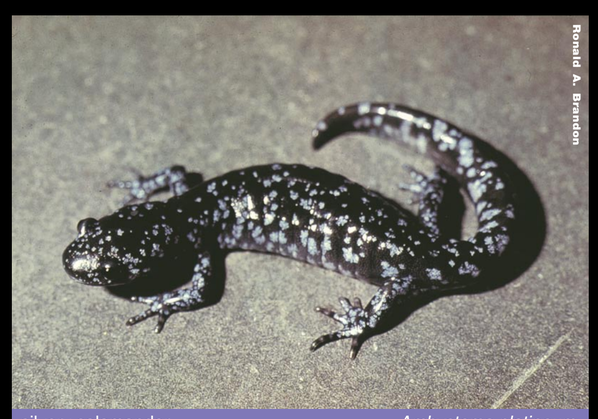
Illinois Salamanders

Jefferson salamander *Ambystoma jeffersonianum*

blue-spotted salamander *Ambystoma laterale*

spotted salamander *Ambystoma maculatum*

marbled salamander *Ambystoma opacum*

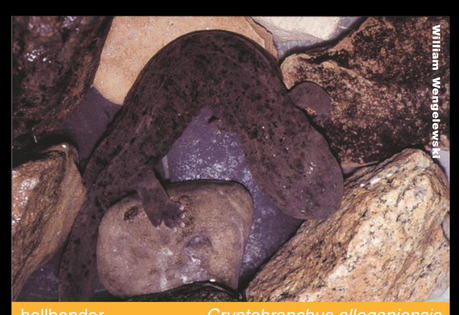


silvery salamander *Ambystoma platineum*

mole salamander *Ambystoma talpoideum*

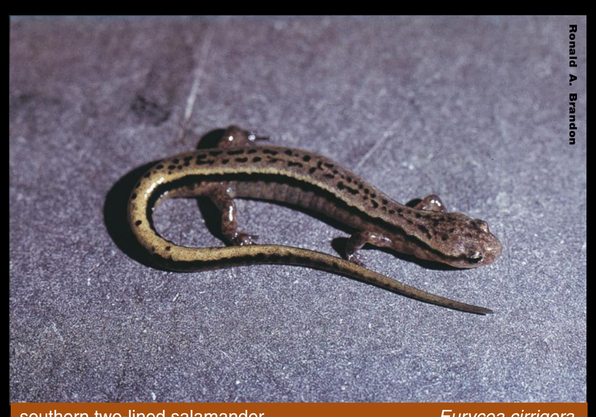
smallmouth salamander *Ambystoma texanum*

tiger salamander *Ambystoma tigrinum*

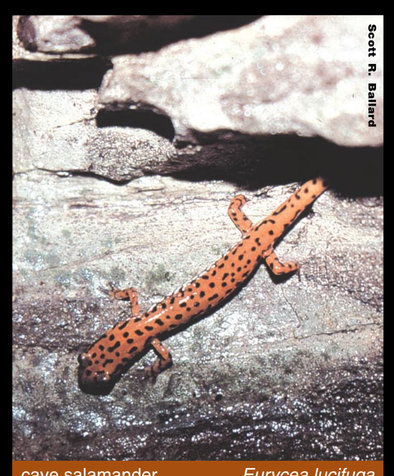


hellbender *Cryptobranchus alleganiensis*

spotted dusky salamander *Desmognathus conanti*

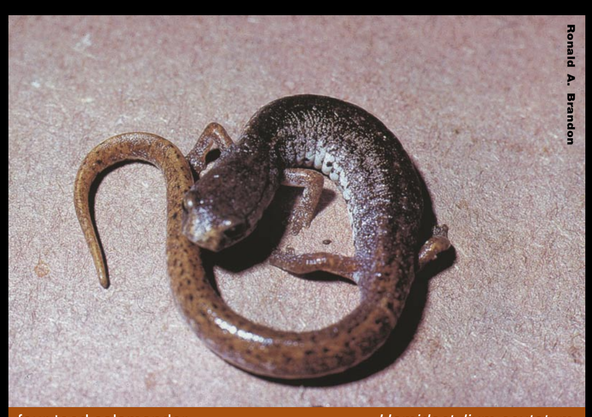


southern two-lined salamander *Eurycea cirrigera*



cave salamander *Eurycea lucifuga*

longtail salamander *Eurycea longicauda*



four-toed salamander *Hemidactylium scutatum*

zigzag salamander *Plethodon dorsalis*

zigzag salamander (SW Illinois) *Plethodon dorsalis*

redback salamander *Plethodon cinereus*

northern slimy salamander *Plethodon glutinosus*

mudpuppy *Necturus maculosus*

eastern newt *Notophthalmus viridescens*

eastern newt (eft) *Notophthalmus viridescens*

lesser siren *Siren intermedia*

Twenty species of salamanders occur in Illinois. Because of their secretive and mainly nocturnal habits, they are observed less often than our state's other amphibians, the frogs and toads. **Terrestrial** salamanders live in forests in underground burrows, in or under rotting logs, under rocks and leaves, and around springs and streams. They venture out of these places only at night or following heavy rainfall. Larvae and aquatic adults live in rivers, creeks, lakes, ponds, swamps, and ditches. Salamanders are predators of earthworms, snails, slugs, spiders, insects, and other invertebrates. A few salamanders also eat small vertebrates, including other salamanders. In turn, they are consumed by a variety of fishes, small mammals, birds, snakes, and invertebrates. Terrestrial salamanders use their thin skin for **respiration**, which requires that they live in moist surroundings. The chief conservation concerns for Illinois salamanders are habitat **fragmentation** and habitat loss.

glossary terms defined on reverse

Species List

Classification:
Phylum Chordata
Class Amphibia
Order Caudata

All species of salamanders currently found in Illinois are represented above. Salamanders are not shown in equal proportion to actual size.

Family Ambystomatidae

Jefferson salamander	*Ambystoma jeffersonianum*
blue-spotted salamander	*Ambystoma laterale*
spotted salamander	*Ambystoma maculatum*
marbled salamander	*Ambystoma opacum*
silvery salamander	*Ambystoma platineum*
mole salamander	*Ambystoma talpoideum*
smallmouth salamander	*Ambystoma texanum*
tiger salamander	*Ambystoma tigrinum*

Family Cryptobranchidae

hellbender	*Cryptobranchus alleganiensis*

Family Plethodontidae

spotted dusky salamander	*Desmognathus conanti*
southern two-lined salamander	*Eurycea cirrigera*
longtail salamander	*Eurycea longicauda*
cave salamander	*Eurycea lucifuga*
four-toed salamander	*Hemidactylium scutatum*
redback salamander	*Plethodon cinereus*
zigzag salamander	*Plethodon dorsalis*
northern slimy salamander	*Plethodon glutinosus*

Family Proteidae

mudpuppy	*Necturus maculosus*

Family Salamandridae

eastern newt	*Notophthalmus viridescens*

Family Sirenidae

lesser siren	*Siren intermedia*

This poster was made possible by:

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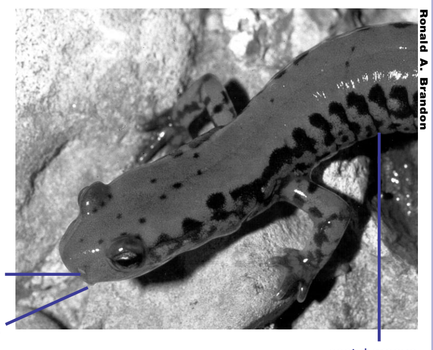
Design: Illinois State Museum

Anatomy

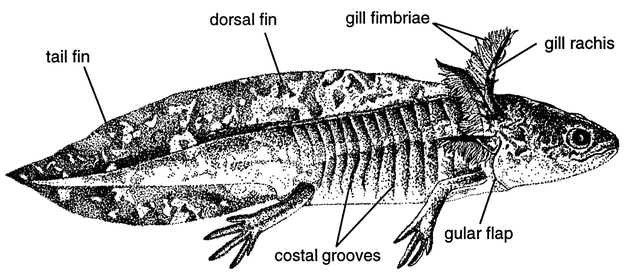


Ronald A. Brandon

Longtail salamander showing the nostril, nasolabial groove, and cirrus on the upper lip. Note also the costal grooves along the side. Like most salamanders it has four toes on the front foot.

Adult salamanders resemble lizards in general body form but have four toes on each of their front feet (versus five in lizards), and their soft skin is not covered with scales. Many salamanders may be recognized easily by distinctive traits or the number of legs or toes. The lesser siren (*Siren intermedia*), for example, lacks rear legs. The mudpuppy (*Necturus maculosus*) and four-toed salamander (*Hemidactylium scutatum*) have four toes on each hind foot, whereas all other Illinois salamanders have five toes per hind foot. **Nasolabial grooves** are present in the eight species of the family Plethodontidae yet are absent in all other Illinois species. The eastern newt (*Notophthalmus viridescens*) lacks the **costal grooves** that are easily seen on other salamanders. Male and female newts can be distinguished by their appearance, but it is difficult to tell the sexes apart in other salamanders except early in the breeding season. At this time, the female's body bulges with unlaid eggs. Males of some salamanders have **secondary sexual features** like enlarged **cirri** (genus *Eurycea*), **mental glands** (genus *Plethodon*), or enlarged **cloacal glands** (genus *Ambystoma*). Identifying **larvae** is challenging even to experts because the appearance of larvae changes constantly as they grow.

Even though most of our salamanders have lungs, the exchange of oxygen and carbon dioxide for **respiration** occurs mainly through their skin. The skin is kept moist for this function by **mucus** secreted by skin glands. Eight Illinois species of salamanders (family Plethodontidae) lack lungs and rely entirely on the skin and mouth lining for gas exchange. **Larval** salamanders and the adults of the lesser siren and mudpuppy have external gills. Other skin glands release chemicals that coordinate reproductive behavior.



Pond-dwelling larva of the Jefferson salamander (*Ambystoma jeffersonianum*) showing the gills, tail fins, and dorsal fin. Illustration courtesy of James W. Petranka.

Life History


Ronald A. Brandon

Egg masses of the spotted salamander (*Ambystoma maculatum*) attached to an underwater twig. Developing eggs are surrounded by individual envelopes and enclosed in a mass of firm, jellylike material.

Most Illinois salamander species have a two-part life cycle that includes the gilled, aquatic **larval** stage and the **terrestrial** adult stage. Therefore, they have access to two habitats at different times in their lives. However, the adult mudpuppy (*Necturus maculosus*) and lesser siren (*Siren intermedia*) spend their entire lives in lakes, ponds, permanent streams, or swamps and never **transform**. Embryos of the terrestrial redback salamander (*Plethodon cinereus),* zigzag salamander (*Plethodon dorsalis*), and northern slimy salamander (*Plethodon glutinosus*) undergo **direct development** and have no larval stage. Rather, their eggs develop directly into tiny versions of the adults.

Courtship and egg-laying are annual events. Males and females of all but the hellbender (*Cryptobranchus alleganiensis*) engage in a distinctive courtship behavior during which sperm from **spermatophores** deposited by males are transferred to the **cloaca** of females. The sperm fertilize the eggs just before they are released to the environment. Females of most species lay their eggs in the spring, while the remainder deposit eggs in autumn. The eggs are placed in a variety of wet or moist places, such as: woodland ponds; under rocks in streams; under mosses, logs, rocks, or leaves along streams or ponds; inside rotting logs; in underground burrows; in rock crevices; or in caves. In some species, adults care for the developing embryos. The adult may stay with the eggs to keep them moist (if on land) by curling its body around them, protect them from predators, and remove dead and decomposing eggs. In other species, the jellylike egg masses are attached to plant stems and twigs in fish-free pools and left with no parental care. Development from embryo into larval form takes from two weeks to three months, depending on the species.

The eastern newt (*Notophthalmus viridescens*) is peculiar because it goes through three distinct stages during its life: larva, **eft**, and adult. Adult newts live in lakes and ponds, where the female lays numerous tiny eggs wrapped individually in leaves of underwater plants. The embryo completes development in about two weeks and hatches into an aquatic larva that feeds and grows for a few months, then transforms into the eft. This **juvenile** newt lives on land for one to three years before returning to water to complete its transformation to the adult form.

Adult and juvenile mole salamanders (family Ambystomatidae) live in rotting logs and burrow in the forest floor. They emerge at night or during heavy rain to feed, and, in spring and autumn, to migrate to breeding ponds. The terrestrial and streamside lungless salamanders (family Plethodontidae) are seldom active on the surface of the ground except at night, usually following rain. Because of their **respiratory** skins that can dry out quickly, these animals live under moist leaves, logs, and rocks, or in burrows. Juveniles and adults of some species are common around springs (cave salamander, *Eurycea lucifuga*; four-toed salamander, *Hemidactylium scutatum*; longtail salamander, *Eurycea longicauda*), banks of small, rocky streams (spotted dusky salamander, *Desmognathus conanti*; southern two-lined salamander, *Eurycea cirrigera*; longtail salamander, *Eurycea longicauda*), and in forest floor litter (redback salamander, *Plethodon cinereus*; zigzag salamander, *Plethodon dorsalis*; northern slimy salamander, *Plethodon glutinosus*). Many lungless salamanders seem to be territorial, with home ranges that they defend by posturing, chasing, and biting other salamanders.

Conservation

Five species of salamanders are listed as either state **threatened** or state **endangered** in Illinois as of 2007. Three of these species are at the edge of their geographical range and have never been very widespread in Illinois. The other two species have been greatly affected by habitat degradation and habitat loss. The endangered silvery salamander (*Ambystoma platineum*) is peculiar. It is a **triploid**, all-female, pond-breeding species known in Illinois from only one natural population. Sperm are needed only to prompt the development of the eggs. In Illinois, the sperm are obtained from the smallmouth salamander (*Ambystoma texanum*). The endangered spotted dusky salamander (*Desmognathus conanti*) and the threatened Jefferson salamander (*Ambystoma jeffersonianum*) occur in only two counties each in Illinois and are at the western edges of their ranges. The spotted dusky salamander inhabits small spring-fed streams and stream banks while the Jefferson salamander is a woodland species that migrates to small temporary or fish-free ponds to breed in the spring. The endangered hellbender (*Cryptobranchus alleganiensis*), an aquatic species dependent on large, rocky streams, has been nearly **extirpated** by stream **siltation**. The threatened four-toed salamander (*Hemidactylium scutatum*) once occurred nearly statewide but now is known from only eleven scattered counties where bits of suitable habitat remain.

The primary conservation concerns for Illinois salamanders are habitat degradation, habitat **fragmentation**, and habitat loss. Many populations have been eliminated, reduced, or separated through loss of habitat. Draining wetlands, channelizing streams, removing temporary woodland ponds and sloughs, and clearing forests have all contributed to the decline of salamander populations in Illinois. Individuals of three Illinois species (hellbender; lesser siren, *Siren intermedia*; mudpuppy, *Necturus maculosus*) are completely aquatic, and three-fourths of the remaining species have a gilled, aquatic, larval stage. These species require high-quality waters to live in at some point in their life cycle.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The state-endangered spotted dusky salamander (*Desmognathus conanti*) occurs in only two Illinois counties, where it lives along spring-fed headwater streams. Note the distinctive white line that extends from its eye to its lower jaw.

Defense


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Defensive posture the cave salamander (*Eurycea lucifuga*) assumes when attacked by a predator such as a bird. Note that the salamander closes its eyes and raises and wiggles its tail above its lowered head. A noxious skin secretion is released onto the surface of the tail.

Because salamanders can be an important food source for many reptiles, birds, and mammals, it is not surprising that they have defense mechanisms to help them avoid predators. Most salamanders produce sticky, distasteful, or poisonous skin secretions that deter these predators. The slimy salamander (*Plethodon glutinosus*) is well known for smearing attackers with a sticky secretion, and the large tail of the tiger salamander (*Ambystoma tigrinum*) can flip harmful secretions onto a predator's face. Skin secretions of the eastern newt (*Notophthalmus viridescens*), especially the **eft**, induce vomiting in predators, which allows them to escape from a predator's digestive tract, if swallowed. Skin secretions may be reinforced by other defensive behaviors. For example, the redback salamander (*Plethodon cinereus*) may assume a coiled, defensive posture that protects its head while presenting its tail and unpleasant skin secretions. The dusky salamander (*Desmognathus fuscus*) can run swiftly and leap to escape. The ability to lose its tail, either by constriction at the base of the tail (four-toed salamander, *Hemidactylium scutatum*) or by the long, easily-broken tail in species of *Eurycea* and *Plethodon* provides an edible distraction for the predator while allowing the salamander to escape. The tail may be completely regenerated within a year or two. Bright warning coloration, such as that of the longtail (*Eurycea longicauda*) and cave salamanders (*Eurycea lucifuga*), helps predators with color vision to associate the prey with the bad-tasting secretions and reminds predators to avoid these salamanders.

Illinois Salamanders

Glossary

aestivate	to be inactive in response to summer heat or scarcity of water
cirrus; **cirri** (pl.)	slender elongations of the upper lip on some male salamanders, one hanging below each nostril at the bottom of the nasolabial groove
cloaca	common passage or cavity of the digestive, reproductive, and excretory systems
cloacal glands	glands in the wall of the cloaca that function during reproduction
costal grooves	vertical creases on the outside body wall that correspond in location and number to the ribs
courtship	pattern of behavioral interactions between males and females during reproduction
direct development	development in terrestrial salamanders in which the hatchling resembles the adult in body form; no larval stage occurs
eft	immature terrestrial juvenile of the eastern newt
endangered species	a species in danger of becoming extinct within all or part of its range
extirpate	to exterminate from a part of a species' range
fragmentation	division into smaller sections that often have no connections
juvenile	individual that has not attained sexual maturity
larva; **larvae** (pl.)	aquatic, gilled, immature salamander
mental gland	cluster of glands on the chin of a male salamander, most noticeable during the breeding season
mucous (adj.); **mucus** (n.)	clear, watery, glandular secretion that covers the skin and keeps it moist
nasolabial grooves	in lungless salamanders, tiny grooves that extend from the nostrils to the lower edge of the upper lip, and onto the cirri if they are present
respiration (n.); **respiratory** (adj.)	exchange of oxygen and carbon dioxide between an organism and the atmosphere
secondary sexual features	characteristics expressed during the breeding season, such as enlarged mental glands, cloacal glands, and cirri in male salamanders
siltation	deposition of fine mineral particles (silt) on the beds of streams or lakes
spermatophore	small sperm-bearing structure produced in the male's cloaca and attached to some object or surface outside the body during courtship; used to make sperm available to the female
terrestrial	land-based, or living on land
tetrodotoxin	a chemical found in the skin of newts, it causes vomiting and may cause paralysis
threatened species	a species likely to become endangered
transform	in salamanders, to change from the larval form to the terrestrial form, which involves absorption of the gills and tail fin, and other changes
triploid	having three sets of chromosomes per cell instead of the usual two sets

Salamander Facts

The mudpuppy (*Necturus maculosus*) and lesser siren (*Siren intermedia*) spend their entire lives in water and never lose the gills, tail fins, and gill slits that they developed as **larvae**.

Eight species of Illinois salamanders (family Plethodontidae) have no lungs and breathe mostly through the skin and lining of the mouth.

A constriction ring at the base of the four-toed salamander's (*Hemidactylium scutatum*) tail allows this animal to detach the tail and distract a potential predator.

The smallest Illinois salamander is the four-toed salamander (*Hemidactylium scutatum*) at a length of four inches (10 cm). The largest Illinois salamanders are the hellbender (*Cryptobranchus alleganiensis*) and lesser siren (*Siren intermedia*), each of which may attain a length of 18 inches (46 cm).

The female zigzag salamander (*Plethodon dorsalis*) guards her eggs for up to three months as the embryos develop. She usually does not eat anything during this time.

There are no male silvery salamanders (*Ambystoma platineum*). The females are **triploid**, having three sets of chromosomes per cell instead of the usual two sets. This species is the result of a hybridization between the Jefferson (*Ambystoma jeffersonianum*) and blue-spotted (*Ambystoma laterale*) salamanders.

The skin of the eastern newt (*Notophthalmus viridescens*) contains powerful chemicals, including **tetrodotoxin**, that deter predators.

When disturbed, the redback salamander (*Plethodon cinereus*) displays a defensive behavior in which it remains immobile, then curls into a tight coil with its head under its upraised tail.

If its pond or stream dries up, the lesser siren (*Siren intermedia*) burrows deeply into bottom sediments, secretes a **mucous** "cocoon" around itself, and **aestivates** for several months until the pond fills again.

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Agency Resources

More information about salamanders is available from the Illinois Department of Natural Resources (IDNR). The Illinois Natural History Survey studies salamander distributions and population levels and maintains a research collection of salamanders. The Division of Ecosystems and Environment reviews development plans proposed by local and state governments and recommends measures to reduce or avoid adverse impacts to **endangered** and **threatened** species and their habitats. The Division also provides information about the distribution of endangered and threatened species in Illinois. The IDNR Division of Education provides educational materials and professional development workshops for teachers on a variety of natural resources topics, including amphibians.

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