THE VERNAL POOL SURVEY PROJECT

Endangered and Nongame Species Program

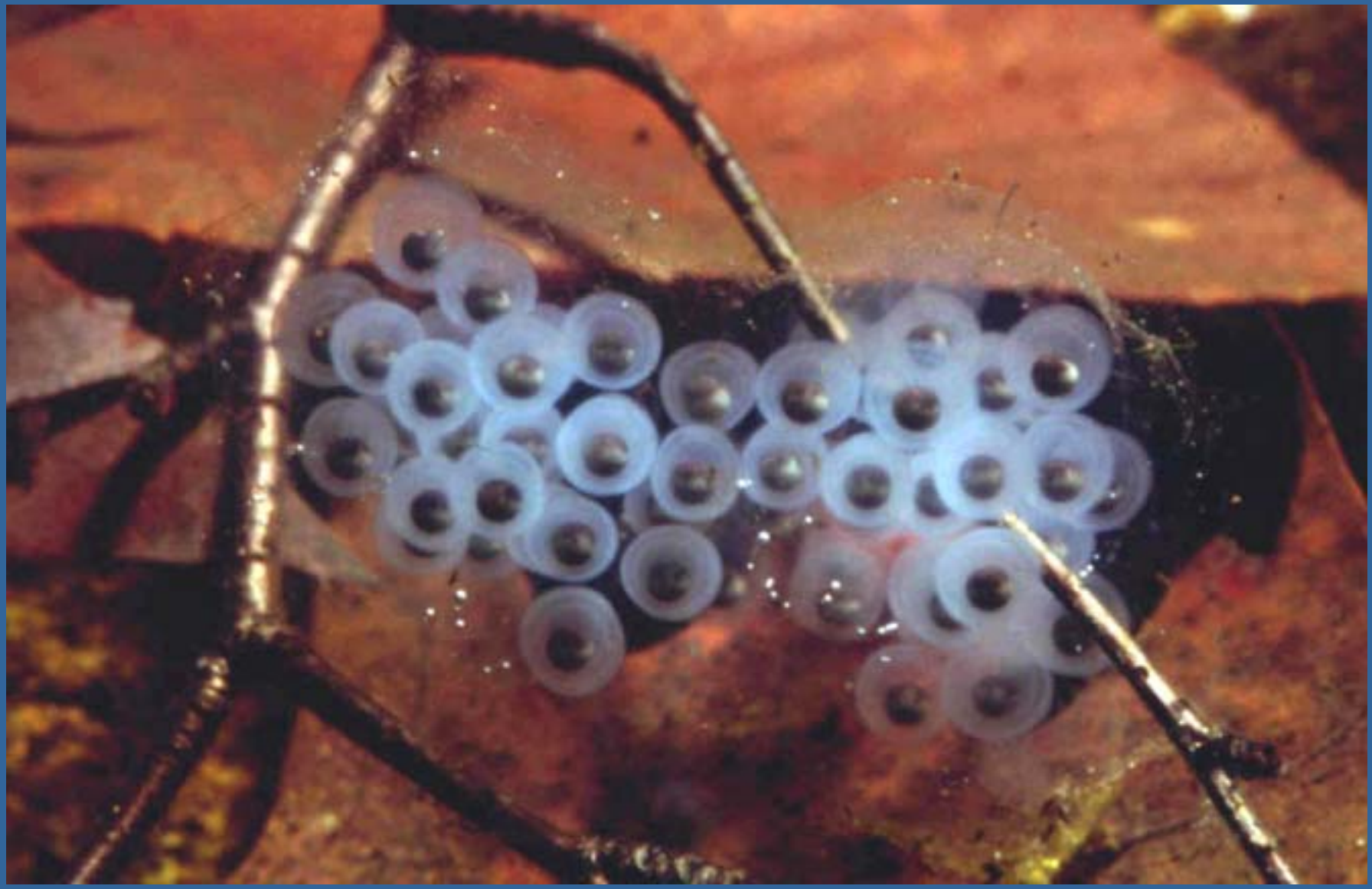
NJ Division of Fish and Wildlife

WHAT IS A VERNAL POOL?

- **Wetland that occurs in a *confined* basin depression without a permanently flowing outlet.**

TYPES OF VERNAL POOLS

WOODLAND VERNAL POOLS



OPEN-CANOPY EMERGENT VERNAL POOLS

SCRUB-SHRUB

VERNAL POOLS


J. Bunnell

VERNAL SWAMPS

MAN-MADE

VERNAL POOLS

THE SIZE OF VERNAL POOLS

RANGE: 10-square feet --- several acres

Vernal Pool Plant Indicators/Associates

Highbush blueberry
(*Vaccinium corymbosum*)

Buttonbush
(*Cephalanthus occidentalis*)

Other species:

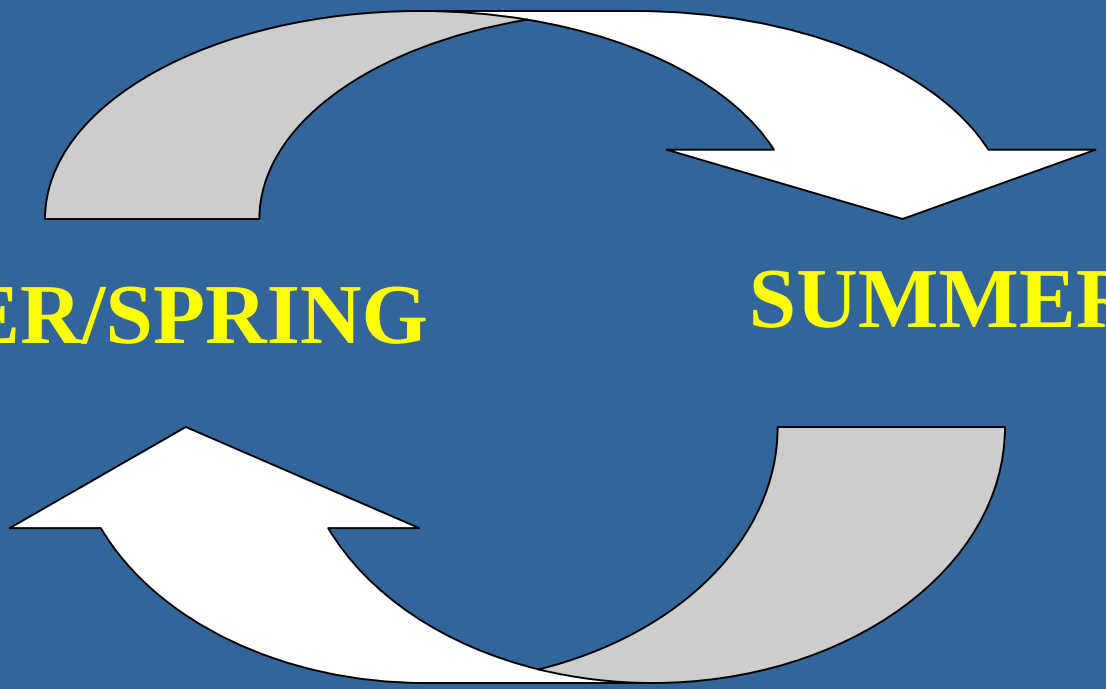
spicebush
leatherleaf
sweet pepper bush
willow
winterberry

WHAT IS A VERNAL POOL?

- Wetland that occurs in a confined basin depression without a permanently flowing outlet.
- **Maintains ponded water for <u>at least</u> two contiguous months between March and September.**

THE VERNAL POOL CYCLE

- During fall and winter months, vernal pools become filled by rain, melting snow, and groundwater discharge
- Under normal weather patterns most vernal pools are filled to capacity by April



- As spring gives way to summer, a combination of decreased rainfall, higher air temperatures, and increased water uptake by plants causes water levels to recede in vernal pools
- By July, most vernal pools are dry

VERNAL POOL IN OCTOBER

VERNAL POOL IN APRIL

WHAT IS A VERNAL POOL?

- Wetland that occurs in a confined basin depression without a permanently flowing outlet.
- Maintains ponded water for two contiguous months between March and September.
- **Dries up during the year or is otherwise free of of reproducing fish populations.**

WHAT IS A VERNAL POOL?

- Wetland that occurs in a confined basin depression without a permanently flowing outlet.
- Maintains ponded water for two contiguous months between March and September.
- Dries up during the year or is otherwise free of permanent fish populations.
- **Features at least one obligate or two facultative amphibian or reptile species.**

Definitions: OBLIGATE & FACULTATIVE SPECIES

- ***Obligate***: amphibians that rely on vernal pools for the successful completion of their life-cycle
- ***Facultative***: amphibians AND reptiles that can use vernal pool habitat for all or a portion of their life cycle, but do not necessarily rely on such habitats.

OBLIGATE VERNAL POOL SPECIES

Eastern Tiger Salamander*
Spotted Salamander
Blue-spotted Salamander*
Jefferson's Salamander
Marbled Salamander

Wood Frog
Eastern Spadefoot Toad

** State Endangered* *** State Threatened*

OBLIGATE VERNAL POOL SPECIES

Marbled salamander

Spotted salamander

Blue-spotted salamander

Jefferson salamander

Eastern tiger salamander

Wood frog

Eastern spadefoot toad

FACULTATIVE VERNAL POOL SPECIES

Snapping Turtle
Eastern Mud Turtle
Spotted Turtle
Eastern Painted Turtle
Wood Turtle**

American Toad
Fowler's Toad
Bullfrog
Carpenter Frog

Pickerel Frog

Southern Leopard Frog
Pine Barrens Treefrog*
Northern Gray Treefrog
Southern Gray Treefrog*
Upland Chorus Frog
New Jersey Chorus Frog
Northern Cricket Frog
Northern Spring Peeper
Green Frog

Long-tailed Salamander**
Four-toed Salamander

Red-spotted Newt

** State Endangered* *** State Threatened*

WHY ARE VERNAL POOLS SO IMPORTANT?

• High biodiversity - 500 animal species identified in vernal pools within the the northeastern U.S.

•In NJ there are 7 amphibian species depend exclusively on vernal pools for breeding (*obligates*), 2 of which are endangered

• All 14 of NJ's frog species use vernal pools for breeding

• provide foraging habitat for wading birds, turtles, snakes, mammals; food webs

• habitat for rare plants and invertebrates (e.g. fairy shrimp, dragonflies)

VERNAL POOL SURVEY PROJECT

OVERVIEW OF METHODOLOGY

Mapping

- Rutgers University using remote-sensing techniques to identify potential vernal pools **WWW.DBCRSSA.RUTGERS.EDU/IMS/VERNAL**

Ground-Truthing

- ENSP Biologists and volunteers inspect potential vernal pools in the field to determine if vernal or not

Species Surveys

- Volunteers perform species surveys at verified vernal pools (Feb-June) and submit data

Data Integration

- Data collected on pools integrated into DEP Certified Vernal Pool database and DEP Critical Habitat Mapping (LANDSCAPE PROJECT)

STATE-LEVEL VERNAL POOL PROTECTION

- **New Rule adopted Sept. 2001 affording protection to isolated wetlands and/or wetlands <1 acre in size = VERNAL POOLS**

- **Before this rule, wetlands of this nature could be filled with General Permit #6**

Vernal Pools can only be protected with new regulations IF they meet **CERTIFICATION** criteria:

1. Occurs in a confined basin depression without a permanently flowing outlet.

2. Provides documented habitat for ***obligate*** or ***facultative*** vernal pool herptile species

3. Maintains ponded water for at least two continuous months between March and September of a normal rainfall year.

4. Free of fish populations throughout the year, or dries up at some time during a normal rainfall year.

HOW TO CERTIFY A VERNAL POOL

OBLIGATE SPECIES METHOD

1. Document breeding evidence of any 1 of the 7 OBLIGATE Vernal Pool Amphibians
   photos preferred but not required

2. Fill out data sheet
   take detailed field notes

3. Identify pool on USGS topo map, aerial map, or tax map
   GPS coordinates useful

4. Submit data sheet, photos, maps, etc. to ENSP for review

FACULTATIVE SPECIES METHOD (if you cannot document any obligate species)

1. Document at least 2 of the FACULTATIVE Vernal Pool Herptiles; for all amphibians evidence of breeding is required

2. Provide evidence that pool is devoid of breeding fish populations and/or dries out completely during the year

Steps 3 & 4 above

THE AMPHIBIANS AND REPTILES OF VERNAL POOLS

OBLIGATE VERNAL POOL SPECIES

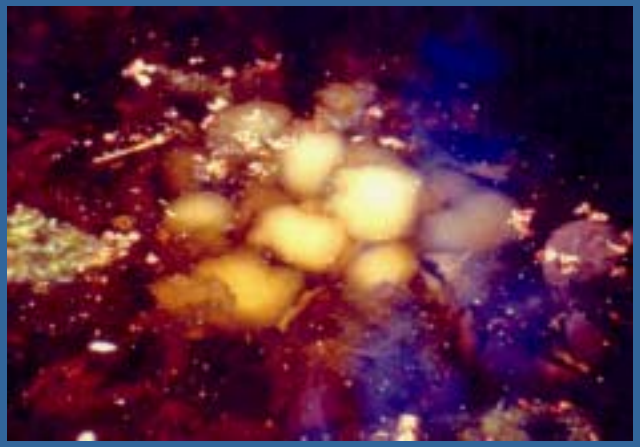
MOLE SALAMANDERS

Family: Ambystomatidae

- spend much of their time underground ("fossorial")
- emerge to breed, then return to their hideouts, only occasionally venturing forth on rainy nights
- large, lunged salamanders
- predatory larvae

SPOTTED SALAMANDER
(Ambystoma maculatum)

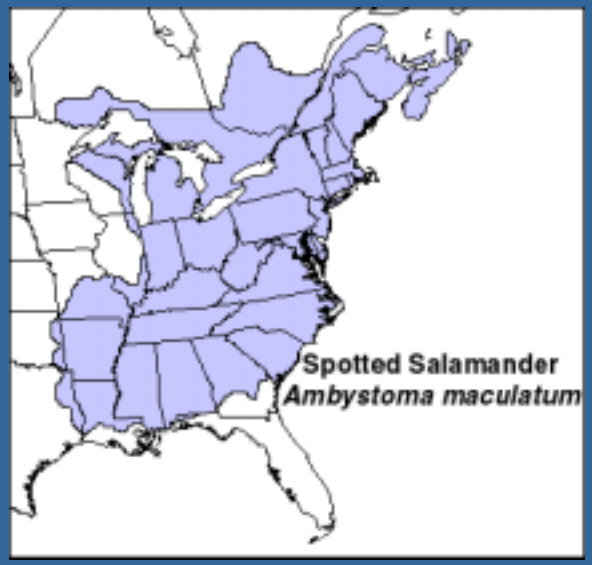
Adult



Communal egg masses

Egg mass

Breeds in all types of pools



National distribution

NJ range

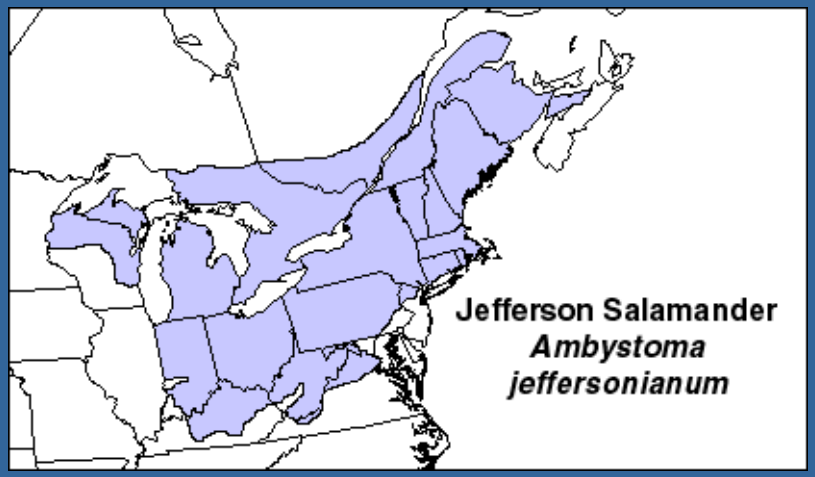
JEFFERSON SALAMANDER
(Ambystoma jeffersonianum)

Adult - note blue flecking

Adult - blue speckles fade with age

Egg mass

Upland woodland pools



National distribution

BLUE-SPOTTED SALAMANDER

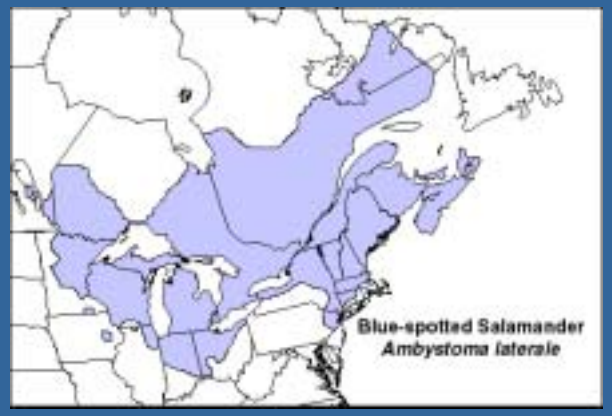
(Ambystoma laterale)

STATE ENDANGERED

Adult

Eggs laid singly, in sheets or in clusters

Vernal swamps; bottomland pools

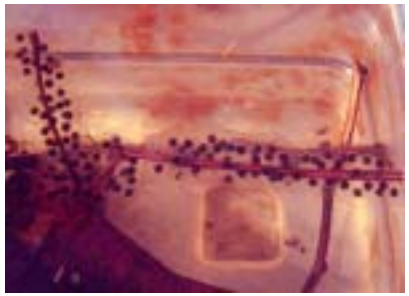


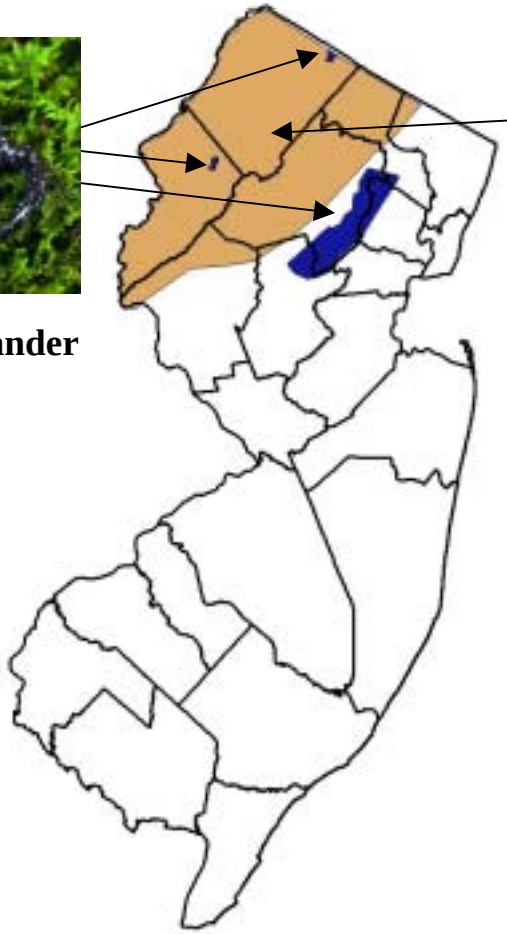
National distribution

Range Map of Jefferson and Blue-spotted salamanders in New Jersey

Blue-spotted salamander

Jefferson salamander





100% Blue-Spotted

ONLY FOUND IN FLOODPLAINS AND BOTTOMLAND POOLS

100% Jefferson

PRIMARILY FOUND IN UPLAND DECIDOUS WOODLAND POOLS

Blue-spotted X Jefferson salamander Hybrids

70% Blue-Spotted

70% Blue-Spotted

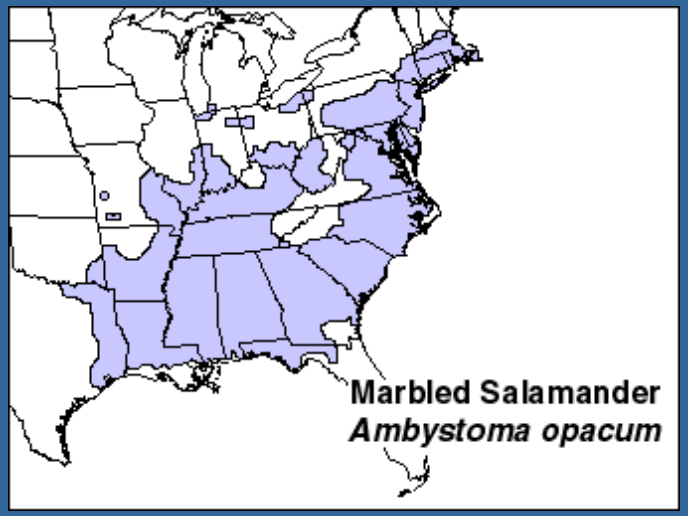
70% Jefferson

MARBLED SALAMANDER
(Ambystoma opacum)

Adult

Adult with eggs

Breeds in dry pools during fall



National distribution

NJ range

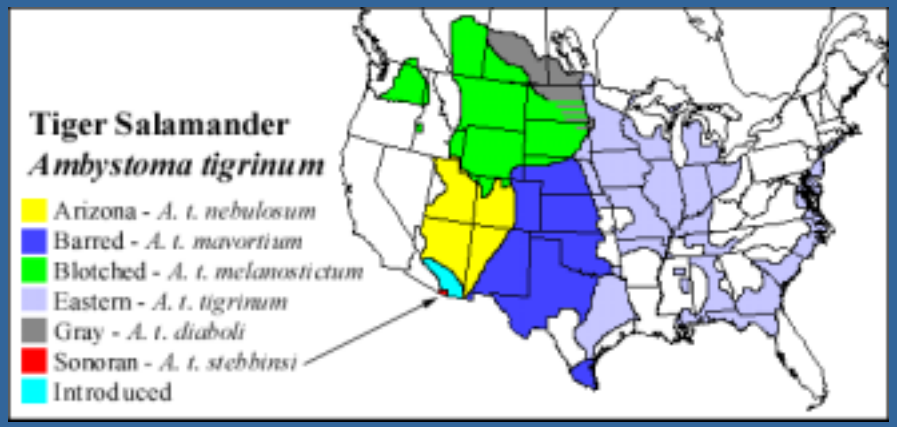
EASTERN TIGER SALAMANDER
(Ambystoma tigrinum)

STATE ENDANGERED

Adult tiger salamander

Frequently breeds in abandoned gravel pits

Egg mass



National distribution

NJ range

LARVAE OF MOLE SALAMANDERS

- bushy, external gills

- flat, wide heads

- predatory--feed on aquatic insects, nematodes, and eggs and larvae of other amphibians

More mole salamander larvae

WOOD FROG
(Rana sylvatica)

Adult

Egg masses

Tadpoles

Transforming juvenile

Lays eggs communally

National distribution

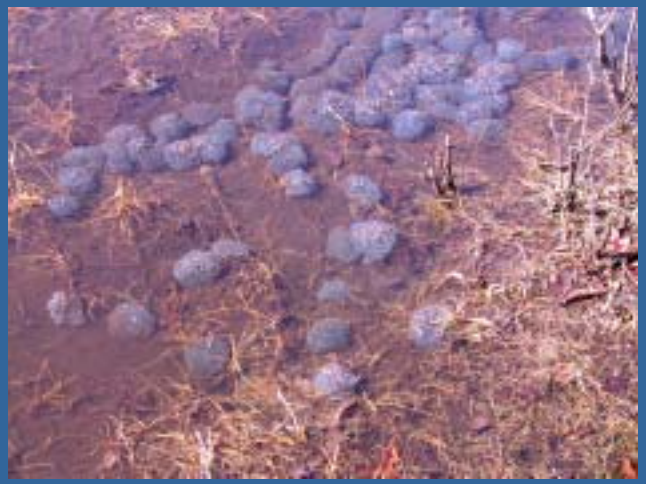
NJ range

EGG MASS IDENTIFICATION

Spotted salamander

- Irregularly shaped
- Clear or milky white
- 30-200 eggs per mass
- Individual or communal
- Submerged
- Colonized by algae

Wood frog



- Globular
- Clear jelly; dark embryo
- 500-2000 eggs per mass
- Near surface
- Colonized by algae

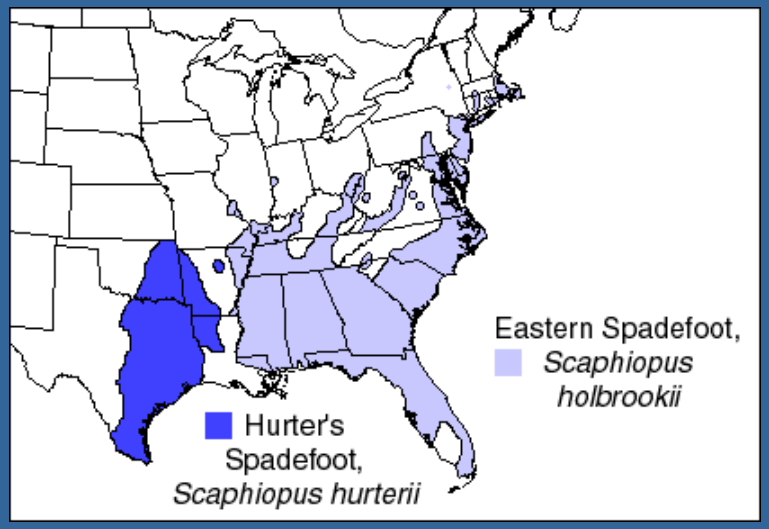
EASTERN SPADEFOOT
(Scaphiopus holbrookii)

Adult


Adult--notice vertical pupil


Tadpole


Breeds in all types of pools;
will sometimes use puddles



National distribution


NJ range

FACULTATIVE VERNAL POOL SPECIES

Snapping Turtle
Eastern Mud Turtle
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Eastern Painted Turtle
Wood Turtle**
American Toad
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Northern Cricket Frog
Northern Spring Peeper
Green Frog
Long-tailed Salamander**
Four-toed Salamander

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AMERICAN TOAD
(Bufo americanus)

- One or two large warts in each dark spot

NJ range

- Found anywhere from backyards to remote woodlands; breeds in shallow bodies of water, including vernal pools, the shallow edges of streams, and permanent ponds

CALL: Long, musical trill, lasting up to 30 seconds

FOWLER'S TOAD
(Bufo woodhousii fowleri)

- Three or more warts usually present in each spot

NJ range

- Occurs mainly in sandy habitats throughout the state; breeds in vernal pools, ditches, and the shallow edges of lakes and ponds

CALL: a short (1-4 seconds), harsh nasal *b-w-a-a-a-h*

GREEN FROG
(Rana clamitans)

Adult female

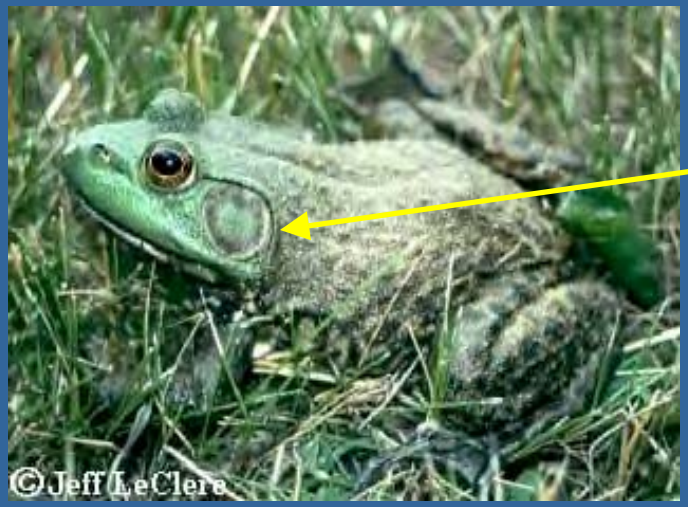
- Prominent dorsal ridges unlike bullfrog
- Chirps when disturbed at water's edge

NJ range

- May be found in any body of freshwater, but are most commonly observed in permanent bodies of water

CALL: a twang like a banjo string or a plucked rubber band

BULLFROG
(Rana catesbeiana)



Adult

- Large ear drum
- Flat, wide head

NJ range

- May inhabit any permanent body of freshwater; usually found in vegetation at the water's edge

CALL: Bellowing *jug-o-rum*

PICKEREL FROG
(Rana palustris)

Adult

- Square-shaped blotches
- Brownish in color

NJ range

- Found in a variety of habitats, ranging from clear streams in ravine or meadows, to brown, murky waters of the Coastal Plain

CALL: Like a low, raspy snore; can call while underwater

SOUTHERN LEOPARD FROG
(Rana utricularia)

Adult

- Blotches round in shape
- Greenish above

NJ range

- Inhabits a variety of wetland habitats; usually found in shallow freshwater, but occasionally found in brackish marshes

CALL: a repetitious clucking sound, with or without an additional low raspy call

CARPENTER FROG
(Rana virgatipes)

Adult

•Yellowish stripes along body

NJ range

Prefers sphagnum bogs

CALL: a rhythmic double-tapping, like carpenters hitting nails with hammers

NORTHERN SPRING PEEPER
(Pseuadcris crucifer)

Adult female with diagnostic pattern

NJ range

- Inhabits a variety of habitats and breeds in almost any body of fresh water

CALL: *Peep, peep, peep, peep*--the call sounds like a high-pitched, chirpy whistle

NORTHERN GRAY TREEFROG

(Hyla versicolor)

- Warty skin
- Juveniles bright green
- Breeds in vernal ponds, marshes, and meadows
- Most common treefrog next to spring peepers

NJ range

CALL: a loud, resonating, high-pitched trill

SOUTHERN GRAY TREEFROG

(*Hyla chrysoscelis*)

STATE ENDANGERED

- Breeds in vernal ponds, marshes, and meadows, gravel pits

NJ range

CALL: rapid, high-pitched trill

CHORUS FROGS

- Upland and New Jersey chorus frogs are almost identical in appearance, but are discernable by the thickness of stripes on back

- Found in a variety of habitats, including swamps, vernal pools, and ditches

NEW JERSEY CHORUS FROG
(Pseudacris triseriata kalmi)

UPLAND CHORUS FROG
(Pseudacris triseriata ferarium)

NJ range

CALL: high-pitched '*prreeeep*'

NJ range

NORTHERN CRICKET FROG
(Acris crepitans)

Adult male

NJ range

- Found near sunny, shallow pools, streams and marshes, with plenty of plants for shelter

CALL: Cricket-like; rhythmic, repetitive clicking

PINE BARRENS TREEFROG
(Hyla andersonii)

STATE THREATENED

Adult displaying orange flashing on underside

Recent metamorph

NJ range

Restricted to acidic Pinelands pools

CALL: repetitious honking

RED SPOTTED NEWT
(*Notophthalamus viridescens*)

Juvenile (red eft)

Adults

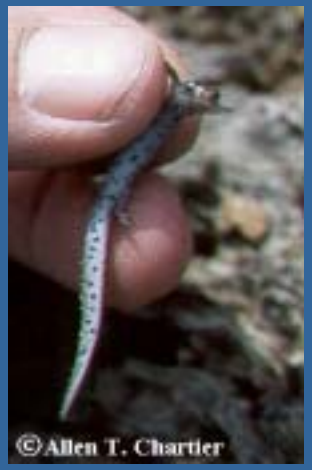
NJ range

Newt eating wood frog eggs

- Found primarily in permanent ponds or semi-permanent vernal pools
- Has both aquatic and terrestrial stage after metamorphosis
- Adults highly predatory on larval amphibians

FOUR-TOED SALAMANDER

(*Hemidactylium scutatum*)



NJ range

Prefers highly structured mossy swamp pools

- Found in woodland and scrub-shrub vernal pools containing an abundance of rotting logs and sphagnum moss hummocks
- White belly heavily flecked with black markings
- Eggs deposited above water line in mossy hummocks

LONG-TAILED SALAMANDER

(*Eurycea longicauda*)

NJ range

- Primarily associated with wooded seepages and streams but also found along edges of vernal pools formed in limestone sinkholes in Warren and Sussex County
- Orangish in color with long tail and herringbone pattern
- Breeds in pools; adults inhabit microhabitats along edge of pool

SPOTTED TURTLE
(Clemmys guttata)

NJ Range

- Turtle most frequently encountered in vernal pools
- Often found breeding in pools in March

EASTERN PAINTED TURTLE
(Chrysemys picta)

Can be observed basking along logs along pool edge or foraging on egg masses and vegetation

Characteristic pattern and coloration

NJ Range

- Strictly an aquatic turtle; if found in vernal pool it is almost certain that a permanent water body is close by

COMMON SNAPPING TURTLE
(Chelydra serpentina)

NJ Range

- Migrates from permanent bodies of water in spring to gorge on amphibian egg masses and larvae in vernal pools

EASTERN MUD TURTLE
(Kinosternon subrubrum)

NJ Range

Vernal ‘ditch’ used by mud turtles

• Found occasionally in vernal pools located in proximity to floodplains; feeds heavily on invertebrates within vernal pools

WOOD TURTLE
(Clemmys insculpta)

STATE THREATENED

Adult male

Riparian habitat

- Will forage extensively in vernal pools located in the vicinity of riparian habitats (floodplains)

VERNAL POOL PHENONLOGY – SOUTHERN NJ

DEC
Tiger salamander

JAN
Tiger salamander

FEB
Wood frog
Spotted sal
Spring peeper

MAR
Wood frog
Spotted sal
Spring Peeper
Chorus frog

APR
Spring peeper
Pickerel frog
Gray treefrog
American toad
Fowlers toad

MAY
Spring peeper
Gray treefrog
So. Leopard frog
PB treefrog
Green frog
Bullfrog
Carpenter frog
American toad
Fowlers toad

JUNE
So. Leopard frog
PB treefrog
Green frog
Bullfrog
Carpenter frog

SEPT
Marbled salamander

VERNAL POOL PHENONLOGY – NORTHERN NJ

FEB
Wood frog
Spotted sal
Spring peeper

MAR
Wood frog
Spotted sal
Spring Peeper
Chorus frog
Pickerel frog
Jefferson sal
Blue spotted sal

APRIL
Spotted sal
Spring peeper
Chorus frog
Pickerel frog
Cricket frog
Jefferson salamander
Blue spotted sal
Fowlers toad
American toad

MAY
Spring peeper
Gray treefrog
Green frog
Cricket frog
American toad
Fowlers toad
Bullfrog

JUNE
Gray treefrog
Green frog
Bullfrog

SEPTEMBER
Marbled salamander

Phenology of Calling Frogs