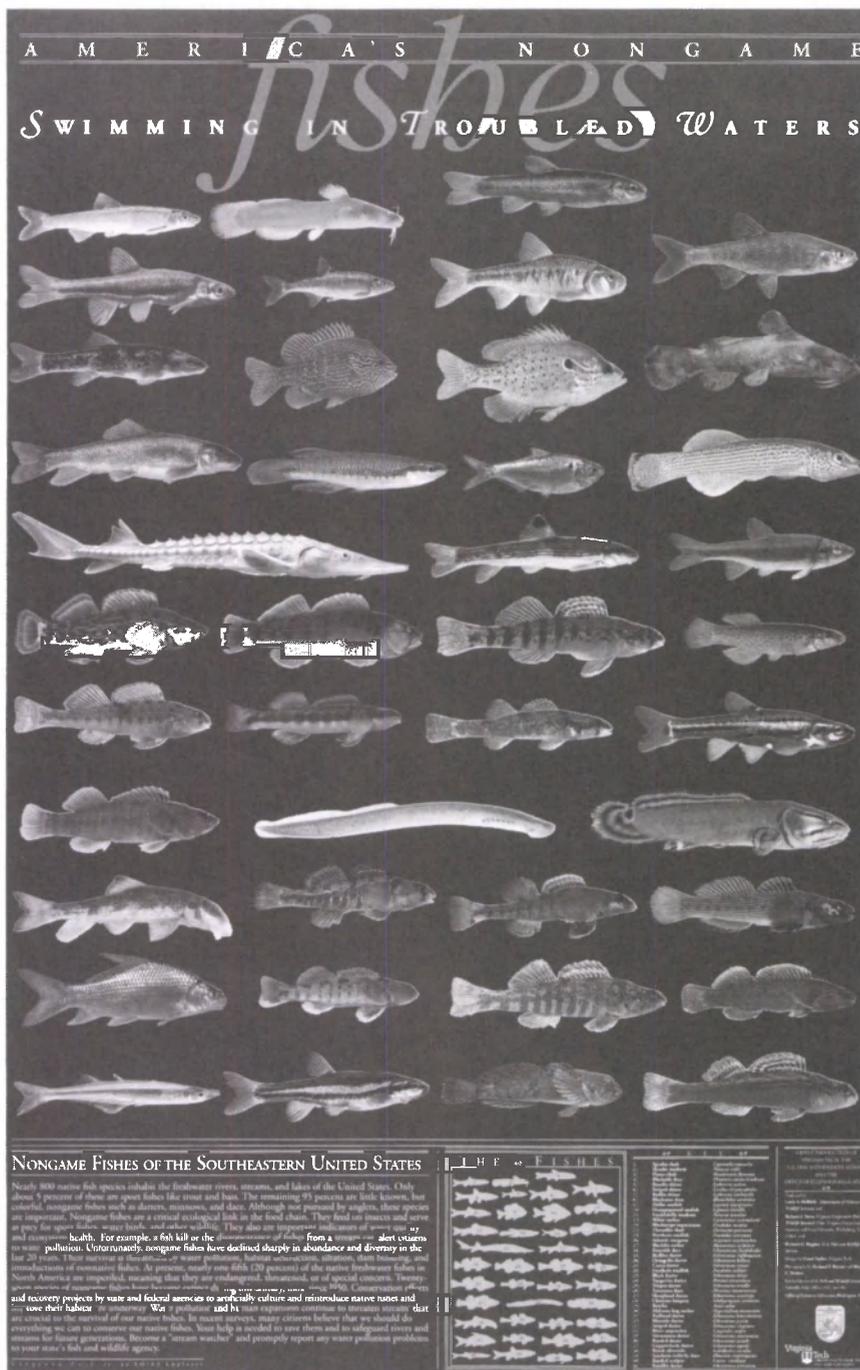


**Yaqui catfish**  
Photo by Kevin Cobble

**Buddy Jensen and Troy Winhaur, of Dexter NFHTC, examining fertilized eggs of the razorback sucker.**  
Photo by Don Hales



# Freshwater Fauna Posters



Some of the unique but little-known creatures of America's rivers and streams are depicted on a set of full-color, 24- by 36-inch posters available from Virginia Tech University. Three posters -- one each on non-game fishes, pearly mussels, and crayfishes -- portray the beauty and diversity of native species. Each poster features original

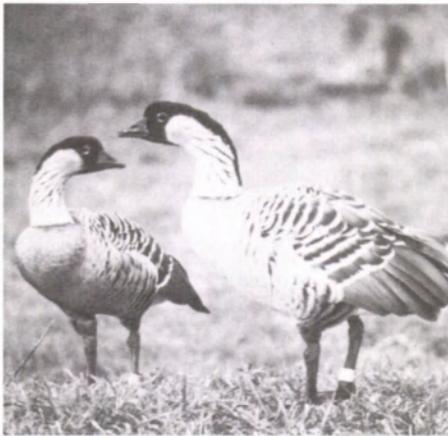
images by accomplished photographers and depicts a sample (25-41 species) of each faunal group, showing the richness of colors, shapes, and varieties inherent in these seldom-seen species. A brief narrative relates the plight of each group and the need for conservation.

To order, please send \$5.00 (plus \$2.50 for shipping and handling) per

poster to Extension Distribution Center, Virginia Polytechnic and State University, 112 Landsdowne Street, Blacksburg, Virginia 24061-0512. Make checks payable to Virginia Tech Treasurer. All proceeds from poster sales will be used to reprint and distribute free posters to secondary schools.



## Region 1



**Hawaiian geese**  
FWS photo by Glen Smart

**Nene or Hawaiian goose (*Nesochen sandvicensis*)** A pair of captive-propagated nene released in March at Hakalau Forest National Wildlife Refuge on the Big Island of Hawai'i are nesting. They weren't the adults expected to nest, but a pair of young birds! Recently, a biologist from the U.S. Geological Survey found a nest with three eggs under the corner of a refuge cabin. Refuge staff are monitoring the nest and keeping people away from the site. The refuge plans on measures to control the mongoose (a non-native predator) in the area to hold down losses of nene eggs and goslings (when the eggs hatch). Of the 10 nene released last year, 6 are still seen in the refuge administrative complex and the location of the others is not known.

**Woodland Caribou (*Rangifer tarandus caribou*)** From a low of approximately 25 individuals when listed as endangered in 1984, the Selkirk population of wood-

land caribou has, through reproduction and augmentation, doubled to approximately 59. The three herds comprising this population are in the Selkirk Mountains in Idaho, Washington, and southern British Columbia, Canada. This spring, in the second phase of a 3-year international transplant effort, 13 caribou were captured in western Canada and released in the eastern Washington part of the Selkirk Mountain Recovery Area. Caribou have a low reproductive rate, and augmentation is believed necessary to achieve recovery since the effort started with so few animals. Fish and Wildlife Service (FWS) partners in this project are the British Columbia Ministry of Environment, U.S. Forest Service, Washington Department of Fish and Game, and Idaho Fish and Game Department.

**Habitat Conservation Plan** On January 30, the FWS, the National Marine Fisheries Service, and Washington State's Department of Natural Resources signed an implementation agreement for the largest Habitat Conservation Plan (HCP) of its kind on forested lands. The 70- to 100-year HCP is designed to protect over 285 species of listed and non-listed wildlife on 1.6 million acres (647,500 hectares) of State-managed forests. The Department of Natural Resources joins four large private timber harvesting companies that have completed similar agreements resulting in a total of 2.135 million acres (864,035 ha) of northwest forested land managed for both long-term habitat conservation and timber harvest. For the Department of Natural Resources, it means a comprehensive plan for State trust lands that allows timber harvesting and other income-generating activities while emphasizing wildlife conservation and ecosystem health.



**Woodland caribou**  
Photo by Bob Summerfield

It also ensures that the different habitat types and attributes found in Pacific Northwest forest ecosystems will be provided, over time, across the landscape. Special habitat types, such as riparian and wetland areas, caves, and talus slopes, have also been addressed by provisions of the HCP

## Region 2



**Mexican gray wolf**  
FWS photo

**Mexican Gray Wolf (*Canis lupus baileyi*)** On March 4, 1997, Secretary of the Interior Bruce Babbitt signed the Record of Decision authorizing reintroduction of the Mexican wolf or lobo to part of its former range in the southwestern United States. Companion documents were signed by the Secretary of Agriculture and the Deputy Assistant Secretary of the Army because recovery areas include national forests and a missile range. In 1998, captive-reared Mexican wolves will be reintroduced into the Blue Range Wolf Recovery Area in the Apache National Forest in Arizona and allowed to disperse onto public lands in the adjacent Gila National Forest in New Mexico. A second recovery area, the White Sands Missile Range, could be used in the future if it is necessary to achieve the recovery objective of 100 Mexican wolves in the wild.

Three family groups of wolves will be moved to temporary holding pens in the Apache National Forest in early 1998 and released after an acclimation period of several weeks. Annual releases into the Blue Range area will occur over the next 5 years, or until natural reproduction is adequate to sustain the population.

The FWS is preparing the final rule to designate reintroduced Mexican wolves and their offspring as a "nonessential experimental" population. This rule will delineate recovery areas and experimental population boundaries, define guidelines for management agencies, and specify the circumstances in which citizens are permitted to harass or kill a problem wolf.

### Region 3

**Eastern Gray Wolf** In Wisconsin, eastern gray wolf numbers continue to increase. The 1996-97 late-winter wolf survey documented about 150 wolves, compared to about 100 documented during the 1995-96 surveys. Wolf numbers in Wisconsin have increased steadily since the 1984-85 winter survey. Additionally, the 1996-97 winter was the third successive year that wolf numbers in Wisconsin were over 80, which means that the criterion in the current recovery plan for reclassifying wolves in that State from endangered to threatened has been met.

However, wolf numbers did not increase in Michigan; instead, there was a small decline. About 112 animals were documented, compared to 116 during the 1995-96 winter survey. This was the first decline since wolves were noted to have returned to Michigan's Upper Peninsula in the winter of 1988-89. The decline may be due to mange and the effects of the 1995-96 and 1996-97 harsh winter conditions on deer populations. It is likely that reproduction in both deer and wolves will continue to decline for at least another year, which means that the amount of time needed for wolf numbers to rebound will increase. Even with the decline, however, wolf numbers in Michigan have been at 80 or above for three consecutive years.

### Region 5

**Peregrine Falcon (*Falco peregrinus*)** The FWS New Jersey Field Office and the New Jersey Division of Fish, Game, and Wildlife recently completed a joint study of contaminant levels in nonviable eggs collected in 1991 and 1992 from eight peregrine falcon eyries in New Jersey. The investigators measured levels of mercury (a toxic heavy metal) and several persistent organochlorine compounds. Eggs from Atlantic coast eyries contained elevated levels of polychlorinated biphenyls (PCBs). These elevated levels indicate that PCBs were the most likely contributors to hatching failure on the Atlantic coast. In contrast, eggs collected from peregrine

falcon nests along the Delaware River did not have elevated PCB levels. This difference may be attributable to varying diets between the Atlantic coast and Delaware River birds.

Dioxin concentrations in eggs from the Atlantic coast were among the highest ever documented in peregrine falcon eggs, and the mean mercury concentration at Atlantic coast eyries was more than 30 times greater than Delaware River eyries. The concentrations of PCBs, dioxins, polychlorinated dibenzofurans, DDE (a breakdown product of the pesticide DDT), and mercury in many eggs were theoretically sufficient to affect peregrine falcon reproduction. However, productivity and eggshell thinning data do not indicate that peregrines in New Jersey are experiencing reproductive impairment due to persistent contaminants. The overall effects of persistent contaminants appear to be relatively minor when compared to other influences, such as nest location (i.e., bridges), disturbance, and predation. It should be noted that peregrine falcons are more resistant to some contaminants than other species, which may be harmed by these substances at current levels. The study's sample size also was small; only eight peregrine nests were examined. In addition, some recent peregrine falcon deaths in the United States are linked to various contemporary, short-lived pesticides, including fenthion, parathion, and 4-aminopyridine. To date, there have been no systematic assessments of the effects of these shorter-lived pesticides on peregrine falcon populations.



**Peregrine falcon**  
FWS photo

During March and April of 1997, the Fish and Wildlife Service (FWS) published the following Endangered Species Act (ESA) listing actions in the *Federal Register*:

## Proposed Listing Rules

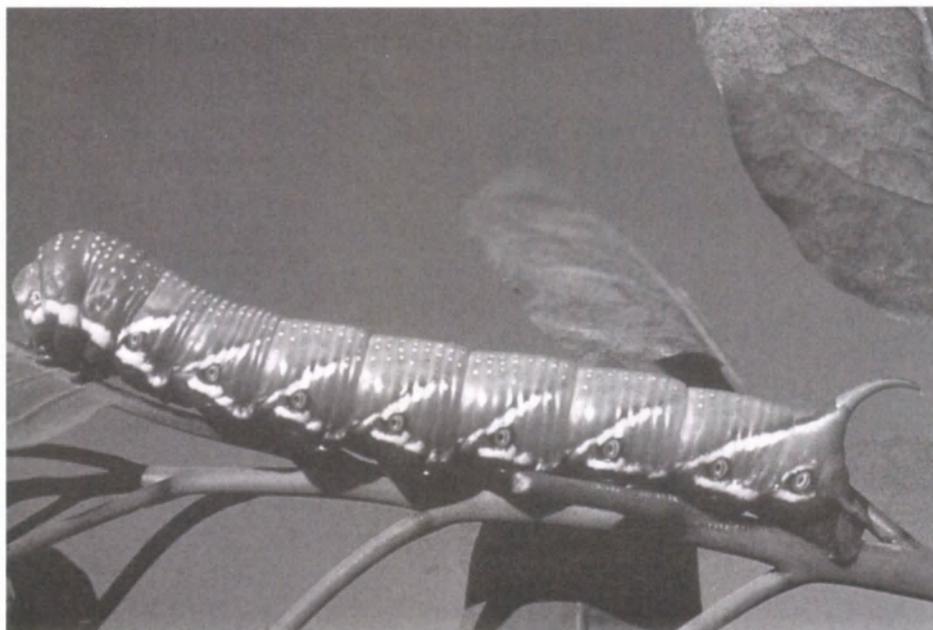
### Blackburn's sphinx moth (*Manduca blackburni*)

On April 2, the FWS proposed to list Blackburn's sphinx moth as endangered. It is not only the first Hawaiian insect ever proposed for ESA protection but also Hawaii's largest native insect, with a wing span of up to 5 inches (12 centimeters).

Once, this unusual species of moth could be found on the islands of Mau'i, Kaua'i, O'ahu, Moloka'i, and Hawai'i (the "Big Island"), but it has disappeared from most of its range. Few individuals have been sighted since 1940. Staff of the B.P. Bishop Museum in Honolulu were unable to find any Blackburn's sphinx moths during a systematic search in the late 1970's and the species was feared to be extinct, but a single population was discovered on public land on Mau'i in 1984. Its survival is imperiled by the same factors that led to the species' decline: loss of the preferred native host plant, the 'aiea (*Nothocestrum latifolium*); predation by accidentally introduced ants; and non-native insects (wasps and flies) that were introduced deliberately for biological control of other insect species. Because Blackburn's sphinx moth is now so rare,

**Blackburn's sphinx moth (opposite) has grayish-brown mottled wings and a gray abdomen with five orange spots along each side. The larva (below) is a large "homworm" caterpillar, either bright green or grayish in color. The caterpillars feed on native 'aiea trees (*Nothocestrum spp.*), native popolo shrubs (*Solanum spp.*), and other plants in the nightshade family (*Solanaceae*).**

Photos by Adam Asquith



it also is vulnerable to overcollection by hobbyists and commercial traders of rare insects.

**Preble's Meadow Jumping Mouse (*Zapus hudsonius preblei*)** This small, nocturnal mouse inhabits wet meadows and riparian habitats along the eastern edge of the Colorado Front Range and similar habitats in southeastern Wyoming. Surveys conducted during the past 5 years have found very few individuals in Wyoming and failed to find any at many historical locations in Colorado. Habitat loss and degradation caused by agricultural, residential, commercial, and industrial development imperil its survival, and the mouse was proposed on March 25 for listing as endangered.

Currently, Preble's meadow jumping mice are known to occur in Jefferson, Boulder, Douglas, and El Paso Counties in Colorado, and in Albany and Laramie Counties, Wyoming. Four of the areas where the mouse is found are Federal facilities, including the Air Force Academy and Rocky Flats Environmental Technology Site in Colorado, and Warren Air Force Base and the Medicine Bow National Forest in Wyoming. The FWS is working with the Colorado Department of Natural Resources and other partners to set up voluntary conservation efforts on both public and private lands for Preble's meadow jumping mouse and other vulnerable species.

## Final Listing Rules

Final rules added eight plants and two animals to the list of threatened and endangered species:

### Cactus Ferruginous Pygmy-owl (*Glaucidium brasilianum cactorum*)

The Arizona population of this small, formerly-abundant bird was listed on March 10 as endangered. Cactus ferruginous pygmy-owls once occurred in large numbers in streamside thickets, woodlands, thornscrub, and desert scrub habitats in central and southern Arizona, and they were common throughout the southern tip of Texas through northern Mexico. But widespread and severe loss of streamside habitats in Arizona, which constituted the main portion of the bird's U.S. range, reduced the State's known pygmy-owl population to a mere 19 individuals by 1996. Three of the owls live on Organ Pipe National Monument along the Mexican border, and the other 16 survive on private lands in the Tucson area. The FWS will offer landowners assistance in designing Habitat Conservation Plans to protect the birds while allowing compatible land uses to proceed. The FWS decided not to list the Texas pygmy-owl population, which is not facing imminent threats to its habitat.

### Barton Springs Salamander (*Eurycea sosorum*)

This small amphibian exists nowhere but in Barton Springs, located within the city of Austin, Texas. A completely aquatic species, the Barton Springs salamander retains external gills throughout its life, making it particularly sensitive to changes in water quality. Aside from its restricted range, the primary threats to this salamander are water pollution and overpumping of the aquifer that feeds the springs.

The FWS had been working with the State of Texas to implement a conservation agreement designed to preclude the need for ESA protection, but the species was listed as endangered on April 30 to comply with a court order. As a recovery plan for the Barton Springs salamander is developed, the FWS will continue to work with the State and local interests to minimize the effects on area activities. Protecting water quality for the salamander will also ensure high-quality water for the people of the region, as the Barton Springs segment of the Edwards Aquifer is the sole source of drinking water for over 35,000 citizens in two counties.

**Eight Vernal Pool Plants** Eight rare plant species endemic to vernal pools in California's Central Valley gained ESA protection through a final listing rule pub-

lished in the March 26 *Federal Register*. The three most imperiled plants, all tufted annuals in the grass family (Poaceae), were classified as endangered:

- hairy Orcutt grass (*Orcuttia pilosa*),
- Sacramento Orcutt grass (*Orcuttia viscida*), and
- Greene's tuctoria (*Tuctoria greenei*).

Because the five other species are vulnerable but not in immediate danger of extinction, they were classified under the ESA as threatened:

- San Joaquin Valley Orcutt grass (*Orcuttia inaequalis*),
- slender Orcutt grass (*Orcuttia tenuis*),
- Colusa grass (*Neostapfia colusana*),
- fleshy owl's-clover (*Castilleja campestris* ssp. *succulenta*) -- an annual herb in the snapdragon family (Scrophulariaceae), and
- Hoover's spurge (*Chamaesyce hooveri*) -- an annual herb in the spurge family (Euphorbiaceae).

Vernal pools are seasonal wetlands that fill during the fall and winter rains and dry out through the spring and summer months. Most of the Central Valley's vernal pool habitats have been altered or destroyed by urban and landfill development, conversion of natural lands to agriculture, competition from non-native plants, aggregate mining, overgrazing by livestock, off-road vehicle use, and other activities that alter wetland hydrology.

## Withdrawal

**Ortegon (*Coccoloba rugosa*)** A 1993 proposal to list this evergreen tree as threatened was withdrawn by the FWS on March 4, 1997. A species native to Puerto Rico, the ortegon is no longer believed to be vulnerable to extinction because additional populations have been discovered.

## Agencies Propose a "No Surprises" Policy

A "No Surprises" policy to provide assurances to landowners who are participating in habitat conservation plans for endangered species was officially proposed as a regulation on May 29 by the Interior Department's U.S. Fish and Wildlife Service and the Commerce Department's National Marine Fisheries Service.

The policy, which was codified in response to a suit filed in 1996 by the Spirit of the Sage Council and settled last March, says that the Federal government will not require landowners who are complying in good faith with the terms of an HCP permit to provide additional land or financial compensation for species covered under a properly functioning HCP. Neither Federal agency will seek any other form of additional mitigation except under unforeseen circumstances.

"Landowners with private or commercial land have a legitimate concern," said Interior Secretary Bruce Babbitt. "They want some assurance that, once they agree to be a party to an HCP and to mitigate the effects of their activities on listed species, we won't come back later for a second bite from the apple. "No Surprises" addresses that concern in a very concrete way: like its name, it signifies that a deal is a deal and that there will be no surprises down the road."

Both Federal agencies began implementing the "No Surprises" policy for HCPs in 1994 and credit the policy with protecting habitat on more than one million acres of private land, that is not required under the Endangered Species Act, and attracting hundreds of private landowners to the table to establish HCPs for endangered species. More than 200 such plans have been established and another 200+ are being developed.

In 1982, Congress authorized habitat conservation plans, designed to protect a species while allowing economic development and encouraging "creative partnerships" when it became apparent that the Endangered Species Act lacked such a mechanism. An HCP allows both agencies to permit "taking" of endangered or threatened species on private land incidental to otherwise lawful activities when the land has been studied by qualified scientists as part of an HCP planning process and habitat conservation areas or other mitigation measures have been taken to protect species under the Endangered Species Act.

Written comments will be accepted during a 60-day public comment period and may be mailed to Chief, Endangered Species Division, U.S. Fish and Wildlife Service (452 ARLSQ), 1849 C St. NW, Washington, DC 20240, or to Chief, Endangered Species Division, National Marine Fisheries Service, Office of Protected Resources, 1315 East-West Highway, Silver Spring, Maryland 20910.



**Blackburn's sphinx moth**

# BOX SCORE

Listings and Recovery Plans as of May 31, 1997

GROUP	ENDANGERED		THREATENED		TOTAL LISTINGS	SPECIES W/ PLANS
	U.S.	FOREIGN	U.S.	FOREIGN		
 MAMMALS	55	252	8	16	331	39
 BIRDS	75	178	14	6	273	72
 REPTILES	15	64	18	14	111	31
 AMPHIBIANS	9	8	6	1	24	11
 FISHES	67	11	40	0	118	74
 SNAILS	15	1	7	0	23	18
 CLAMS	56	2	6	0	64	44
 CRUSTACEANS	15	0	3	0	18	6
 INSECTS	24	4	9	0	37	21
 ARACHNIDS	5	0	0	0	5	4
<b>ANIMAL SUBTOTAL</b>	<b>336</b>	<b>520</b>	<b>111</b>	<b>37</b>	<b>1,004</b>	<b>320</b>
 FLOWERING PLANTS	495	1	110	0	606	313
 CONIFERS	2	0	0	2	4	1
 FERNS AND OTHERS	26	0	2	0	28	19
<b>PLANT SUBTOTAL</b>	<b>523</b>	<b>1</b>	<b>112</b>	<b>2</b>	<b>638</b>	<b>333</b>
<b>GRAND TOTAL</b>	<b>859</b>	<b>521</b>	<b>223</b>	<b>39</b>	<b>1,642*</b>	<b>653**</b>

**TOTAL U.S. ENDANGERED:** 859 (336 animals, 523 plants)  
**TOTAL U.S. THREATENED:** 223 (111 animals, 112 plants)  
**TOTAL U.S. LISTED:** 1082 (447 animals\*\*\*, 635 plants)

\*Separate populations of a species listed both as Endangered and Threatened are tallied once, for the endangered population only. Those species are the argali, leopard, gray wolf, piping plover, roseate tern, chimpanzee, green sea turtle, saltwater crocodile, and olive ridley sea turtle. For the purposes

of the Endangered Species Act, the term "species" can mean a species, subspecies, or distinct vertebrate population. Several entries also represent entire genera or even families.

\*\*There are 454 approved recovery plans. Some recovery plans cover more than one species, and a few species have separate plans covering different parts of their ranges. Recovery plans are drawn up only for listed species that occur in the United States.

\*\*\*Four animals have dual status in the U.S..

**E N D A N G E R E D**  
*Species*  
**B U L L E T I N**

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

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