

Protecting Wetlands for *Amphibian and Reptile Conservation*

Wetlands are important elements of a watershed because they serve as the vital link between land and water resources. Wetlands play an integral role in the ecology of a watershed. Their shallow waters, nutrients, and primary productivity are ideal for organisms that form the base of the food web upon which many species of wildlife depend. Wetland habitat provides the necessary food, water and shelter for mammals and migrating birds. Other animals, such as amphibians and reptiles, collectively known as herpetofauna, or “herps,” depend on wetlands for all or part of their life cycle, meaning that their survival is directly linked to the presence and condition of wetlands.



Amphibians and Reptiles Depend on Wetlands

Wetlands serve as critical habitat for many species of amphibians and reptiles. Most amphibians lay gelatinous eggs under water, while others, like certain salamanders, lay their eggs on moist land. After the eggs hatch, the baby amphibians enter an aquatic larval stage, which can last from several days to many months. Once the aquatic stage is completed, the amphibians leave the water and enter the terrestrial adult stage of life. Wetlands serve as breeding sites, as a habitat for larval development and as a primary food source for adults. Insects, spiders, snails, worms and small fish are all prey for certain amphibians.

For many reptiles, wetlands also serve as primary habitat, supplying them with an ample source of food and habitat for breeding and nursing. Specially adapted reptiles that are able swimmers are likely to be found in wetlands. Some of these include the common snapping turtle, spotted turtle, northern water snake, cottonmouth snake, diamondback water snake and garter snakes.

Amphibians and reptiles depend upon a variety of wetland types. These may include marshes, swamps, bogs and fens (and their associated subclasses). Some wetlands are only wet a portion of the year and are considered “ephemeral” wetlands. These wetlands provide important habitat and breeding grounds (see side bar).

There are often strong ecological connections among wetlands in a landscape. Although some may be permanent and others ephemeral, amphibian populations can depend on multiple wetlands within a given area. To protect these species over the long term, the variety and density of suitable habitat sites within the landscape must be preserved, along with terrestrial corridors that connect the wetlands.

Why are ephemeral wetlands important?

Vernal pools, one type of ephemeral wetland, are of critical importance to amphibian populations. As small, often isolated wetlands, vernal pools are only wet for a portion of the year. Periodic drying creates a fish-free environment for amphibians, many of which have adapted rapid egg and larval stages as a race against the dry season. The absence of fish predators in vernal pools benefits amphibian populations.



Garter Snake (*Thamnophis elegans*) - When disturbed, garter snakes will release an unpleasant smelling musk from glands located at the base of their tail.

Photo courtesy of FARC

Threats to Herps and Wetlands



Photo by Jay Osenkowski

The American toad (*Bufo americanus*) is one of the most commonly heard frog or toad species in the United States. The male toad's call is a long, uninterrupted 15-20 second trill that can be heard over a long distance.

Wetland Habitat Loss

Over 220 million acres of wetlands are thought to have existed in the lower 48 states prior to 1700. Since then, extensive losses have occurred, and over half of our original wetlands have been drained and converted to other uses. Though the rate of loss has decreased in recent decades, wetlands and other aquatic resources are still threatened by activities such as ditching, draining, dredging and stream channelization; deposition of fill material for commercial and residential development, dikes, levees and dams; crop production, logging and mining. Since many amphibian species need both aquatic and terrestrial habitat, it is very important to preserve wetlands and a buffer strip of adequate upland habitat.

Why are amphibians so vulnerable?

Some amphibians breathe through their porous skin, which makes them extremely vulnerable to pollution in the soil, air, and water. You can think of amphibians as sponges that soak up their surrounding environment. This is why you shouldn't try to catch frogs if you have insect repellent on- the toxic repellent will seep into their skin and harm them.

Chemical Pollution

Due to their amphibious lifestyles, herpetofauna are very sensitive to changes in the water and surrounding land. Many synthetic organic compounds and metals adversely affect amphibians and reptiles. Sublethal effects of chemical pollutants can impair a herp's ability to swim, catch food and reproduce successfully. Amphibians are particularly sensitive to chemical contaminants owing to their permeable eggs and skin. A recent study by the U.S. Geological Survey (USGS) showed that "organophosphorus pesticides from agricultural areas, which are transported to the Sierra Nevada on prevailing summer winds, may be affecting populations of amphibians that breed in mountain ponds and streams." The scientists estimate that damage could be even worse for those species more closely associated with water.

Endocrine disrupting chemicals (EDC) have been of great concern in the amphibian and reptile community. Studies have shown that chemicals like polychlorinated biphenyls (PCBs) build up in turtle eggs, reduce eggshell thickness and cause reproductive failure. Other studies have shown reduced male organ size among reptiles, which results in difficult sex recognition and the subsequent lack of reproduction. Both amphibians and reptiles are very susceptible to the dangers of EDCs.

Photo by Alan Savitsky



Marbled Salamander (*Ambystoma opacum*) - Courtship begins when the male nudges the female with his snout.

In order to maintain healthy amphibian and reptile populations, wetland habitat must be protected. A watershed contains multiple habitats, all of which are affected by changes in hydrology, land use and water quality. Since no habitat is isolated from its surroundings, protection of herps must take place at both the large-scale watershed level and at the smaller scale of individual wetlands.

Population declines and disappearances of amphibians and reptiles leading to widespread scientific and public concern have been well documented. The causes for their decline, while not fully understood, appear to be complex and numerous.

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Nutrient Loading

The indirect effects of excess nutrients can be very detrimental to amphibians. Nutrients such as nitrogen and phosphorous can cause dominance of algae, which is not conducive to laying eggs. Excess nutrients can also reduce the amount of oxygen available in the water for amphibian tadpoles and alter the composition and numbers of the invertebrate communities that are food for the juveniles. In Texas, playa wetlands receiving nutrient-laden feedlot effluent were devoid of amphibians found in natural wetlands. In this case, experiments indicated that the nutrient concentrated effluent had to be reduced to less than 3% of its original strength in order to minimize adverse effects.

Some turtles, such as the diamondback terrapin, are endangered owing to commercial harvesting, stemming primarily from the food industry.

The pet trade also endangers many reptiles, such as the box turtle.

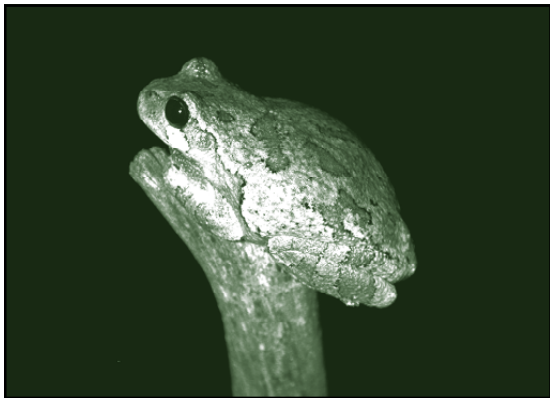


Photo by Melinda Knutson

Eastern Gray Treefrog (*Hyla versicolor*) - Its call is a resonant, flutelike trill similar to the call of the red-bellied woodpecker. Depending upon its environment, this treefrog can range in color from bright green to gray. They breed in permanent to semi-permanent wetlands.

On the whole, it is difficult to document reptile population trends. Many species have secretive natures, which, when combined with large home ranges, low population densities and a rarity of congregational behavior, may result in a severe population decline without being noticed by people.



Photo by Mark Bright

American Crocodile (*Crocodylus acutus*) - Once hunted intensively for their hides, today poaching and the loss of habitat to human development are the greatest threats faced by American crocodiles.

Additional Threats

Global climate change may threaten aquatic and semiaquatic life by reducing wetland acreage due to frequency and severity of storms and sea level rise. Latitudinal shifts in temperature and precipitation patterns also threaten herps.

Ozone depletion causes an increase in the amount of Ultraviolet radiation that reaches the earth's surface and waters. Research has shown that UV-B radiation has adverse effects on some amphibians. The Montreal Protocol has reduced emissions of ozone-depleting chemicals.

Invasive species pose a constant threat to native herps. Invasive plants and animals can alter the ecological community that is relied upon by native reptiles and amphibians. Invasive herpetofauna can also directly damage native populations. In many parts of the U.S., invading bullfrogs are preying on and often eliminating other amphibians, as well as impacting some reptiles and fish.

Disease and Parasites significantly contribute to declining amphibian and reptile populations. To help prevent the spread of disease and parasites, follow careful washing procedures when traveling between wetlands.

Conservation Efforts for Amphibians and Reptiles

Conservation efforts for amphibians and reptiles come in many different forms. Like other wildlife conservation efforts, the first step is to identify and monitor existing populations. The USGS has a volunteer monitoring program where participants learn to identify local frog calls and submit observational data at different times of the year.

Fortunately, laws are being passed in some States to protect herpetofauna. New Jersey adopted special protections for vernal pools to ensure sufficient regulatory review. California enforces laws to prevent people from taking native reptiles and amphibians without a license, except common herp species. The laws also forbid the sale of herpetofauna for human consumption. Various bird and wetland initiatives have positive impacts on herps as well.

The North American Wetlands Conservation Act (NAWCA), a habitat-oriented program led by the U.S. Fish and Wildlife Service, has been particularly helpful to amphibians and reptiles, as waterfowl and herpetofauna often share the same habitat. The conservation programs within the U.S. Department of Agriculture's Farm Bill program also help to preserve or restore habitat for herpetofauna.

How Can You Help?

You can help to save amphibian and reptile diversity in many different ways. On a larger scale, working to protect your watershed is the first step to ensuring clean water and healthy habitat for herps. You should:

- Prevent soil erosion by seeding for grass or planting shrubs;
- Avoid dumping chemicals down drains;
- Maintain vegetative buffer strips between your land and any surface waterbody; and
- Avoid releasing or transporting exotic plant or animal species into the environment.

Protecting surface water and wetlands is important to promoting herp diversity. Identifying, monitoring and restoring local wetlands are great ways to educate yourself and your community about the important functions and values of wetlands. Supporting public and private organizations involved in habitat protection is another way to help. Further information can be found at <http://www.epa.gov/owow/wetlands/vital/protection>.



Photo courtesy of PARC

The chicken turtle (*Deirochelys reticularia*) is found in the southeastern United States from southeast Virginia to east Texas. Their preferred habitat includes quiet bodies of water such as ponds, swamps, and marshes. Although an aquatic species, it readily wanders and is often found out of water. They are mainly carnivorous, and their diet includes tadpoles and crayfish.

PARC - Partners in Amphibian and Reptile Conservation

Partners in Amphibian and Reptile Conservation (PARC) is the largest herpetological conservation partnership in the nation. They are a habitat-focused partnership involving State agencies, Federal agencies, the private sector, conservation organizations, and the academic community. The partnership is dedicated to protecting endangered reptile and amphibian species and keeping common native species common. Their website (www.parcplace.org) contains educational materials on the conservation of amphibians and reptiles along with an extensive list of weblinks.



EPA 843-F-03-015
Office of Water

Additional Resources

On the Internet

Partners for Amphibian and Reptile Conservation	www.parcplace.org
U.S. Environmental Protection Agency	www.epa.gov/owow/wetlands
U.S. Geological Society	www.usgs.gov/amphibians
U.S. Fish and Wildlife Service	www.wetlands.fws.gov
USDA Natural Resources Conservation Service	www.nrcs.usda.gov/programs/wrp