

Field Marks

Genus	Species Common Name	Adult Size (cm)	Dorsal Background Coloration	Dorsal Pattern	Ventral Background Coloration	Ventral Pattern	Head Notes	Tail Notes	Limb Notes
Ambystoma	Jefferson Salamander group*	15-18	Gray-brown	Solid color, sometimes with flecks; often with gold to light tan stripe on top of tail	Gray	None	Broad head, widely spaced nostrils/ <u>squared snout</u>	Laterally compressed	<u>Long toes</u>
	Blue-spotted Salamander group*	9-12 (hybrids 15)	Black	<u>Blue spots/flecks</u> especially on sides	Almost black	None	Narrow, fairly <u>rounded snout</u> , nostrils close together	Rounded	
	Spotted Salamander	11-21	Black	<u>Yellow spots</u> on black background	Gray	None	Broad head	Rounded	
Desmognathus	Northern Dusky Salamander	6-11	Muddy brown to black	Adult: none; young: may show paired spots on back or lighter stripe on back with dark wavy edges	Cream	Flecks, darker under tail	<u>Light diagonal line</u> extending from eye to angle of jaw when young	Keeled	<u>Hind limbs thicker than forelimbs</u>
Eurycea	Northern Two-lined Salamander	6-12	Yellow-brown	<u>Black lines bordering yellow-brown stripe</u>	<u>Yellow</u> under tail	None			<u>Equal size front and hind limbs</u>
Gyrinophilus	Spring Salamander	12-19	<u>Salmon-pink</u>	Dark reticulations	Light/pale pink	Some black flecks on throat	<u>Light lines, bordered by dark lines, run from eyes to nostrils; squared snout</u>	<u>Sharply keeled</u> , fish-like	
Hemidactylium	Four-toed Salamander	5-9	Orange-brown	Grooves make chevrons	Glossy enamel white	<u>Black spots on white background</u>		<u>Constriction</u> at base of tail	Four toes on hind feet
Necturus	Mudpuppy	20-33	Dark brown	Black spotting	White to gray	Sometimes has bluish black spots	<u>External gills</u> (red) throughout life; flat head; squared snout	Laterally compressed	Four toes on hind feet
Notophthalmus	Eastern Newt	6-12	Adult: dark green; red eft: red-orange	<u>Red spots surrounded by black</u> along sides	Adult: yellow; red eft: orange	Adult: Black spots	<u>Line horizontally through the eye</u>	Laterally compressed, particularly in males	
Plethodon	Eastern Red-backed Salamander	6-10	Dark red, sometimes dark brown/gray or reddish/orange	Stripe (red) down center of back (on most but variable), sometimes gray with flecking.	Cream	Dark <u>vermiculations</u> (worm trails)			

*These species (Jefferson Salamander and Blue-spotted Salamander) have historically produced hybrids with each other; consequently, some individuals can be hard to identify, so we classify them into "groups" (e.g. Jefferson Salamander & related hybrids).

Eggs

Genus	Species Common Name	Egg Size When Laid*	Eggs Per Mass	Shape of Mass	No. Masses/Female	Size of Mass	Location	Egg Membranes	Egg Color	Timing of Oviposition
Ambystoma	Jefferson Salamander group	2.0-2.5 mm	7-40 (VT avg 15)	<u>Loose, elongate, sausage shaped</u>	Up to 16 (based on no. ova/female)	50 mm x 25 mm	Attached to tree branches or vegetation (in water)	3, <u>vitelline membrane closely hugs edge of embryo</u>	Black; green alga may colonize; hybrids often have many white non-viable embryos	Late March - April
	Blue-spotted Salamander group	1.5-1.6 mm	<u>Single</u> (pure) or 2-4 (hybrids)	Poorly defined	56-225 (avg. ~225 ova/female)	N/A	Leaf petioles, twigs, detritus, rocks (in water)	3, <u>vitelline membrane closely hugs edge of embryo</u>	Black; green alga may colonize; hybrids often have many white non-viable embryos	Late March - April
	Spotted Salamander	1.8-2.8 mm	1-250 (VT avg 66)	<u>Firm, ovoid - cylindrical</u>	2-4	50-150 mm x 50-250 mm	Twigs, tree branches, aquatic plants, sometimes on bottom (in water)	2, <u>vitelline membrane well spaced from edge of embryo</u>	Black; green alga may colonize; clear or cloudy white egg mass	Mid March - early June
Desmognathus	Northern Dusky Salamander	3.0-4.5 mm	5-40 (VT avg 19)	Globular cluster	1	20-30 mm**	Usually in seeps, often under mosses on logs (on land)	3	Cream to whitish	Late May through early August
Eurycea	Northern Two-lined Salamander	<u>2.5-3.0 mm</u> 4.5-5.0 mm w/membrane	12-110 (VT avg 35)	Flat	1	<u>50 x 32 mm</u>	Underside of rock in stream (in water)	2	White to pale yellow	Mid April -June
Gyrinocheilus	Spring Salamander	<u>3.5-4.0 mm</u> 9 mm w/membrane	15-132 (VT avg 47)	Flat	1	<u>130 x 170 mm</u>	Underside of rock in stream or under streambed (in water)	3	Light yellow	Summer (June - July)
Hemidactylium	Four-toed Salamander	2.5-3.0 mm	4-65 (VT avg 23)	Loose cluster	1	15-20 mm**	Under moss or in tussocks (on land but over water)	2	Very lightly pigmented above, mostly transparent	Mid April to mid May
Necturus	Mudpuppy	5.0-6.5 mm	18-174 (avg 77)	Flat	1	150-300 mm diameter	Beneath logs, rocks, boards (in water >0.5 m deep)	3	Cream to light yellow	May - early June
Notophthalmus	Eastern Newt	1.5 mm	1	<u>Single eggs</u>	NA	N/A	Leaves and stems of aquatic plants, leaves (in water)	3, elliptical	Dark brown and yellowish green	April - June
Plethodon	Eastern Red-backed Salamander	3.0-4.0 mm	1-14 (VT avg 8)	Grapelike cluster	1	20 mm**	Moist places within or beneath logs, or under rocks; suspended from roof of cavity (on land)	2	Pale yellow to yellowish white	Early June - late summer

*Size of the embryo when laid; jelly layers surrounding the embryo expand after laying to protect the egg. **For species that lay small clusters of eggs on land, size of mass was estimated from photographs of eggs with adults in Vermont and and/or our experience. Communal clutches for Four-toed Salamanders could be larger, 35-50 mm or more.

Mating & Larvae

Genus	Species Common Name	Incu- bation Time*	Egg Hatching	Size of Larvae **	Larvae	Length of Larval Stage*	Timing of Mating	Interesting notes
Ambystoma	Jefferson Salamander group	4-7 (as long as 14) weeks	May	10 to 55	Hatchlings: balancers, olive green/brown with tinges of yellow on sides (possibly <u>dorsally banded</u>). Pale <u>lateral stripe</u> by mid-stages. Older larvae: grayish with <u>mottled tail fins</u> . <u>Toes elongated/tapered</u> .	2-4 months	1-2 days before egg-laying	Females may skip one or more years before returning to breed.
	Blue-spotted Salamander group	3-4 weeks	May	8 to 55	Hatchlings: balancers, dark brown, <u>yellowish transverse bars</u> . Older larvae: brownish with yellowish <u>lateral stripe</u> (less distinct with age), <u>mottled tail fins</u> . <u>Dorsal fins heavily blotched/mottled with black</u> .	2-3.5 months	Within a few days before egg-laying	
	Spotted Salamander	4-7 weeks (5 weeks in MA)	Mid May-early June	10 to 75	Hatchlings: balancers, yellow/beige-pink background, extensive <u>stippling (no transverse bars)</u> . Mid stage: <u>tail fin finely stippled with darker pigmentation near the tip</u> . Older larvae: olive green, <u>usually no lateral stripe</u> , few distinctive markings. Pale venter. <u>Shorter head & tail than other Ambystoma</u> .	2-4 months	Within 2-3 days before egg-laying	Mass is 2-5 cm long when first laid, then expands (as do all amphibian masses laid in water). Clarity of mass based on amount of protein in outer jelly. In deep spring-fed pools, may overwinter as larvae.
Desmog-nathus	Northern Dusky Salamander	7-11 weeks	Late May - Sept.	8 to 38	Gills <u>short</u> and <u>white without rachises</u> (branching from the base). <u>Larger hind legs than forelegs</u> . A row of large light-colored spots along each side; <u>diameters of spots greater than the spaces between them</u> . Toe tips <u>pointed & keratinized</u> .	7-12 months	Autumn & spring	Lungless. May actively construct a small depression. Female tends nest (may leave nest at night), and may stay with young for a few days-weeks.
Eurycea	Northern Two-lined Salamander	4-10 weeks	June - August	11 to 52	Gills branch from the <u>rachis, longer than Dusky's</u> , and have some <u>pigment (reddish)</u> . A row of smaller light-colored spots along each side; <u>diameters of spots smaller than the spaces between them</u> . Toe tips <u>rounded & not keratinized</u> .	2(-3) years	Sept. - May	Lungless. Female tends nest; communal nesting.
Gyrino-philus	Spring Salamander	6-8 weeks	Late summer/autumn	23 to 160	Long, squared snouts and small eyes; no dorsal light spots; light <u>yellowish-brown/gray/lavender</u> with <u>fine reticulations or flecking</u>	3-4 years	Autumn & spring	Lungless. Female tends nest; some nests may be deep in stream bed (very few found).
Hemi-dactylium	Four-toed Salamander	5-9 weeks	Late May - early June	11 to 25	Mottled yellowish brown dorsum (may have fused dorsal spots with dark edges), prominent eyes, <u>dark mask across face, clear tail fin</u>	3-6 weeks	Fall/early winter	Lungless. Female tends communal nest; brooding female is often the one who first oviposits.
Necturus	Mudpuppy	5-9 weeks	July to August	14 to 200	Dark dorsal band down midline, <u>yellow stripe</u> on each side of dorsal band, dark band below yellow	5+ years to sexual maturity	Autumn, and late winter - April	Female tends nest. Synchronized oviposition in 1 week or less; female excavates depression under rock/log.
Notoph-thalmus	Eastern Newt	3-5 weeks	Mid May - July	7 to 35	Hatchlings: balancers, beige/tan, dark bar through eye. Mid-stage: <u>some dark spotting, dark stripe from snout through the eyes, face two-toned</u> .	2 months	Autumn & spring	Oviposition takes several weeks (female lays a few eggs per day, widely scattered).
Pleth-odon	Eastern Red-backed Salamander	6 weeks	Late July - August	19 to 25	(in the egg)	N/A	Autumn - spring	Lungless. Female tends nest. Biennial oviposition (females), takes two years to fully yolk eggs.

*varies based on environmental factors (temperature, oxygen/desiccation, predators, pathogens, etc.)

**in mm total length, from size at hatching to size at metamorphosis, or sexual maturity (Mudpuppy)

Sexual Dimorphism

Genus	Species Common Name	Swollen Nasolabial Grooves* & Cirri	Mental Gland	Squared Snout	Swollen Jaw Muscu- lature	Swollen Cloaca	Cloacal Papillae	Visible Eggs (Candling) **	Visible Testes (Candling)	Additional Sexually Dimorphic Characteristics***	Size at Maturity, SVL (mm)****
Ambystoma	Jefferson Salamander group					V		V		Males have more compressed tails & top ridge of tail dull yellow/gold. Head flatter and broader in males than females.	M: 62 F: 76
	Blue-spotted Salamander group					V				Males have keeled tails that are compressed in the distal half.	M: 42-45 F: 51-52
	Spotted Salamander					V		V		Gravid females have a relatively slender tail and lighter cloaca compared with males. Males have more of dorsum covered by spots.	M: 63 F: 78
Desmog- nathus	Northern Dusky Salamander		LP					V	V		M: 35 F: 40
Eurycea	Northern Two-lined Salamander	LP	V	V	V			V		Males have yellowish-white courtship glands on the posterior area of the jaws/eyelid, and a wider head.	M: 67 F: 61 (TL)
Gyrino- philus	Spring Salamander							V			60-70
Hemi- dactylium	Four-toed Salamander	V	LP	V							M: 50 F: 60 (TL)
Necturus	Mudpuppy					V	V			Cloacal papillae are two tiny bumps extending backwards from the posterior end of the vent; the swollen cloaca (bulbous anteriorly, sometimes reddish) is an easier field mark to use.	200 (TL)
Notophthalm us	Eastern Newt					V				Tails keeled & twice as high as females. Black claspers (nuptial pads) on inner thighs and toe tips of hind feet. Yellowish glandular spot on posterior margin of vent. Red spots redder and brighter. Cloaca more swollen than female's cloaca.	Highly variable
Pleth- odon	Eastern Red-backed Salamander	V	LP	V				V	V	Males develop a whitish swollen region around the cloaca during breeding season.	M: 32 F: 34

V denotes characters typically visible in the field; LP denotes characters that are less prominent and can be difficult to see in the field. All characters except visible eggs refer to males, and most characters are only visible or prominent during the breeding season. (Information from Rucker et al. 2021 and Petranka 1998.)

*All plethodontids (lungless salamanders) have nasolabial grooves, but they swell and form cirri in only a few species.

**Timing of oviposition (shown on page 2) represents when candling may no longer be an effective method to identify females. Timing of mating (shown on page 3) corresponds to the period of time when sexual dimorphism is likely to be exhibited.

***Note that most gravid females show swollen abdomens, which can be quite apparent in some species. This characteristic is not noted in this column.

****Size at maturity represents the snout-vent length (unless noted as total length, TL) of each sex where sexual maturity or breeding activity has been confirmed (from Rucker et al. 2021).

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