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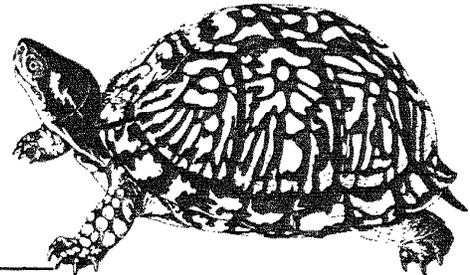


New England Wildlife: Habitat, Natural History, and Distribution

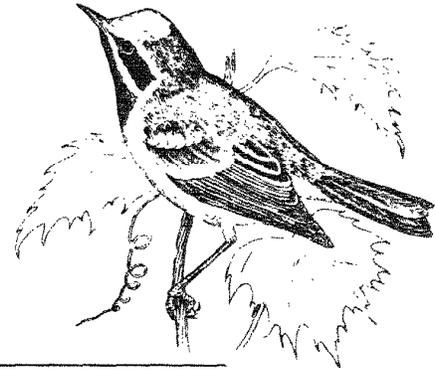
Richard M. DeGraaf
Deborah D. Rudis



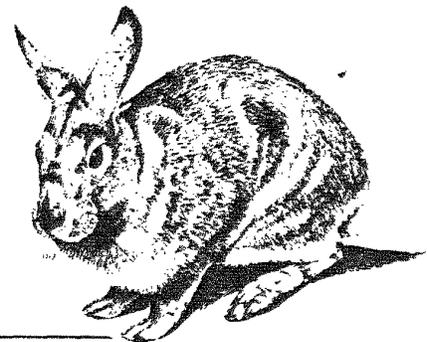
Amphibians



Reptiles



Birds



Mammals

ABSTRACT

Describes natural history profiles of New England wildlife species and their associations with forested and nonforested habitats. Provides a data base that will enable forest managers or wildlife biologists to describe the species or groups to be found in a given habitat.

THE AUTHORS

Richard M. DeGraaf is principal research wildlife biologist and leader of the wildlife habitat research unit, Northeastern Forest Experiment Station, Amherst, Massachusetts. He has conducted research on urban wildlife and forest wildlife habitat associations in the White Mountains of New Hampshire.

Deborah D. Rudis is a wildlife biologist with the Annapolis field office, Ecological Services, U.S. Fish and Wildlife Service, Annapolis, Maryland. Her background includes fieldwork on small mammal distributions, bird censusing, and graduate work on the occurrence and distribution of amphibians in the White Mountains.

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AMPHIBIANS AND REPTILES

This section provides a compilation of natural histories, distributions, and habitat associations for the 26 amphibians and 30 reptiles occurring in New England. The distributions of several species are not well known in New England; maps need to be updated periodically. Nomenclature follows that of Collins and others (1982): *Standard Common and Current Scientific Names for North American Amphibians and Reptiles*.

We have included the mudpuppy (*Necturus m. maculosus*) and red-eared slider (*Pseudemys scripta elegans*), introduced species that have established populations in parts of the region. We have omitted the eastern mud turtle (*Kinosternon s. subrubrum*) because Connecticut individuals are believed to have been released

and no breeding populations are known to exist. We have also omitted the rough green snake (*Opheodrys aestivus*)—although two records exist for Connecticut, no breeding populations are known.

Species are listed in phylogenetic order. Measurement units here are as reported in the original work. When the original work used English units, metric equivalents have been supplied. Variations in development and hatching times for a species may be attributed to genetic and environmental factors. Although key references are given for each species, the species accounts point up many gaps in our knowledge of amphibians and reptiles.

Species and Subspecies

Caudata

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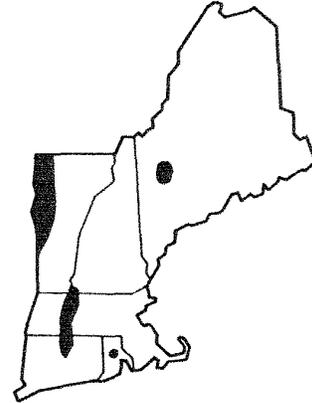
Serpentes

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Local occurrence	S	Sp	St	L	S	Sp	St	L	S	Sp	St	L	S	Sp	St	L	S	Sp	St	L	S	Sp	St	L
SPECIAL HABITAT NEEDS	Special habitat needs																							
Four-toed Salamander <i>Hemidactylum scutatum</i>	Wet woodlands																							
Northern Spring Salamander <i>Gyrinophilus p. porphyriticus</i>	Streams, seeps or springs																							
Northern Two-lined Salamander <i>Eurycea b. bislineata</i>	Streams for breeding																							
Eastern Spadefoot <i>Scaphiopus h. holbrookii</i>	Sandy soils, temporary pools for breeding																							
Eastern American Toad <i>Bufo a. americanus</i>																								
Fowler's Toad <i>Bufo woodhousii fowleri</i>	Sandy soils, shallow water for breeding																							
Northern Spring Peeper <i>Hyla c. crucifer</i>	Pools for breeding																							
Gray Treefrog <i>Hyla versicolor</i>	Seeps, aquatic sites for breeding																							
Bullfrog <i>Rana catesbeiana</i>	Deep permanent water with floating and emergent vegetation																							
Green Frog <i>Rana clamitans melanota</i>	Riparian habitat																							
Mink Frog <i>Rana septentrionalis</i>	Permanent ponds with lily pads																							
Seasonal use	B	W	B	W	B	W	B	W	B	W	B	W	B	W	B	W	B	W	B	W	B	W	B	W
Aspen																								
Paper birch																								
Northern hardwoods																								
Red maple																								
Northern red oak																								
White pine— Northern red oak— Red maple																								
Balsam fir																								
Eastern white pine																								
Red spruce - Balsam fir																								
Red spruce																								
Eastern hemlock																								

Mudpuppy

(*Necturus m. maculosus*)



RANGE: St. Lawrence River w. to se. Manitoba, s. to e. Kansas and n. Alabama and through c. Pennsylvania to New York and the Champlain Valley. Absent from the Adirondacks. Introduced in parts of New England.

RELATIVE ABUNDANCE IN NEW ENGLAND: Uncommon.

HABITAT: Entirely aquatic. Clear or muddy waters of lakes, rivers, ditches, and large streams. One individual found at 90 feet (27.4 m) in Lake Michigan (Behler and King 1979:283). Often found in submerged log piles around the bases of bridge pilings in larger rivers and around obstructions in streams (Shoop and Gunning 1967).

SPECIAL HABITAT REQUIREMENTS: Moving water.

AGE/SIZE AT SEXUAL MATURITY: At 5 years and at 8 inches (20.3 cm) total length (Bishop 1947:43). Retains external gills as an adult.

BREEDING PERIOD: Autumn (Bishop 1947:42).

EGG DEPOSITION: May and June of the year following mating. Reproduces in flowing water (Oliver 1955:211). Prefers water depths of at least 3 feet (0.9 m) and bottoms with weeds and rocks to provide nesting cover. Nest sites are often under large rock slabs in water depths of 6 to 8 inches (15 to 20 cm) in New York (Stewart 1961:68).

NO. EGGS/MASS: 18 to 180 eggs (average 60 to 100) in water beneath objects, attached singly by stalks (Bishop 1941:26).

TIME TO HATCHING: 38 to 63 days, female guards eggs (Bishop 1941:27).

HOME RANGE/MOVEMENT: Displacement of individuals in Louisiana suggests homing ability; occupy restricted areas throughout the year (Shoop and Gunning 1967).

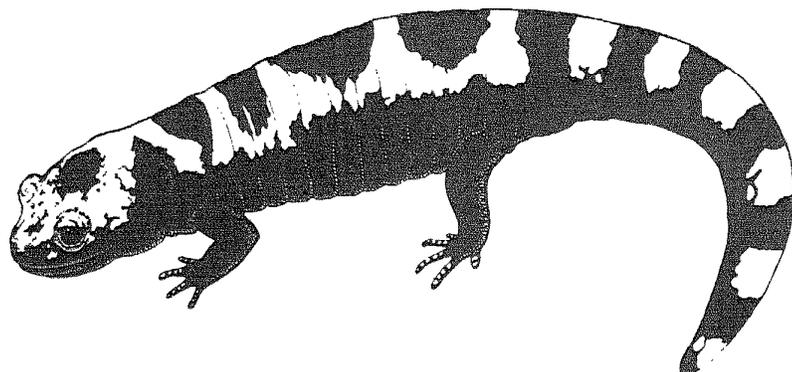
FOOD HABITS/PREFERENCES: In New York, aquatic insects were 30 percent of the diet by weight, particularly nymphs and larval forms, crustaceans 33 percent, small fish 13 percent, also mollusks, spawn, other amphibians, worms, leeches, and plants (Hamilton 1932). Most food captured at night along the bottom.

COMMENTS: The mudpuppy is chiefly nocturnal, bottom dwelling, and active through the winter, when it moves to deeper water. This species was first found in the Connecticut River in Massachusetts in 1931 where laboratory specimens had been released from Amherst College (Warfel 1936). The Maine population also originated from released individuals; however, the Rhode Island population origin is unknown but is presumed to be introduced (Vinegar and Friedman 1967).

KEY REFERENCES: Bishop 1947, Logier 1952.

Marbled Salamander

(*Ambystoma opacum*)



RANGE: New Hampshire and c. Massachusetts, c. Pennsylvania to s. Illinois, s. Missouri to e. Texas. Throughout the Eastern United States except s. Louisiana and Florida.

RELATIVE ABUNDANCE IN NEW ENGLAND: Uncommon.

HABITAT: Sandy and gravelly areas of mixed deciduous woodlands, especially oak-maple and oak-hickory (Minton 1972:46), trap rock slopes (M. Klemens, personal communication). During breeding season, found in low areas around ponds, swamps, and quiet streams. Inhabits somewhat drier areas than other species of *Ambystoma*. During the summer usually found under logs and rocks. Found at 900 feet (274 m) above sea level in Connecticut (Babbitt 1937). Larvae usually found in temporary water throughout the winter. Probably hibernates in deep burrows.

SPECIAL HABITAT REQUIREMENTS: Ponds or swamps in wooded areas for breeding.

AGE/SIZE AT SEXUAL MATURITY: 15 to 18 months.

BREEDING PERIOD: During the fall, adults migrate to breeding areas (September in northern parts of range).

EGG DEPOSITION: September to early October in northern parts of range (Bishop 1941:138). Temperature taken at the nest sites in both New Jersey and South Carolina ranged from 11-15°C (52-59°F), (Anderson and Williamson 1973).

NO. EGGS/MASS: 50 to 232 (average 100) eggs laid singly in shallow depressions beneath surface materials (Bishop 1941:142). Eggs laid in dry beds of temporary ponds and streams or on land, or at the edge of ponds or

swamps, where they will be washed into the water to hatch.

TIME TO HATCHING: 15 to 207 days; female forms a nest site and may brood eggs (Oliver 1955:234).

EGGS HATCH: Usually in fall or early winter when submerged but without rain will hatch in spring. Anderson (1972) found a wide range of temperature tolerance — 3-14°C (37 — 75°F) — for egg development.

LARVAL PERIOD: Larvae overwinter with little growth until spring, and transform to terrestrial form in late May to June (Noble and Brady 1933). A higher temperature and abundant food supply will hasten metamorphosis (Stewart 1956b). The larval period was 135 days in New Jersey (Hassinger et al. 1970).

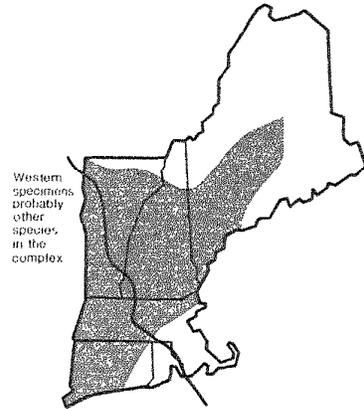
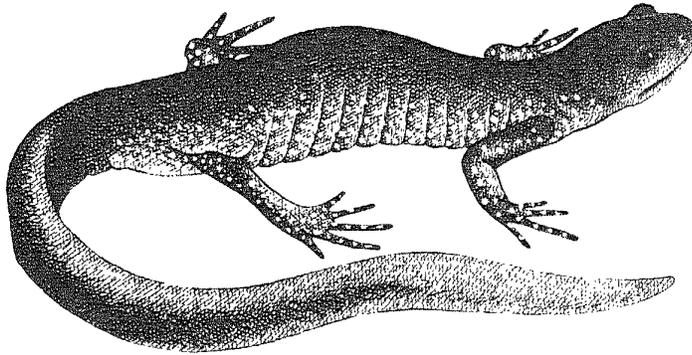
HOME RANGE/MOVEMENT: Adults migrate an average of 194 m from breeding sites to summer range in Indiana (Williams 1973, cited in Semlitsch 1980b:320).

FOOD HABITS/PREFERENCES: Arthropods, including adults and larval insects and crustaceans. Also takes earthworms and mollusks. Marbled salamander larvae eat small aquatic insects, crustaceans, and other small invertebrates and are cannibalistic (Minton 1972:47). Larvae rise in the water column to feed (T. Tynning, personal communication).

COMMENTS: Terrestrial and nocturnal, often using runways of other animals or tunnels through loose soil. Young larvae are aquatic and primarily nocturnal.

KEY REFERENCES: Anderson 1967b, Hassinger et al. 1970, Lazell 1979.

Jefferson Salamander
(*Ambystoma jeffersonianum*)



NOTE: See COMMENTS section.

RANGE: Western New England to wc. Indiana, c. Kentucky to w. Virginia and n. to n. New Jersey.

RELATIVE ABUNDANCE IN NEW ENGLAND: Locally common to rare.

HABITAT: Terrestrial, found in undisturbed damp, shady deciduous or mixed woods, bottomlands, swamps, ravines, moist pastures, or lakeshores. Hides beneath leaf litter, under stones or in decomposing logs and stumps. Cleared strips create a barrier for dispersal (Pough and Wilson 1976). Upland hardwood forests on glaciated limestone areas northwest of the Great Swamp in New Jersey (Anderson and Giacosis 1967). In Connecticut, members of the *Ambystoma jeffersonianum* complex are more abundant and widespread in upland areas of the Connecticut River Valley (M. Klemens, personal communication) and documented within shale ravines in Connecticut (Babbitt 1937). Hibernates on land in winter months, usually near breeding waters. Have been found within rotten logs (Blanchard 1933b).

SPECIAL HABITAT REQUIREMENTS: Requires temporary ponds for breeding period. Egg mortality exceeded 60 percent in pools more acid than pH 5 in Tompkin's County, New York (Pough 1976).

AGE/SIZE AT SEXUAL MATURITY: Females at 21 months (Bishop 1941:102), snout to vent length 70 to 75 mm in males, 75 to 80 mm in females (Minton 1954). Juveniles probably enter the breeding population at 2 to 3 years of age (Wilson 1976, cited in Thompson et al. 1980:119).

BREEDING PERIOD: February to April, migrates to ponds and vernal pools for spawning (Brandon 1961). Breeds earlier than *A. maculatum* in central Pennsylvania (Gatz 1971).

EGG DEPOSITION: February to April, often beneath ice. Will tolerate pH of 4 to 8, with best hatching success at 5 to 6 pH range (Pough and Wilson 1976). Isolated upland pools bordered by shrubs and surrounded by forest were primary breeding sites in Maryland (Thompson et al. 1980).

NO. EGGS/MASS: 107 to 286 eggs (Oliver 1955:234). Many variations of egg deposition, laid singly or in small cylindrical masses of 1 to 35 eggs each, in water attached to twigs or plants or under rocks. Egg masses average 16 eggs per mass (Bishop 1941:94).

TIME TO HATCHING: 13 to 45 days (Bishop 1947:135, Oliver 1955:234).

LARVAL PERIOD: 56 to 125 days (Bishop 1941:99). Found overwintering in Nova Scotia (Bleakney 1952).

Jefferson Salamander (Continued)

(*Ambystoma jeffersonianum*)

HOME RANGE/MOVEMENT: Adults migrated an average of 252 m from breeding ponds to summer range in Indiana. Newly metamorphosized individuals moved an average 92 m from the ponds (Williams 1973, cited in Semlitsch 1980b:320). In hardwood forest of northern Kentucky, adults moved an average of 250 m from ponds in a series of 6 to 8 moves in 45 days (Douglas and Monroe 1981).

FOOD HABITS/PREFERENCES: Small invertebrates, including worms, millipedes, spiders, insects, and aquatic crustaceans. Feeds on most animal life that it can capture.

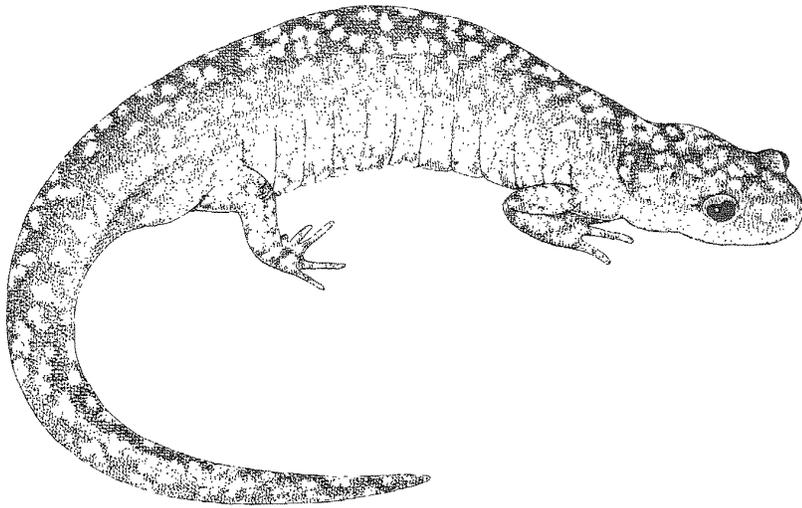
COMMENTS: Before 1964, almost all references to specimens in the *Ambystoma jeffersonianum* complex (including *A. jeffersonianum*, *A. laterale*, *A. tremblayi*, and *A. platineum*) were reported as *A. jeffersonianum* (Uzzell 1964). Many papers have since dealt with the ge-

netics and taxonomy of this complex. This ongoing taxonomic revision has resulted in many apparently erroneous locality records. *Ambystoma jeffersonianum* is currently believed not to occur east of the Connecticut River Valley (at least in central and northern New Hampshire), and all museum specimens from this area identified as *A. jeffersonianum* have been found to refer to the diploid blue-spotted salamander (*A. laterale*) or the triploid Tremblay's salamander (*A. tremblayi*) (Thomas French, personal communication).

The Jefferson salamander may occur throughout the Connecticut River Valley in southwestern New Hampshire. The only one verified record in New Hampshire is Winchester, Cheshire County, in May 1984 (NHNHI unpublished data).

KEY REFERENCES: Anderson and Giacosis 1967, Looper 1952, Pough and Wilson 1976, Uzzell 1967a.

Silvery Salamander
(*Ambystoma platineum*)



RANGE: Occurs with *A. jeffersonianum*; however, range is mainly restricted to areas north of the Wisconsin glacial moraine where ranges of *A. jeffersonianum* and *A. laterale* meet or overlap. Central Indiana e. to n. New Jersey and w. Massachusetts.

RELATIVE ABUNDANCE IN NEW ENGLAND: Locally common.

HABITAT: Found with *A. jeffersonianum* in upland hardwood forests in Sussex County, New Jersey (Anderson and Giacosis 1967).

SPECIAL HABITAT REQUIREMENTS: See *A. jeffersonianum*.

AGE/SIZE AT SEXUAL MATURITY: Unreported.

BREEDING PERIOD: March to April (Behler and King 1979:296).

EGG DEPOSITION: Unreported.

NO. EGGS/MASS: Typically 15 to 20 eggs per mass, in cylindrical masses attached to submerged twigs and grass stems. Rarely if ever attached to pond bottom debris (Uzzell 1967c:49.1).

HOME RANGE/MOVEMENT: Unreported.

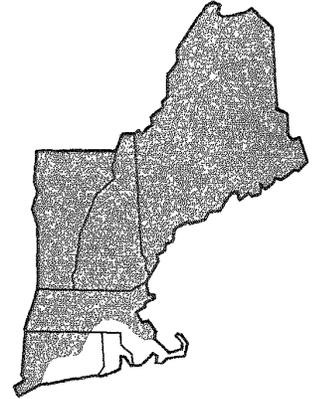
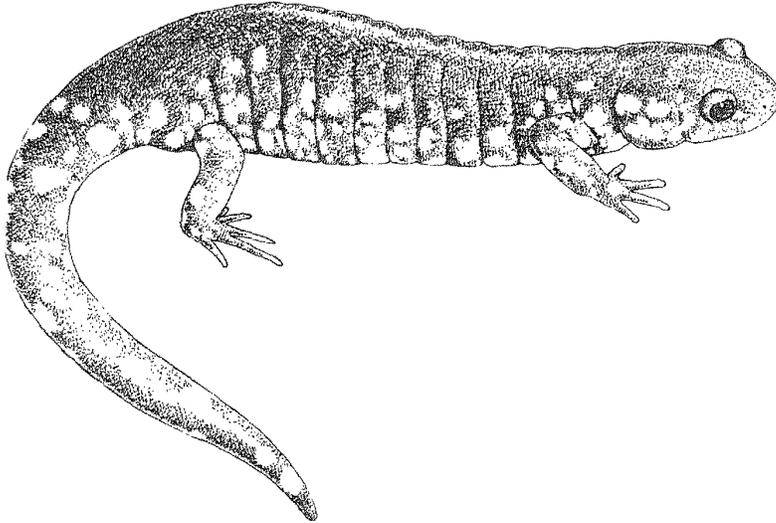
FOOD HABITS/PREFERENCES: Unreported.

COMMENTS: A hybrid of Jefferson and blue-spotted salamanders with three sets of chromosomes (two sets from Jefferson and one from blue-spotted). Most are female, only one male has been recorded (Smith 1978:88). Genetic material is not contributed by male Jefferson; the sperm only stimulates egg production (Uzzell 1964). *A. jeffersonianum* and *A. laterale* probably developed from a common ancestor that was reproductively isolated by the Wisconsin glaciation. As the glacier retreated and the two species mixed, hybridization occurred (Uzzell 1964). All four species of the complex have been found to occur sympatrically in a few areas: *A. laterale* and *A. tremblayi* are generally more northern; *A. jeffersonianum* and *A. platineum* are generally more southern in the range of the complex (Austin and Bogart 1982).

KEY REFERENCES: Smith 1978; Uzzell 1964, 1967.

Blue-spotted Salamander

(*Ambystoma laterale*)



NOTE: See COMMENTS section for Jefferson salamander.

RANGE: Southeastern Quebec and the n. shore of the Gulf of St. Lawrence to James Bay and the s. end of Lake Winnipeg, s. to n. Illinois and Indiana, n. New York and New England. Disjunct colonies in New Jersey, Long Island, Iowa, and Labrador.

RELATIVE ABUNDANCE IN NEW ENGLAND: Rare; threatened in southern portion of range.

HABITAT: Wooded, swampy or moist areas (Minton 1954). Occasionally in overgrown pastures. Sometimes occurs where soil is sandy, and may be found under logs or other forest debris (in hardwood forests in the remnants of glacial Lake Passaic in New Jersey) (Anderson and Giacosis 1967). Occurs in a wide range of elevations (in western Connecticut) and along the Connecticut River floodplain (M. Klemens, personal communication).

SPECIAL HABITAT REQUIREMENTS: Ponds or semi-permanent water for breeding.

AGE/SIZE AT SEXUAL MATURITY: Snout to vent length of 47 to 55 mm in Indiana (Minton 1954).

BREEDING PERIOD: During early spring rains when night temperatures are above freezing (Lazell 1968).

EGG DEPOSITION: March to early April. Eggs laid on the bottoms of temporary shallow forest ponds, roadside drainage ditches, temporary pasture ponds, kettle holes (Landre 1980), attached to litter or in bottom detritus (Stille 1954), and twigs (Uzzell 1976b:48.1).

NO. EGGS/MASS: Varies greatly: 199 to 247 eggs (Uzzell 1964); 82 to 489 (Minton 1972:36); 6 to 10 eggs per mass (Landre 1980); often laid singly (Uzzell 1967b).

TIME TO HATCHING: About 1 month (Smith 1961:28).

LARVAL PERIOD: Extending to late June or mid-August (Smith 1961:28).

HOME RANGE/MOVEMENT: Unreported.

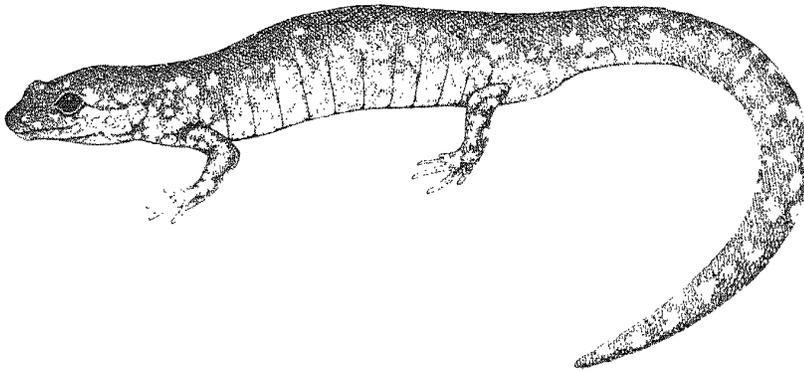
FOOD HABITS/PREFERENCES: Arthropods, annelids, and centipedes.

COMMENTS: Acid precipitation and habitat loss are major threats to this species in the Northeast.

KEY REFERENCES: Anderson and Giacosis 1967; Bleakney 1957; Landre 1980; Uzzell 1964, 1967b.

Tremblay's Salamander

(*Ambystoma tremblayi*)



NOTE: See COMMENTS section for Jefferson salamander.

RANGE: Disjunct colonies in New Brunswick, Ottawa River drainage, e. Massachusetts, New Jersey, nw. Ohio, Indiana and Michigan, and n. Wisconsin. (Connecticut record dependent on interpretation of electrophoretic data.)

RELATIVE ABUNDANCE IN NEW ENGLAND: Rare

HABITAT: Deciduous forests surrounding small ponds or lakes (Minton 1972:37). Have been found under logs.

SPECIAL HABITAT REQUIREMENTS: Woodland ponds for breeding.

AGE/SIZE AT SEXUAL MATURITY: Unreported.

BREEDING PERIOD: March in Indiana (Minton 1972:38).

EGG DEPOSITION: April (Uzzell 1964).

NO. EGGS/MASS: 135 to 162 eggs (Uzzell 1964), laid in groups of two, three, or four, sometimes singly, in small clusters at pond bottoms or attached to submerged sticks (Uzzell 1967a:50.1).

LARVAL PERIOD: Transform in 95 to 101 days (Uzzell 1964). Larval period shortens as eggs are deposited later in the spring.

TIME TO HATCHING: Unreported.

HOME RANGE/MOVEMENT: Unreported.

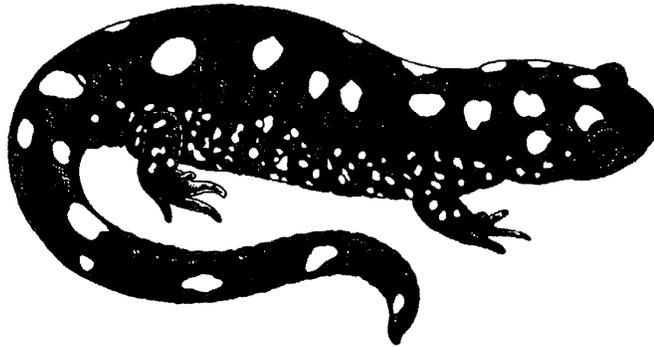
FOOD HABITS/PREFERENCES: Thought to be similar to *A. laterale*.

COMMENTS: Triploid of hybrid origin from *A. laterale* and *A. jeffersonianum*, similar to *A. laterale*, from which it receives two sets of chromosomes, one set from *A. jeffersonianum*. Female population only (gynogenetic reproduction) depends on males of *A. laterale* to stimulate egg development (Uzzell 1964). The spermatophore of *A. laterale* is picked up, but the sperm does not penetrate the egg.

KEY REFERENCES: Minton 1972; Uzzell 1964, 1967a.

Spotted Salamander

(*Ambystoma maculatum*)



RANGE: Nova Scotia and the Gaspé Peninsula to s. Ontario, s. through Wisconsin, s. Illinois excluding prairie regions, to e. Kansas and Texas, and through the Eastern United States, except Florida, the Delmarva Peninsula, and s. New Jersey.

RELATIVE ABUNDANCE IN NEW ENGLAND: Common though populations declining, probably due to acid precipitation.

HABITAT: Fossorial; found in moist woods, steambanks, beneath stones, logs, boards. Prefers deciduous or mixed woods on rocky hillsides and shallow woodland ponds or marshy pools that hold water through the summer for breeding. Usually does not inhabit ponds containing fish (Anderson 1967a). Terrestrial hibernator. In summer often wanders far from water source. Found in low oak-hickory forests with creeks and nearby swamps in Illinois (Cagle 1942, cited in Smith 1961:30). Have been found in the pitch pine-scrub oak community of the Albany Pine Bush (Stewart and Rossi 1981), dense oak forests in Rhode Island.

SPECIAL HABITAT REQUIREMENTS: Mesic woods with semi-permanent water for breeding. Eggs tolerate pH range of 6 to 10 with best hatching success at pH 7 to 9 (Pough and Wilson 1976). High embryonic mortality occurred in temporary pools with pH below 6.0 in New York (Pough 1976).

AGE/SIZE AT SEXUAL MATURITY: During second year. Males may mature 1 year earlier than females (Wacasey 1961).

BREEDING PERIOD: March to mid-April. Mass breeding migrations occur in this species: individuals enter and leave breeding ponds using the same track each year, and exhibit fidelity to breeding ponds (Shoop 1956, 1974). Individuals may not breed in consecutive years (Husting 1965). Breeding migrations occur during steady evening rainstorms.

EGG DEPOSITION: 1 to 6 days after first appearance of adults at ponds (Bishop 1941:114).

NO. EGGS/MASS: 100 to 200 eggs, average of 125, laid in large masses of jelly, sometimes milky, attached to stems about 15 cm (6 inches) under water. Each female lays 1 to 10 masses (average of 2 to 3) of eggs (Wright and Allen 1909). Woodward (1982) reported that females breeding in permanent ponds produced smaller, more numerous eggs than females using temporary ponds.

TIME TO HATCHING: 31 to 54 days (Bishop 1947:145). In a cold ($\leq 10^{\circ}\text{C}$) 50°F) spring-fed pond, eggs developed in 60 days in Rhode Island (Whitford and Vinegar 1966), Shoop (1974) reported 8 to 14 days.

LARVAL PERIOD: 61 to 110 days, and as short as 15 to 60 days (Shoop 1974); found overwintering in Nova Scotia (Bleakney 1952) and Rhode Island (Whitford and Vinegar 1966). Transforms July to September.

HOME RANGE/MOVEMENT: Individuals have been found up to a quarter of a mile (400 m) from the nearest breeding site in North Carolina (Gordon 1968). Will travel 91.2 to 182.4 m (300 to 600 feet) from woods to ponds to

Spotted Salamander (Continued)
(*Ambystoma maculatum*)

open meadows in New York (M. Stewart, personal communication). Individuals were found to use subterranean rodent burrows as retreats; tagged salamanders that were monitored were found within a 300 cm² area of these burrows. Displaced adults moved up to 500 m to return to breeding ponds in Massachusetts (Shoop 1968). Average migration of 150 m from breeding ponds in Kentucky 6- to 220-m range in thick oak-hickory forest. Linear migration was unaffected by the presence or absence of vegetation or change in the topography (Douglas and Monroe 1981).

FOOD HABITS/PREFERENCES: Earthworms, snails, slugs, insects, spiders, particularly larval and adult beetles

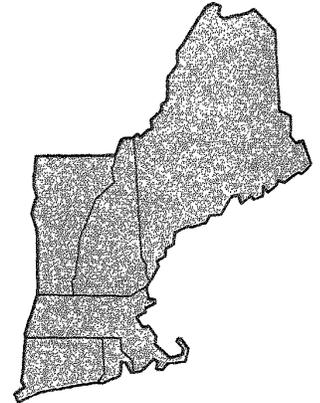
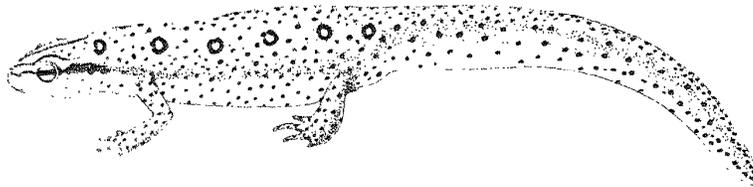
(Wacasey 1961). Larval stage may also eat small fish. Cannibalism by larvae occurs under crowded conditions.

COMMENTS: Nocturnal; travel only on ground surface for migrations to and from breeding pools. Rainfall, snowmelt, or high humidity coupled with air temperature of 10°C (50°F) or more, are necessary for migrations to breeding pools. Numbers may be declining primarily due to over-collection and acid rain.

KEY REFERENCES: Anderson 1967a, Douglas and Monroe 1981, Shoop 1965.

Red-spotted Newt

(*Notophthalmus v. viridescens*)



RANGE: Nova Scotia and Gaspé Peninsula w. to the n. shore of Lake Superior and e. Michigan s. to c. Alabama. nc. Georgia. Absent along coast from se. South Carolina, southward.

RELATIVE ABUNDANCE IN NEW ENGLAND: Common.

HABITAT: Adults found in ponds, particularly water with abundant submerged vegetation, and in weedy areas of lakes, marshes, ditches, backwaters, and pools of shallow slow-moving streams or other unpolluted shallow or semipermanent water. Terrestrial juveniles (efts) live in moist areas on land, typically under damp leaves, under brush piles or logs and stumps, usually in wooded habitats. More common in areas of higher elevation in Connecticut (M. Klemens, personal communication; from sea level to an elevation of 1.6 km on Mt. Marcy in the Adirondacks (M. Stewart, personal observation). Moist beech-maple-hemlock woods in New York (Hurlbert 1969), and oak-pine woods in Massachusetts (Healy 1974). May be seen moving about on wet days in spring and summer. Efts hibernate on land, burrowing under logs and debris, but most adults remain active all winter underwater in pond bottoms or in streams. During winter months often found semiactive in groups of 20 to 40 (Morgan and Grierson 1932).

SPECIAL HABITAT REQUIREMENTS: Water with aquatic vegetation for the adult newt.

AGE/SIZE AT SEXUAL MATURITY: 2 to 8 years (Healy 1974). Aquatic juveniles feed almost year-round and mature in

2 years. The eft feeds only during rainy summer periods and requires more time to reach maturity.

BREEDING PERIOD: Spring (April to June), fall (August to October), sometimes November to December (Hurlbert 1969). Characteristically breed in lakes, ponds, and swamps (Hurlbert 1970).

EGG DEPOSITION: Late March to June.

NO. EGGS/MASS: 200 to 375 eggs (Bishop 1941:64), laid in water, attached singly to the leaves of aquatic plants.

TIME TO HATCHING: 3 to 5 weeks (Logier 1952:64), temperature dependent.

LARVAL PERIOD: 12 to 16 weeks. Postlarval migration from aquatic to terrestrial habitat occurs from summer through late fall during diurnal rainfall in New York (Hurlbert 1970).

HOME RANGE/MOVEMENT: Approximately 270 m² for red eft (juveniles) in an oak-pine woodland in western Massachusetts; maximum daily movement was 13 m (Healy 1974). Average movement along the edge of a small pond in Pennsylvania was 10.1 feet (3.1 m) for females, and 11.2 feet (3.4 m) for males; most individuals remained within 5 feet (1.5 m) of shore (Bellis 1968). Harris (1981) reported that all movement was random for 323 males in a Virginia pond and so considered males to be nonterritorial.

Red-spotted Newt (Continued)

(*Notophthalmus v. viridescens*)

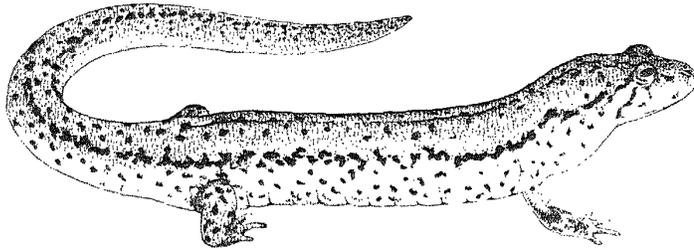
FOOD HABITS/PREFERENCES: Both larvae and adults (Hamilton 1932) are opportunistic feeders (Burton 1977). Insects and their larvae, particularly mayfly, caddisfly, midge and mosquito larvae (Ries and Bellis 1966), springtails (MacNamara 1977); tadpoles, frog eggs, worms, leeches, small mollusks and crustaceans, spiders, mites, occasionally small minnows (Hamilton 1932), salamander eggs also a major food item (T. Tynning, personal communication). Also ingests molted skin. Snails are an important food source for the red eft (Burton 1976). Cannibalism on their own larvae provides an important component of the diet in July and August (Burton 1977).

COMMENTS: Mates in ponds and streams. The red eft remains on land for 2 to 7 years; most remain on land 4 to 5 years, then return to the water where they transform to aquatic adults (Healy 1974). Neotenic individuals have been found on the Coastal Plain in Massachusetts and in New York (Bishop 1941:73-75). Some individual populations omit the terrestrial eft stage. Skin secretions of red efts are highly toxic — about 10 times more toxic than those of adults (Brodie 1968).

KEY REFERENCES: Bishop 1947, Mecham 1967.

Northern Dusky Salamander

(*Desmognathus f. fuscus*)



RANGE: Southern New Brunswick and s. Quebec to se. Indiana and c. Kentucky to the Carolinas; throughout the Northeast excluding s. New Jersey.

RELATIVE ABUNDANCE IN NEW ENGLAND: Common to abundant.

HABITAT: In woodlands at the margins of cool running water — favors clear rocky streams, in springy banks, seepage areas, beds of semidry brooks; under the cover of wet leaves, moss, rock piles, other debris, or in burrows in the soil. Ventures from streamside only during wet weather. Occurs from sea level to mountain elevations. Moves under logs and rocks in deeper water to hibernate in September. May remain active throughout the winter in stream bottoms or deep in unfrozen soil (Ashton and Ashton 1978). Formerly found in bluffs overlooking the Harlem River in Manhattan (Gans 1945).

SPECIAL HABITAT REQUIREMENTS: Permanent streams or seeps in woodlands.

AGE/SIZE AT SEXUAL MATURITY: Variable: about 3 years (Dunn 1926:92), most males at 3.5 years, females deposit first eggs at 5 years (Organ 1961). Some males mature at 2 years, females at 3 years (Danstedt 1975). Body size at maturity varies among populations (Tilley 1968).

BREEDING PERIOD: Breeding occurs in either late spring or fall (Bishop 1941:212-213). Possible that females

breed biennially (Organ 1961). Breeds in ponds or streams.

EGG DEPOSITION: June to September in Connecticut (Babbitt 1937). Female guards the eggs in damp hollows beneath stones, under loose bark of logs, between wet leaf litter layers and in moss close to the water's edge. Larvae move to water where development continues (M. Stewart, personal communication). Clutches found less than 50 cm from the edge of streams and springs or in seepage areas (Krysiak 1980).

NO. EGGS/MASS: 8 to 28 stalked eggs in compact clusters, average 17 (Bishop 1941:314).

TIME TO HATCHING: 7 to 8 weeks in Massachusetts (Wilder 1917), 5 to 8 weeks, New York (Bishop 1941:318), about 10 weeks, Connecticut (Babbitt 1937:16).

LARVAL PERIOD: 7 to 10 months, usually transform in June (Wilder 1913:295). From 9 to 12 months in Maryland (Danstedt 1975).

HOME RANGE/MOVEMENT: Less than 10 feet (3 m) along a stream in a wooded ravine in Pennsylvania (Bartholomew and Bellis 1969). Average range of 1.4 m² in a gravel bottom stream in Ohio (Ashton and Ashton 1978). Aver-

Northern Dusky Salamander (Continued)

(*Desmognathus f. fuscus*)

age about 150 square feet (14 m²) along a stream in Kentucky, maximum movement of 100 feet (30.5 m) as open water dried up (Barbour 1971:57). Average weekly movement less than 0.5 m (Ashton 1975). In an intermittent mountain stream, average for 5 individuals was 48 m² daily movements less than 2 m (Barbour et al. 1969b).

FOOD HABITS/PREFERENCES: Small aquatic and terrestrial invertebrates, insects — 96 percent of prey by weight (Burton 1976), grubs, worms, crustaceans, spiders, and

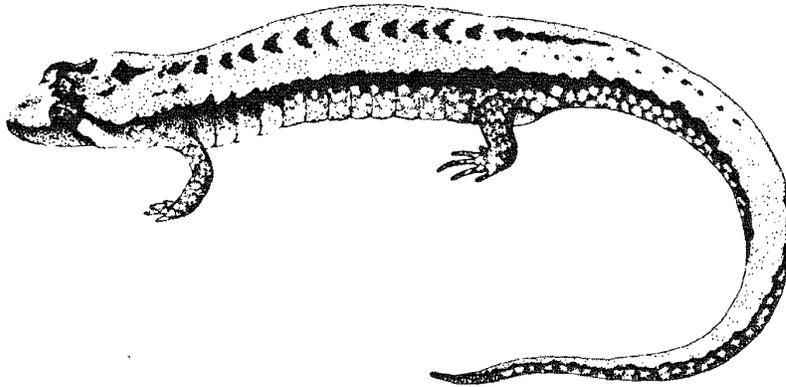
occasionally mollusks; sometimes larvae of own species. Nocturnal feeder, also active on cloudy or rainy days.

COMMENTS: Larval stage is aquatic; adults are riparian. Healy (1974) found efts most active on the forest floor when temperatures were above 13°C (55°F) and substrate was moist.

KEY REFERENCES: Ashton 1975, Bishop 1947, Orga 1961.

Mountain Dusky Salamander

(*Desmognathus ochrophaeus*)



RANGE: Appalachian mountains and uplands from New York to n. Georgia at altitudes ranging from a few hundred feet (approximately 60 m) above sea level to timberline in the s. Appalachians. One juvenile specimen from central Vermont, identification debated (Lazell 1976).

RELATIVE ABUNDANCE IN NEW ENGLAND: Rare.

HABITAT: Semi-terrestrial, found along stream edges and on the forest floor. In wet woods under forest debris, logs, stones, sometimes beneath the bark of dead trees. Near water—small streams, springs, or seeps. Seeps and springs used for late autumn and winter hibernation. Individuals inhabiting seepage banks are active earlier in spring and later in the fall than streamside individuals (Keen 1979).

SPECIAL HABITAT REQUIREMENTS: Seeps, springs, or streams in woodland areas.

AGE/SIZE AT SEXUAL MATURITY: About 3 years: females at 36 months deposit clutch; snout to vent length is 30 to 34 mm (Keen and Orr 1980).

BREEDING PERIOD: Spring, autumn, or winter (Fitzpatrick 1973).

EGG DEPOSITION: Annual cycle occurring in late winter/spring or autumn, female guards eggs.

NO. EGGS/MASS: 11 to 14 eggs (Bishop 1941:335). Stalked eggs deposited in clusters underneath stones or

logs in small cavities. Fecundity in *Desmognathus* depends on size (Tilley 1968).

TIME TO HATCHING: 50 to 70 days (Tilley 1972), hatching in fall and early spring.

LARVAL PERIOD: 2 to 8 months (Tilley 1970); in the southern Appalachians, larvae occasionally overwinter (Tilley 1973:129.1).

HOME RANGE/MOVEMENT: Average movement of 40 to 45 cm between captures of displaced and nondisplaced individuals in a rock-face habitat in North Carolina (Huheey and Brandon 1973). Homing to the nest shown by breeding females (Forester 1979). Females are philopatric, ovipositing in the same section of a stream in successive years (Forester 1977).

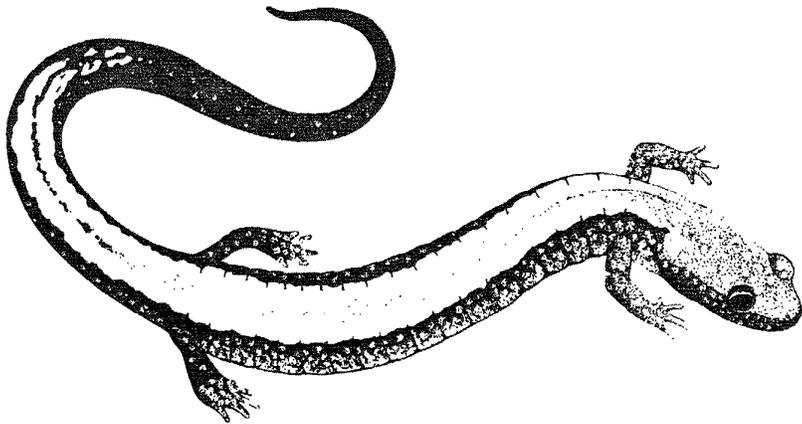
FOOD HABITS/PREFERENCES: Insects, including adult and larval forms of flies, beetles, wasps, and ants. Oligochaetes (Keen 1979), also takes other small arthropods (Huheey and Brandon 1973). Eats shed skin (Bishop 1941:341).

COMMENTS: Basically nocturnal but also active on dark humid days. Will climb trees and shrubs to feed.

KEY REFERENCES: Bishop 1947, Hairston 1949, Huheey and Brandon 1973, Tilley 1973.

Redback Salamander

(*Plethodon cinereus*)



RANGE: Nova Scotia w. to s. Ontario and e. Minnesota, s. in scattered colonies to Missouri, in the Smoky Mountains, in s. Tennessee and e. to Cape Hatteras.

RELATIVE ABUNDANCE IN NEW ENGLAND: Abundant.

HABITAT: Entirely terrestrial. Mixed deciduous or coniferous woods, inhabiting interiors of decaying logs and stumps, also found underneath stones, moist leaf litter, and bark. Wet areas and extremely moist bottomland avoided. Enters xeric, sandy habitats where moist microhabitats exist (M. Klemens, personal communication).

Hibernates down to 15 inch (38 cm) soil depth (Oliver 1955:121) or in rock crevices. May be active during mild winter weather (Minton 1972:67). In Indiana, individuals were found active in an ant mound throughout the winter (Caldwell 1975). Found hibernating a 30 to 36 inch (76.2 to 91.4 cm) depth in decaying root systems of dead white oaks in se. Massachusetts (Hoff 1977). Has been found hibernating in aquatic situations in Maryland (Cooper 1956).

SPECIAL HABITAT REQUIREMENTS: Logs, stumps, rocks, and so on.

AGE/SIZE AT SEXUAL MATURITY: Generally during second year (Oliver 1955:277), but female usually reproduces in third year (Burger 1935). Males at 42.0 mm snout to vent length, females 44.8 mm snout to vent length in Michigan (Werner 1971).

BREEDING PERIOD: Biannual cycle, spring and late fall (October through December) in Maryland (Saylor 1966).

EGG DEPOSITION: June to July of next year.

NO. EGGS/MASS: 3 to 14 eggs, average 7 to 10, in small clusters attached to roof of small chamber, laid in and under rotted logs and stumps. Reproduce annually in Connecticut (Lotter 1978).

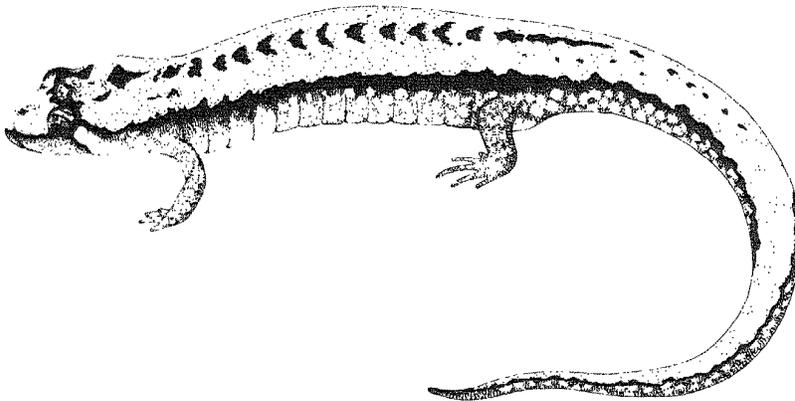
TIME TO HATCHING: 30 to 60 days (Oliver 1955:234), extending to 84 days in Maine (Banasiak 1974). Hatch in August to September. Larval stage is completed within egg.

HOME RANGE/MOVEMENT: Home range is small due to restricted horizontal movement (Taub 1961). Movement of less than 1 foot (30.5 cm) for 14 individuals in hardwood forest habitat in New Jersey; individuals usually found under the same object where initially captured (Taub 1961). Home ranges of 13 m² for females, about 24 m² for males were determined in a northern hardwood forest in Michigan (Kleeberger and Werner 1982).

FOOD HABITS/PREFERENCES: Small insects and their larvae, earthworms, snails, slugs, spiders, sowbugs, millipedes, mites (Surface 1913:95). Occasionally cannibalistic. Mites were the most important food, accounting for

Mountain Dusky Salamander

(*Desmognathus ochrophaeus*)



RANGE: Appalachian mountains and uplands from New York to n. Georgia at altitudes ranging from a few hundred feet (approximately 60 m) above sea level to timberline in the s. Appalachians. One juvenile specimen from central Vermont, identification debated (Lazell 1976).

RELATIVE ABUNDANCE IN NEW ENGLAND: Rare.

HABITAT: Semi-terrestrial, found along stream edges and on the forest floor. In wet woods under forest debris, logs, stones, sometimes beneath the bark of dead trees. Near water--small streams, springs, or seeps. Seeps and springs used for late autumn and winter hibernation. Individuals inhabiting seepage banks are active earlier in spring and later in the fall than streamside individuals (Keen 1979).

SPECIAL HABITAT REQUIREMENTS: Seeps, springs, or streams in woodland areas.

AGE/SIZE AT SEXUAL MATURITY: About 3 years: females at 36 months deposit clutch; snout to vent length is 30 to 34 mm (Keen and Orr 1980).

BREEDING PERIOD: Spring, autumn, or winter (Fitzpatrick 1973).

EGG DEPOSITION: Annual cycle occurring in late winter/spring or autumn, female guards eggs.

NO. EGGS/MASS: 11 to 14 eggs (Bishop 1941:335). Stalked eggs deposited in clusters underneath stones or

logs in small cavities. Fecundity in *Desmognathus* depends on size (Tilley 1968).

TIME TO HATCHING: 50 to 70 days (Tilley 1972), hatching in fall and early spring.

LARVAL PERIOD: 2 to 8 months (Tilley 1970); in the southern Appalachians, larvae occasionally overwinter (Tilley 1973:129.1).

HOME RANGE/MOVEMENT: Average movement of 40 to 45 cm between captures of displaced and nondisplaced individuals in a rock-face habitat in North Carolina (Huheey and Brandon 1973). Homing to the nest shown by breeding females (Forester 1979). Females are philopatric, ovipositing in the same section of a stream in successive years (Forester 1977).

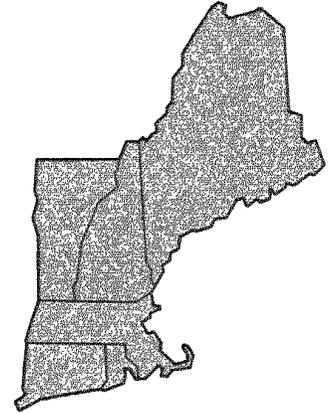
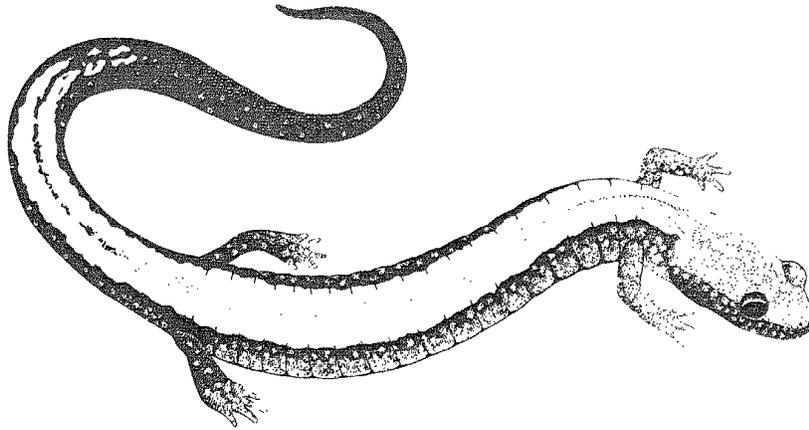
FOOD HABITS/PREFERENCES: Insects, including adult and larval forms of flies, beetles, wasps, and ants. Oligochaetes (Keen 1979), also takes other small arthropods (Huheey and Brandon 1973). Eats shed skin (Bishop 1941:341).

COMMENTS: Basically nocturnal but also active on dark humid days. Will climb trees and shrubs to feed.

KEY REFERENCES: Bishop 1947, Hairston 1949, Huheey and Brandon 1973, Tilley 1973.

Redback Salamander

(*Plethodon cinereus*)



RANGE: Nova Scotia w. to s. Ontario and e. Minnesota, s. in scattered colonies to Missouri, in the Smoky Mountains, in s. Tennessee and e. to Cape Hatteras.

RELATIVE ABUNDANCE IN NEW ENGLAND: Abundant.

HABITAT: Entirely terrestrial. Mixed deciduous or coniferous woods, inhabiting interiors of decaying logs and stumps, also found underneath stones, moist leaf litter, and bark. Wet areas and extremely moist bottomland avoided. Enters xeric, sandy habitats where moist microhabitats exist (M. Klemens, personal communication).

Hibernates down to 15 inch (38 cm) soil depth (Oliver 1955:121) or in rock crevices. May be active during mild winter weather (Minton 1972:67). In Indiana, individuals were found active in an ant mound throughout the winter (Caldwell 1975). Found hibernating a 30 to 36 inch (76.2 to 91.4 cm) depth in decaying root systems of dead white oaks in se. Massachusetts (Hoff 1977). Has been found hibernating in aquatic situations in Maryland (Cooper 1956).

SPECIAL HABITAT REQUIREMENTS: Logs, stumps, rocks, and so on.

AGE/SIZE AT SEXUAL MATURITY: Generally during second year (Oliver 1955:277), but female usually reproduces in third year (Burger 1935). Males at 42.0 mm snout to vent length, females 44.8 mm snout to vent length in Michigan (Werner 1971).

BREEDING PERIOD: Biannual cycle, spring and late fall (October through December) in Maryland (Sayler 1966).

EGG DEPOSITION: June to July of next year.

NO. EGGS/MASS: 3 to 14 eggs, average 7 to 10, in small clusters attached to roof of small chamber, laid in and under rotted logs and stumps. Reproduce annually in Connecticut (Lotter 1978).

TIME TO HATCHING: 30 to 60 days (Oliver 1955:234), extending to 84 days in Maine (Banasiak 1974). Hatch in August to September. Larval stage is completed within egg.

HOME RANGE/MOVEMENT: Home range is small due to restricted horizontal movement (Taub 1961). Movement of less than 1 foot (30.5 cm) for 14 individuals in hardwood forest habitat in New Jersey; individuals usually found under the same object where initially captured (Taub 1961). Home ranges of 13 m² for females, about 24 m² for males were determined in a northern hardwood forest in Michigan (Kleeberger and Werner 1982).

FOOD HABITS/PREFERENCES: Small insects and their larvae, earthworms, snails, slugs, spiders, sowbugs, millipedes, mites (Surface 1913:95). Occasionally cannibalistic. Mites were the most important food, accounting for

Redback Salamander (Continued)

Plethodon cinereus

85 percent of the prey items in a New Hampshire study (Burton 1976), insects 73 percent by weight in a New York study (Jameson 1944). During rainy summer nights, found on leaf litter presumably foraging for food (Burton and Likens 1975). Often climbs tree trunks and shrubs in search of food, particularly during wet nights.

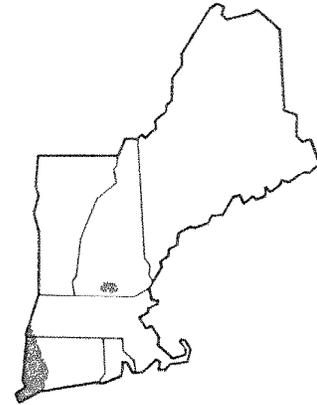
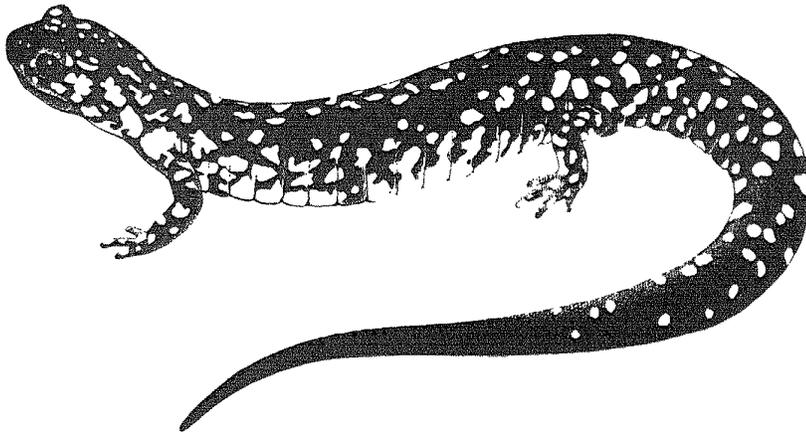
COMMENTS: Three distinct color phases occur: redback, leadback, and erythrystic. In Connecticut, the redback morph occurs almost exclusively in cold upland areas;

in areas of more moderate climate and elevation, both redback and leadback morphs occur (M. Klemens, personal communication). All records of erythrystic individuals occur north of 41° and south of 47° latitude (Tilley et al. 1982). The redback salamander is the most abundant terrestrial vertebrate in New England and accounts for the greatest amount of vertebrate biomass in the Hubbard Brook Experimental Forest in New Hampshire (Burton and Likens 1975).

KEY REFERENCES: Heatwole 1962, Smith 1963.

Slimy Salamander

(*Plethodon g. glutinosus*)



RANGE: Extreme w. Connecticut through c. New York to e. Oklahoma, Arkansas, s. in Louisiana to c. Florida. Scattered colonies in s. New Hampshire and Texas.

RELATIVE ABUNDANCE IN NEW ENGLAND: Uncommon to rare.

HABITAT: Moist wooded hillside and ravines. Terrestrial, found underneath moist humus, manure piles, in crevices in rock, shale banks, and under logs in woodland areas. Bishop (1941:718) found the species most abundant in banks along highways and woodland openings. Has been found in second-growth oak-hickory forests and steep hemlock slopes of ravines in the Helderberg Mountains, New York (M. Stewart, personal communication), to an elevation of 1,768 m in Great Smoky Mountain National Park (Powders and Tietjen 1974). Also in mature mixed deciduous forests (Semlitsch 1980a). Hibernates underground from November to March or April.

SPECIAL HABITAT REQUIREMENTS: Rock outcroppings, logs within wooded areas.

AGE/SIZE AT SEXUAL MATURITY: Females mature at about 4 years and lay eggs in the fifth year, males at 4 years (Highton 1962). Snout to vent length is 59 to 74 mm in females, 53 to 70 mm in males (Highton 1962).

BREEDING PERIOD: Autumn and spring (Highton 1956).

EGG DEPOSITION: Probable biennial oviposition occurring in late spring or early summer in northern populations (Highton 1962). Eggs laid within rock crevices or

rotted logs (Smith 1961:58), also found in caves (Bishop 1941:224).

NO. EGGS/MASS: 13 to 34 eggs, average 16 to 17 (Highton 1962). Eggs aggregated in a thin envelopment. Fecundity increases with body size. (Semlitsch 1980a).

TIME TO HATCHING: Probably in late summer; entire larval period spent within egg.

HOME RANGE/MOVEMENT: Twenty-two individuals in n. Florida were recaptured at or within 4 feet (1.2 m) of the original capture point (Highton 1956). Adult home ranges are less than 9 m diameter; immatures range is less than 6 m diameter, in oak-hickory forest with thick leaf litter in North Carolina. Mean movement distances were 17.5 m for males, 14.3 m females, and 4.2 m juveniles. Probably capable of movements more than 90 m beyond home-range area (Wells and Wells 1976).

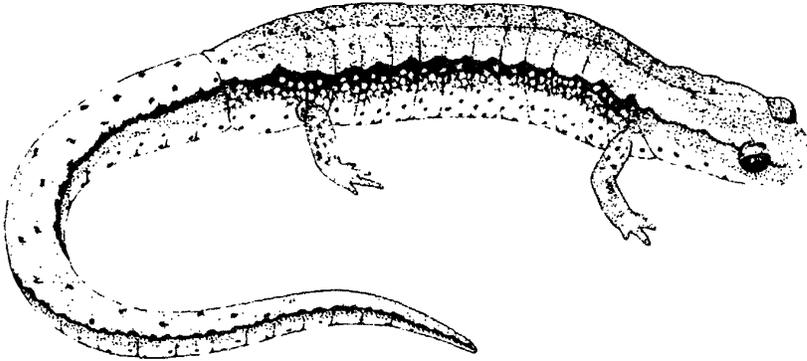
FOOD HABITS/PREFERENCES: Euryphagic (Powders and Tietjen 1974). Mostly insects, also sowbugs, worms, centipedes, spiders, slugs, and snails (Hamilton 1932). Availability probably governs feeding habits. Ants and beetles were the most abundant food items in a Virginia study, accounting for 58 percent of the total weight of food (Davidson 1956).

COMMENTS: Nocturnal, may be active during some rainy days. During hot, dry spells found deep underground or under logs in dense aggregations (Wells and Wells 1976).

KEY REFERENCES: Bishop 1941; Highton 1956, 1962.

Four-toed Salamander

(*Hemidactylium scutatum*)



RANGE: Nova Scotia w. to s. Ontario and Wisconsin, s. to Alabama and Georgia. Absent from most of n. New England. Scattered disjunct populations occur in the Eastern United States.

RELATIVE ABUNDANCE IN NEW ENGLAND: Uncommon to rare.

HABITAT: Wet woodlands, preferably with sphagnum moss; shaded, shallow woodland pools; tamarack bogs. Hides in moss, in moist decaying wood, under stones or wet leaves. Prefers an acidic environment. Found in beech/maple, yellow birch/maple and other hardwood forests, found less often in coniferous woods (Neill 1963:2.1). In mixed forests in New York (Bishop 1941:190). Larval stage is aquatic, found in pools and quiet streams with an abundance of moss. Typically hibernates in decaying root systems of trees. Aggregations may appear during hibernation with rotted wood or leaf litter (Blanchard 1933b). Maple, alder sapling swamp in Connecticut (C. Raithel, personal communication).

SPECIAL HABITAT REQUIREMENTS: Acidic wet woodlands.

AGE/SIZE AT SEXUAL MATURITY: About 2-1/2 years (Barbour 1971:74).

BREEDING PERIOD: Late summer and autumn, peak in fall. Breeding area adjacent to mixed hardwood or northern conifer woods in West Virginia (N. Green, personal observation) and Albany County, New York (M. Stewart, personal communication), and Michigan (Blanchard 1923).

EGG DEPOSITION: March to April or May (Blanchard 1934, Barbour 1971:73). Nests located next to and just above water.

NO. EGGS/MASS: 19 to 50 eggs (Dunn 1926:200, 202), average 50 in New York (Bishop 1941:183). Communal nesting may occur with up to 800 eggs laid per nest. One to four females will remain with eggs (Wood 1953). Eggs laid singly; adhered to moss, in natural cavities or in depressions formed by the female, also among roots, decayed leaves.

TIME TO HATCHING: 38 to 60 days (Blanchard 1934).

LARVAL PERIOD: 6 weeks (Blanchard 1923); as long as 18 weeks; variation in larval development depends upon pond conditions (Bishop 1941:186).

HOME RANGE/MOVEMENT: Unreported.

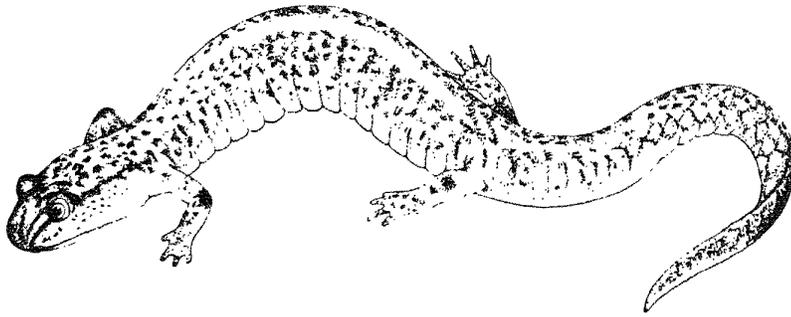
FOOD HABITS/PREFERENCES: Small invertebrates, including insects, spiders, and earthworms.

COMMENTS: A nocturnal and secretive species, therefore difficult to locate.

KEY REFERENCES: Bishop 1947, Neill 1963.

Northern Spring Salamander

(*Gyrinophilus p. porphyriticus*)



RANGE: Through the Appalachian range from wc. Maine and extreme se. Quebec s. to e. Ohio and c. Alabama, Pennsylvania and n. New Jersey. Absent from the Coastal Plain. Recently reported from Rhode Island (C. Raithel, personal communication).

RELATIVE ABUNDANCE IN NEW ENGLAND: Uncommon to rare, except in Vermont and nw. Berkshire County, Massachusetts, where common (T. Tynning, personal communication).

HABITAT: Found in but not restricted to forested areas with clear, cold water, springs, mountain streams, creeks, boggy areas. Also in depressions under stones or other cover adjacent to water. Usually occurs at higher elevations in spruce/fir forests, typically in moist situations, in underground water courses and limestone caves (N. Green, personal observation), beech/maple/hemlock forests, in shale ravine streams in Tompkins and Albany Counties, New York (M. Stewart, personal communication). Have been found in hillside meadow streams, swamps, and lake margins.

SPECIAL HABITAT REQUIREMENTS: Streams, seeps, or springs. In winter, wet soil near water where remains somewhat active in burrows.

AGE/SIZE AT SEXUAL MATURITY: 4 to 5 years, at total length of about 5-1/2 inches (14 cm) in New York (Bishop 1947:370).

BREEDING PERIOD: Mid-October to winter months (Bruce 1972). Annual reproduction cycle (Bruce 1969).

EGG DEPOSITION: April to summer and into the fall (Bruce 1972), female guard eggs (Organ 1961).

NO. EGGS/MASS: 9 to 63 (Bruce 1972), 44 to 132 eggs, New York (Bishop 1941:247), 44 to 66, Virginia (Organ 1961). Eggs laid in running water under logs and stones, usually in groups, sometimes attached singly.

TIME TO HATCHING: Fall (Organ 1961). Hatch late summer, early fall. The young from one clutch may remain near the nest site for several months after hatching (Bruce 1980).

LARVAL PERIOD: Variable larval period, average of about 4 years. Metamorphosis occurs in late spring summer (Bruce 1980). Larvae are aquatic.

HOMERANGE/MOVEMENT: Unreported.

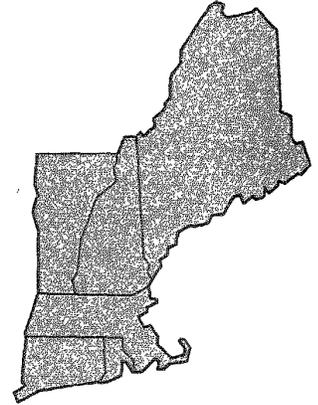
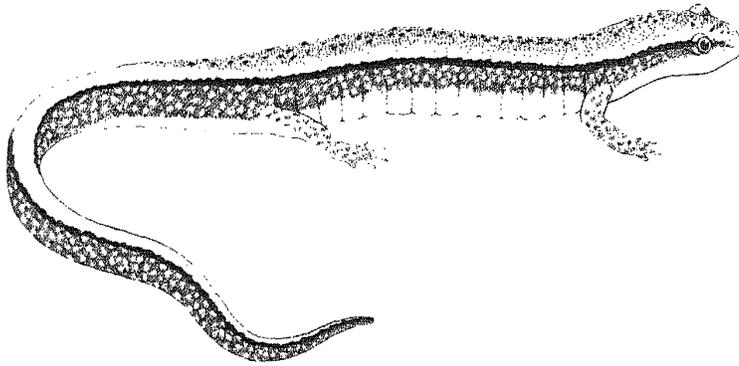
FOOD HABITS/PREFERENCES: Euryphagic predator — consumes aquatic insects and their nymph and larval forms, crustaceans, centipedes, earthworms, snails, spiders, millipedes, small frogs, and salamanders. Terrestrial insects were 79 percent of total prey items in New Hampshire (Burton 1976). Has been found to eat its own larvae (Logier 1952:76). Salamanders account for 50 percent of the diet in the Appalachians (Bruce 1972); salamanders a minor part of diet in New York (Bishop 1941:253). Nocturnal, forages for food among rocks and vegetation in or along stream beds on rainy summer nights. Larvae are generalist feeders until metamorphosis when they take larger food items (Bruce 1980).

COMMENTS: Formerly named the purple salamander.

KEY REFERENCES: Bishop 1941; Brandon 1967; Bruce 1972, 1980.

Northern Two-lined Salamander

(*Eurycea b. bislineata*)



RANGE: Gaspé Peninsula, Quebec and e. Ontario sw. through Ohio to e. Illinois, s. to extreme ne. Mississippi to Virginia.

RELATIVE ABUNDANCE IN NEW ENGLAND: Common to abundant.

HABITAT: Floodplain bottoms to moist forest floors at high elevations to 1,829 m (6,000 feet) (Behler and King 1979:321). Along brooks and streams, boggy areas near springs or seeps. Found under objects at water's edge in moist soil or in coarse sand and gravel at stream bottoms or edges, leaf litter and crayfish burrows (Ashton and Ashton 1978). In wet woodlands or pastures. During wet or humid weather will wander into moist woods more than 100 m from water courses (D. Rudis, personal observation).

Hibernates under water, or remains active in feeding aggregations in springs and cold-flowing streams in New York (Stewart 1956a) and adjacent unfrozen soil (Ashton and Ashton 1978).

SPECIAL HABITAT REQUIREMENTS: Alkaline streams for breeding.

AGE/SIZE AT SEXUAL MATURITY: The majority mature during the second fall after metamorphosis (Stewart 1956a).

BREEDING PERIOD: Autumn and early spring. Breeds in streams.

EGG DEPOSITION: May to early June in Massachusetts (Johnson and Goldberg 1975).

NO. EGGS/MASS: 12 to 36 eggs, average of 18 eggs in Massachusetts (Wilder 1924). Eggs deposited in clusters attached to bottoms of stones or logs in running water. Several females may use the same stone as a nest site, one female remains with eggs until hatching.

TIME TO HATCHING: 1 to 2 months after eggs laid.

LARVAL PERIOD: 2 or 3 years, aquatic (Wilder 1924).

HOME RANGE/MOVEMENT: Average area less than 14 m² for 20 monitored individuals along a stream in Ohio (Ashton and Ashton 1978). Territories were aggressively defended in an artificial environment (Grant 1955).

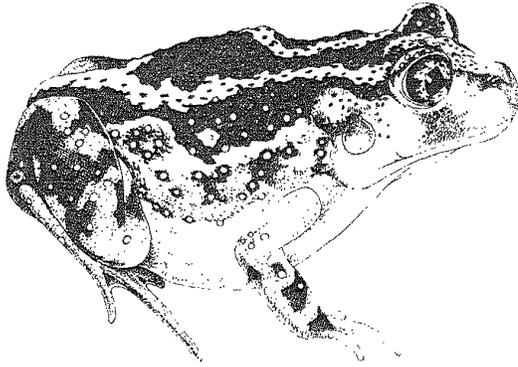
FOOD HABITS/PREFERENCES: Insects, particularly beetles, beetle larvae, mayflies, stonefly nymphs, and dipterans; also spiders, mites, millipedes, sowbugs, and earthworms (Hamilton 1932). Most prey are of terrestrial origin (Burton 1976).

COMMENTS: Will travel in the open during wet or rainy nights, rarely during wet days. Adults are extremely agile and when disturbed often escape through a series of rapid jumps.

KEY REFERENCES: Bishop 1941, Bleakney 1958, Mittleman 1966.

Eastern Spadefoot

Scaphiopus h. holbrookii



RANGE: Southeastern Massachusetts extending to New York and se. Missouri, s. to e. Louisiana and Florida. Not found in the higher elevations of the Appalachians or the Everglades of Florida.

RELATIVE ABUNDANCE IN NEW ENGLAND: Rare.

HABITAT: In dry sandy or loose soils in sparse shrub growth or open forest areas. Terrestrial and subterranean, only enters water to breed, usually in temporary rain pools. Prefers forest areas with leaf litter (Pearson 1955). In farmland areas in Connecticut River Valley, Massachusetts, and pitch pine — scrub oak dunes in New York (Stewart and Rossi 1981). Colonies occur along floodplains of major rivers. Emerge in spring from hibernation when soil moisture is sufficient.

SPECIAL HABITAT REQUIREMENTS: Sandy soils, temporary pools for breeding.

AGE/SIZE AT SEXUAL MATURITY: During second year after metamorphosis, males at 15 months, females at 19 months (Pearson 1955).

BREEDING PERIOD AND EGG DEPOSITION: Usually April or May, extending into August; breeding is initiated by a heavy rainfall (Gosner and Black 1955). Breeds in congregations of many individuals if population is high. Usually a one-night phenomenon.

NO. EGGS/MASS: 1,000 to 2,500 eggs in masses of 6 to 110 in irregular bands in or around plants of temporary water. Eggs are very adhesive.

TIME TO HATCHING: 5 to 15 days (Oliver 1955:236).

TADPOLES: Late broods transform in 16 to 20 days (Gosner and Black 1955), 48 to 63 days for early broods (Driver 1936).

HOME RANGE/MOVEMENT: Mean home range about 10 m² 108 square feet in n. Florida, for 90 percent of captures average home range was about 6.2m² (67 square feet); occupy one or several underground burrows within home range (Pearson 1955). Maximum dispersal distances of 9.8 m 32 feet; individuals were recaptured in the same home ranges after 5 years (Pearson 1957).

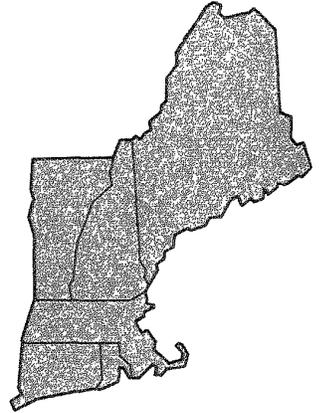
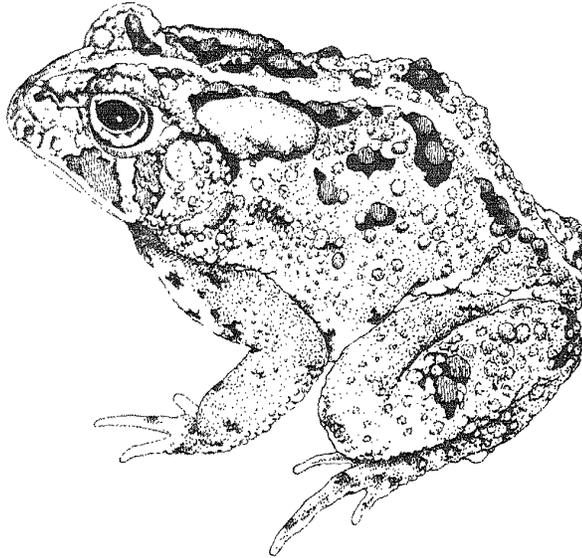
FOOD HABITS/PREFERENCES: Flies, spiders, crickets, caterpillars, true bugs, other ground-dwelling arthropods, earthworms, and snails. Moths are eaten when they can be caught (Bragg 1965:36). Tadpoles are planktonic feeders for the first few days (Richmond 1947), later becoming carnivorous and sometimes even cannibalistic.

COMMENTS: Nocturnal, peaks of activity occur just after sundown and before sunrise. Fossorial; individuals have remained in burrows an average of 9.5 days at a time, emerging to feed (Pearson 1955). Can remain underground for weeks or months during dry periods, to depths of 3 to 7 feet (1 to 2 m) (Ball 1933, cited in Babbitt 1937:20). As evidence of the spadefoot's secretive and nocturnal habits, there was a total of 16 reported sightings from 1811 to 1936 in the ne. part of its range (Ball 1936, cited in Bragg 1956).

KEY REFERENCES: Ball 1936, Bragg 1956, Pearson 1955, Wasserman 1968.

Eastern American Toad

(*Bufo a. americanus*)



RANGE: Nova Scotia and the Gaspé Peninsula w. through c. Ontario to Lake Winnipeg, s. to e. Kansas, c. Indiana, c. Alabama and c. North Carolina.

RELATIVE ABUNDANCE IN NEW ENGLAND: Common.

HABITAT: Found in almost any habitat: gardens, woods, yards with cover, damp soil and a food supply. Sea level to mountain elevations. Usually in moist upland woods.

SPECIAL HABITAT REQUIREMENTS: Needs shallow water for breeding. Hibernates in burrows underground to 12 inches (30.5 cm) deep (Oliver 1955:122) from October to late March or April.

AGE/SIZE AT SEXUAL MATURITY: 3 to 4 years (Dickerson 1969:72), 2 to 3 years (Hamilton 1934).

BREEDING PERIOD AND EGG DEPOSITION: Early April to July, peak in late April in the Northeast. Travels to breeding ponds at night in large numbers (Maynard 1934).

NO. EGGS/MASS: 4,000 to 12,000 eggs (Dickerson 1969:67). Laid in long curling strings amidst aquatic vegetation.

TIME TO HATCHING: About 3 to 12 (average 4) days.

TADPOLES: 5 to 10 weeks.

HOME RANGE/MOVEMENT: Exhibits homing behavior by returning to breeding sites; 264 individuals used the same site annually in Ontario (Oldham 1966). Newly me-

tamorphosed toads showed celestial orientation when leaving ponds; as most movement is nocturnal, course determination is probably during daylight hours (Dole 1973).

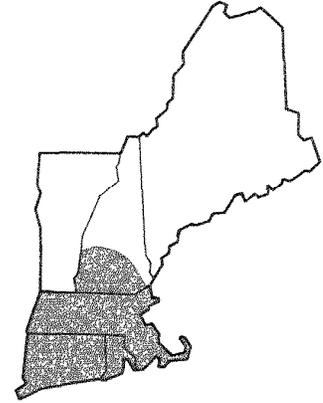
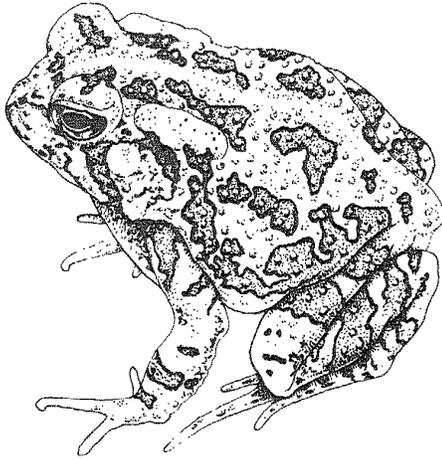
FOOD HABITS/PREFERENCES: Terrestrial arthropods, including insects, sowbugs, spiders, centipedes, and millipedes. Slugs and earthworms are other invertebrate foods. Some vegetable matter is taken accidentally. Food species determined by availability (Hamilton 1954). Feeds from twilight through the evening hours.

COMMENTS: Most active during evening hours. May bask (M. Stewart, L. White, personal observation) but will seek cover during the heat of the day. Calls and breeds during the day at the peak of breeding season (T. Tynning, personal communication).

KEY REFERENCES: Hamilton 1954, Wright and Wright 1949.

Powler's Toad

(*Bufo woodhousii fowleri*)



RANGE: Southern New England w. to c. Pennsylvania, the n. shore of Lake Erie and e. shore of Lake Michigan s. to Missouri, e. Oklahoma, Texas, c. Georgia and South Carolina.

RELATIVE ABUNDANCE IN NEW ENGLAND: Uncommon but locally abundant.

HABITAT: Prefers areas with sandy soil—shorelines, river valleys, beaches, and roadside areas. Usually found in lowland areas, but frequently in pine and oak forests, gardens, lawns and fields, also found in small marshy ponds. Hibernates in burrows in well-drained sandy soils to 3 feet (0.9 m) deep from early fall to late spring (May in Connecticut).

SPECIAL HABITAT REQUIREMENTS: Sandy soils, shallow water for breeding.

AGE/SIZE AT SEXUAL MATURITY: Probably breeds during third year (Stille 1952).

BREEDING PERIOD AND EGG DEPOSITION: Late April to May extending to mid-August (2 to 4 weeks later than *Bufo a. americanus*). Shallow water of pools, lake margins, ditches, and so on, necessary for breeding.

NO. EGGS/MASS: Up to 8,000 eggs laid in long strings in aquatic vegetation (Wright and Wright 1949:212).

TIME TO HATCHING: About 1 week.

TADPOLES: 40 to 60 days, usually transform midsummer.

HOME RANGE/MOVEMENT: Average distances between captures ranged from 22 to 32 m during a 3-year period on a golf course in Connecticut (Clarke 1974). Night movements of 200 to 700 feet (61 to 213 m) or more to reach waters' edge (Lake Michigan). Toads usually found within 100 feet (30.5 m) of previous capture point (Stille 1952).

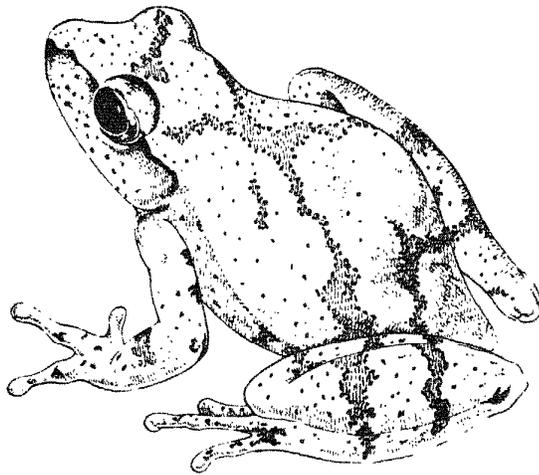
FOOD HABITS/PREFERENCES: Chiefly ground-dwelling insects, particularly ants and beetles; also consumes earthworms, spiders, snails, and slugs.

COMMENTS: During evening hours may move to edge of water to replenish body moisture (Stille 1952). May be active during the day, but typically crepuscular (Minton 1972:95). Activity periods vary with populations, mostly nocturnal in Connecticut (Clarke 1974).

KEY REFERENCES: Clarke 1974, Logier 1952, Wright and Wright 1949.

Northern Spring Peeper

(*Hyla c. crucifer*)



RANGE: Nova Scotia, the Gaspé Peninsula and Quebec to the s. tip of Hudson Bay through Ontario to Lake Winnipeg, s. to e. Texas and throughout the Eastern United States, except Florida and s. Georgia.

RELATIVE ABUNDANCE IN NEW ENGLAND: Common to abundant.

HABITAT: Marshy or wet woods, second growth woodlots, sphagnum bogs, nonwooded lowlands, near ponds and swamps. Found on the ground or burrowed into the soil. Breeds in permanent or temporary water, usually woodland ponds with aquatic debris. Found in cool moist woods after breeding (M. Stewart, personal observation). Hibernates on land during late November to January or early spring, under moss and leaves.

SPECIAL HABITAT REQUIREMENTS: Pools for breeding.

AGE/SIZE AT SEXUAL MATURITY: Early in second year at about 20 mm snout to vent length (Delzell 1958).

BREEDING PERIOD AND EGG DEPOSITION: Early March to June (in the North).

NO. EGGS/MASS: 800 to 1,000 eggs (Wright 1914:16). Laid singly near the bottom of shallow weedy ponds, attached to submerged plants (Oliver 1955:236).

TIME TO HATCHING: 6 to 12 days.

TADPOLES: 90 to 100 days (Wright 1914:42). Usually transform during July (Wright and Wright 1949:314).

HOME RANGE/MOVEMENT: In s.e. Michigan, home-range diameters ranged from 4 to 18 feet (1.2 to 5.5 m), established around forest debris and vegetation; average daily travel was 20 to 130 feet (6.1 to 39.6 m) reported by Delzell (1958).

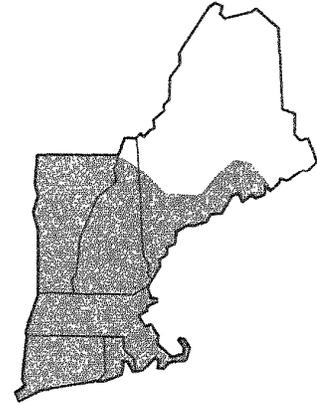
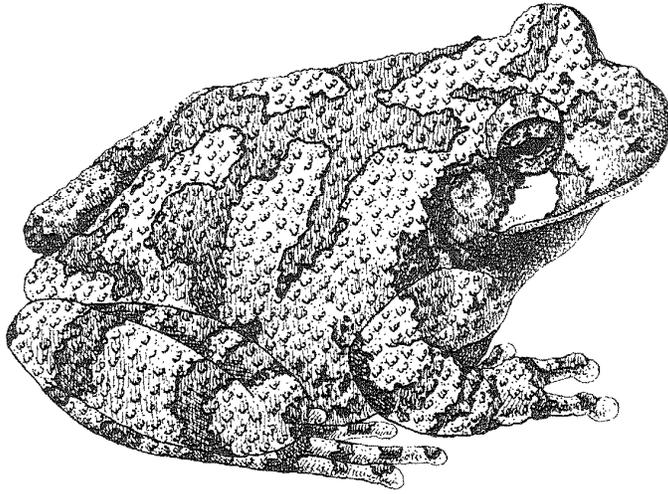
FOOD HABITS/PREFERENCES: Small nonaquatic insects: preferably ants, flying bugs, beetles, flies, springtails, and spiders; also mites, ticks, and small snails. Foods taken probably reflect availability, catchability, and size rather than preference (Oplinger 1967).

COMMENTS: Young frogs terrestrial in first year (Delzell 1958). May move long distances from breeding areas in summer and fall, single calls heard from woods, shrubby openings, far from water (M. Stewart, personal observation).

KEY REFERENCES: Delzell 1958, Logier 1952, Wright and Wright 1949.

Gray Treefrog

(*Hyla versicolor*)



RANGE: Eastern United States and s.e. Canada from s. Maine to Manitoba and s. through c. Texas and the Gulf states to c. Florida.

RELATIVE ABUNDANCE IN NEW ENGLAND: Common.

HABITAT: Forested regions with small trees, shrubs and bushes near or in shallow water. Often found on moss or lichen on bark of old trees. Will breed in temporary pools or permanent water, swamps, bogs, ponds, weedy lakes, and roadside ditches; breeding sites are extremely variable. Commonly inhabit moist areas in hollow trees, under loose bark, or in rotted logs during summer months, (Smith 1961:93). Hibernate under tree roots, under leaves (Babbitt 1937).

SPECIAL HABITAT REQUIREMENTS: Aquatic sites for breeding.

AGE/SIZE AT SEXUAL MATURITY: Breeds at 3 years (Palmer 1949:455).

BREEDING PERIOD: Early May to July, Connecticut (Babbitt 1937). May to August in the Southeast (Martof et al. 1980:116). Season varies with latitude (Smith 1961:93). Peak in early May, Ithaca, New York (Wright 1914:44).

EGG DEPOSITION: Generally 20 to 35 days between first appearance and first eggs (Wright 1914:47). Loosely attached to vegetation on the surface of shallow water (Martof et al. 1980:116).

NO. EGGS/MASS: Total of 1,800 to 2,000 eggs (Wright

1914:49). Packets of 10 to 40 eggs (Martof et al. 1980:116), or 4 to 25 eggs (Smith 1961:93).

TIME TO HATCHING: 4 to 5 days (Babbitt 1937).

TADPOLES: 50 to 60 days, shorter period in warmer areas. Transform late in June to September.

HOME RANGE/MOVEMENT: Unreported.

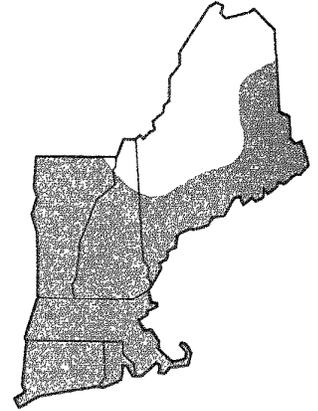
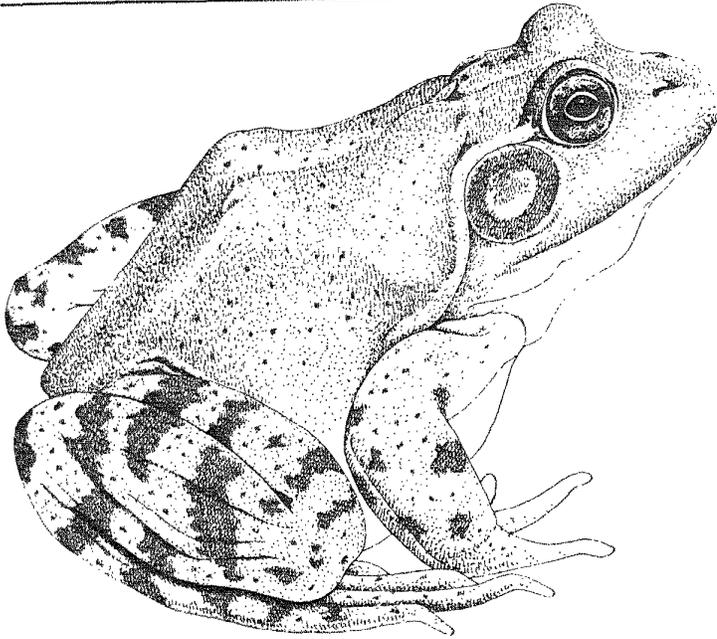
FOOD HABITS/PREFERENCES: Small insects, spiders, plant lice, mites, and snails. Forages in vegetation and on the ground (Martof et al. 1980:116).

COMMENTS: Most active during evening hours when vocal both during and out of breeding season. Rarely found outside of breeding period. Able to change color from gray to green. Young are emerald green. Single calls heard occasionally in summer during humid days, often before a storm. *H. versicolor* is a tetraploid species with 48 chromosomes (Martof et al. 1980:115). Noxious skin secretions by *H. versicolor* may repel predators (Brodie and Formanowicz 1981).

KEY REFERENCES: Logier 1952, Martof et al. 1980, Wright and Wright 1949.

Bullfrog

(*Rana catesbeiana*)



RANGE: Nova Scotia w. to Wisconsin, s. through the Great Plains to e. Colorado, Texas and ne. Mexico; throughout the Eastern United States, except s. Florida and parts of n. Maine. Introduced in California and British Columbia.

RELATIVE ABUNDANCE IN NEW ENGLAND: Common, but formerly more abundant.

HABITAT: Near shorelines of large bodies of water with emergent vegetation, lakes, river oxbows. Highly aquatic. Tend to remain in same pools for the summer months if water level is stable (Raney 1940). Will occupy floating logs far from shore. Breed close to shore lines in areas sheltered by shrubs (Raney 1940). Hibernates under water in mud and leaves about mid-October, emerges late February to March, May in New York (Wright 1914:78).

SPECIAL HABITAT REQUIREMENTS: Deep permanent water and emergent vegetation.

AGE/SEX AT SEXUAL MATURITY: In fourth or fifth year.

BREEDING PERIOD AND EGG DEPOSITION: Late May to July (in the North), peak in July.

NO. EGGS/MASS: 12,000 to 20,000 eggs (Wright 1914:82). Eggs laid in floating films of jelly in water of lakes, quiet streams, and ponds.

TIME TO HATCHING: 5 to 20 days (Oliver 1955:237). Often 4 days or less (Wright 1914:83).

TADPOLES: For 2 to 3 winters.

HOME RANGE/MOVEMENT: Average distance traveled in Summer, 200 to 300 feet (61 to 91 m) in a woodland lake and pond in New York (Raney 1940, Ingram and Raney 1943). Evening movement of 200 to 700 feet (61 to 213 m) to water in Michigan (Stille 1952). Home range of 131 bullfrogs in an Ontario pond had an average mean activity radius of 8.6 feet (2.6 m) with minimum and maximum movements of 2.0 feet (0.6 m) and 37.1 feet (11.3 m), respectively (Currie and Bellis 1969). Males defend territories during breeding season. In a Michigan study (Emlen 1968), the average distance between males within a chorus was 17.8 feet (5.4 m), implying an average minimum territorial radius of approximately 9 feet (2.7 m).

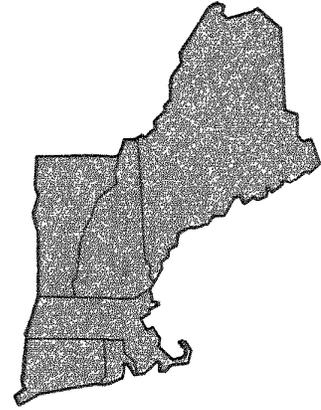
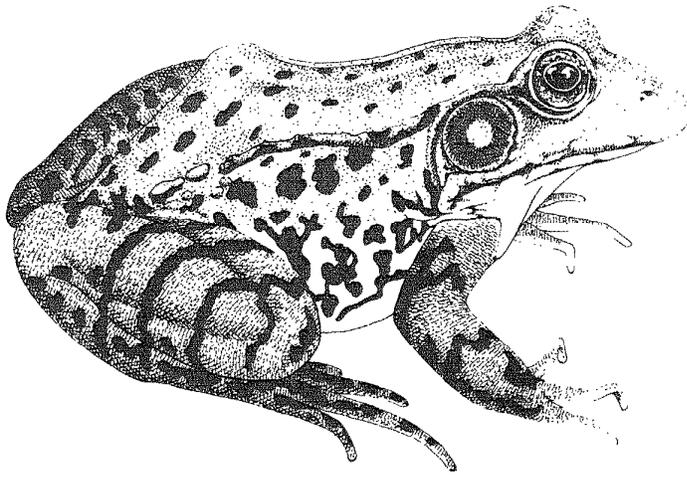
FOOD HABITS/PREFERENCES: Any available small animals; fish, other frogs, salamanders, newts, young turtles, snakes, small birds, mice, crayfish, insects, snails, and spiders. Also cannibalistic. Feeds among the water weeds; an indiscriminate and aggressive predator.

COMMENTS: The bullfrog has become rare in many areas, presumably due to toxic effects of DDT and other pollutants (M. Stewart, personal communication).

KEY REFERENCES: Logier 1952, Wright and Wright 1949.

Green Frog

(*Rana clamitans melanota*)



RANGE: Nova Scotia through Quebec and s. Ontario to c. Minnesota, s. to e. Oklahoma and e. to n. Georgia and South Carolina. Absent from c. Illinois.

RELATIVE ABUNDANCE IN NEW ENGLAND: Common.

HABITAT: Riparian, inhabiting margins of shallow permanent or semipermanent fresh water, shores and banks of lakes and ponds, creeks, woodland streams, limestone quarry pools, springs, vernal pools, moist woodlands near water. Seldom more than a few meters from the water. Young often found in semipermanent water. Hibernates underground or underwater from October until March, usually within its home range (Martof 1953b). May be active on warm winter days.

SPECIAL HABITAT REQUIREMENT: Riparian areas.

AGE/SIZE AT SEXUAL MATURITY: Males sexually active the season following metamorphosis when 60 to 65 mm long; females mature during the second or third year when 65 to 75 mm long (Martof 1956). Some females reached maturity at 90 mm at Cranberry Lake, New York (M. Stewart, personal communication). Some may not breed until the second year after transformation (Wells 1977).

BREEDING PERIOD AND EGG DEPOSITION: April to August, peak in mid-May, varies with locality. The same female may lay two clutches (Wells 1976). Emerge from hibernation in early spring but do not breed until mid-May in Connecticut (Babbitt 1937).

NO. EGGS/MASS: 3,500 to 4,000 eggs (Wright 1914:16),

to 5,000 (Pope 1944). Eggs deposited in floating masses of jelly attached to underwater twigs and stems in permanent water.

TIME TO HATCHING: 3 to 6 days (Babbitt 1937).

TADPOLES: 1 to 2 years. Less than 1 year in southern parts of range. May transform in same season eggs are laid (Martof 1956).

HOME RANGE/MOVEMENT: Ranged from 20 m² to 200 m² with an average of 61 m² in southern Michigan near a stream and lake; daily movements were less than 10 m for 80 percent of the 824 individuals recaptured (Martof 1953b). During breeding season, males maintained a 2 to 3 m distance between each other (Martof 1953a). Territory size depends on cover density, 1 to 1.5 m between males in areas of dense cover. Territories with diameters of 4 to 6 m defended in open areas in New York (Wells 1977).

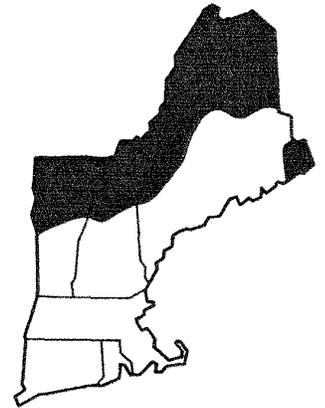
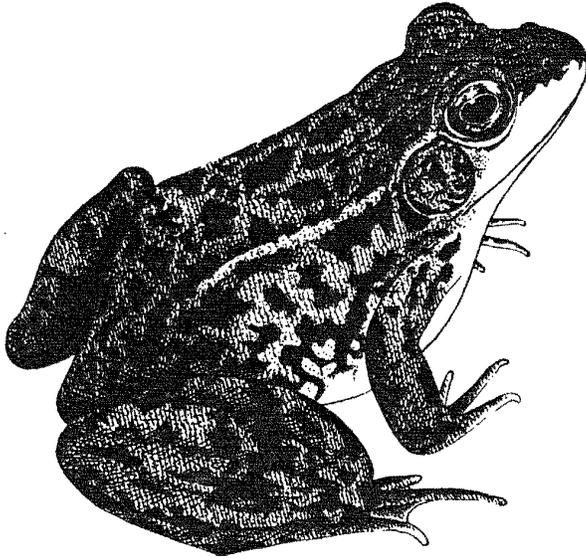
FOOD HABITS/PREFERENCES: Terrestrial feeders among shoreline vegetation. Insects and their larvae, worms, small fish, crayfish and other crustaceans, newts, spiders, small frogs, and mollusks are taken. Beetles, flies, grasshoppers, and caterpillars constituted over 60 percent of food items (Hamilton 1948). Terrestrial beetles are the most important food item (Steward and Sandison 1972). Tadpoles are herbivorous.

COMMENTS: Found in or at edge of water during daylight hours; evening hours spent along the banks feeding or in water defending territories (Wells 1977).

KEY REFERENCES: Logier 1952; Martof 1953b, 1956; Wright and Wright 1949.

Mink Frog

(*Rana septentrionalis*)



RANGE: Nova Scotia, n. New England and New York w. to n. Wisconsin and Minnesota, n. through Ontario to St. James Bay and to n. Quebec and Labrador.

RELATIVE ABUNDANCE IN NEW ENGLAND: Only in extreme northern areas, locally common to rare.

HABITAT: At the edges of northern lakes and ponds, cold springs, inlets where cold streams enter ponds and stream edges. Prefers open water with abundant lily pads. Sometimes found in northern bogs.

SPECIAL HABITAT REQUIREMENTS: Breeds and hibernates only in permanent waters. Prefers lily pads in open water for basking and foraging (M. Stewart, personal communication).

AGE/SIZE AT SEXUAL MATURITY: Males 1 year after metamorphosis, females 1 to 2 years after metamorphosis (Hedeen 1972).

BREEDING PERIOD AND EGG DEPOSITION: June to early August (Hedeen 1972), peak in July (Wright and Wright 1949:535).

NO. EGGS/MASS: One individual laid 509 eggs (Hedeen 1972). Eggs laid in globular jelly-like masses attached to aquatic vegetation such as spatterdock (*Nuphar*) then drop to bottom where they develop (M. Stewart, personal communication).

TIME TO HATCHING: Unreported.

TADPOLES: For 1 to 2 years. Transform during summer months.

HOME RANGE/MOVEMENT: Unreported.

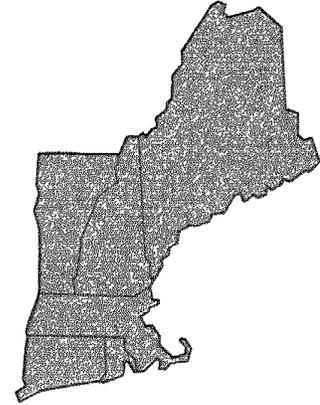
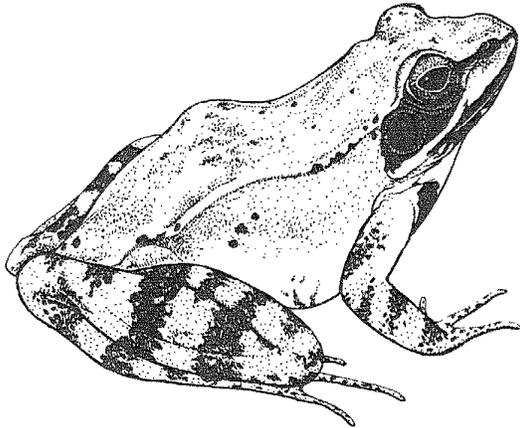
FOOD HABITS/PREFERENCES: Adults feed from lily pads on animal matter, including adult insects and larvae, particularly aphids and chrysomelids (Kramek 1972, 1976), also minnows, millipedes, leeches, snails, spiders; plant material taken inadvertently. Most prey taken from the water surface—usually opportunistic feeders, but can be selective (Kramek 1972). Diet is a reflection of prey species availability. Tadpoles feed primarily on algae (Hedeen 1970).

COMMENTS: Very similar to *R. clamitans melanota* in appearance and habits. Adults produce a musky scent, especially when handled roughly (Conant 1975:342). Competition from green frogs and bullfrogs may be an important factor in habitat selection in the Northeast (M. Stewart, personal communication). In ponds treated with rotenone in the Adirondacks, the anuran community of green, mink, and bullfrogs probably requires 10 to 15 years to recover to pretreatment levels (Stewart 1975).

KEY REFERENCES: Hedeen 1977, Logier 1952, Marshall and Buell 1955.

Wood Frog

(*Rana sylvatica*)



RANGE: Atlantic provinces and n. Quebec to Alaska (northern limit is along treeline) s. into North Dakota, the Great Lakes States, to the Appalachians in Tennessee and extreme n. Georgia. Throughout the Northeast.

RELATIVE ABUNDANCE IN NEW ENGLAND: Common in suitable habitat.

HABITAT: Terrestrial; in mesic woods, often far from water during the summer months as woodland ponds dry up; xeric woods with moist microhabitats (M. Klemens, personal communication). Prefers wooded areas with small ponds for breeding (Heatwole 1961). Found in boreal conifer forests, swamps and upland hardwood forests to elevations of 1,158 m, (Trapido and Clausen 1938). Found in bogs and trap rock slopes in Connecticut (M. Klemens, personal communication). Hibernates under moist forest floor debris or flooded meadows (M. Klemens, personal communication) from October to late March. Embryos and larvae showed limited tolerance to water with a high humic content in a Minnesota peat bog (Karns 1980).

SPECIAL HABITAT REQUIREMENTS: Prefers temporary woodland pools, back waters of slow-moving streams.

AGE/SIZE AT SEXUAL MATURITY: Males at 2 years, females at 3 years (Bellis 1961).

BREEDING PERIOD AND EGG DEPOSITION: March to July at temperatures of about 10°C (50°F) (Smith 1956:113). Moore (1939) found maximum temperature tolerance of 24°C (75°F) for egg development. Often breeds before ice is off the water (Martof 1970:86.2). Egg-laying usually completed within 4 to 6 days (Herreid and Kinney 1967).

NO. EGGS/MASS: 2,000 to 3,000 eggs (Wright 1914:16), 1,019 average in Massachusetts (Possardt 1974).² Eggs attached to submerged twigs or free on the bottom in globular masses.

TIME TO HATCHING: 10 to 30 days (Oliver 1955:236), temperature dependent.

TADPOLES: 6 to 15 weeks (Minton 1972:132). May overwinter in n. Canada.

HOME RANGE/MOVEMENT: Average home-range size for 453 individuals in a Minnesota peat bog was 77.2 square yards (65.5 m²), range 3.5 to 440.5 square yards (2.9 to 368.3 m²). Distance between captures averaged 12.3 yards (11.2 m) and ranged from 0 to 78 yards (0 to 71.3 m) as reported by Bellis (1965).

FOOD HABITS/PREFERENCES: Insects; particularly beetles, flies and hymenopterans (Moore and Strickland 1955), also spiders, snails, slugs, and annelids.

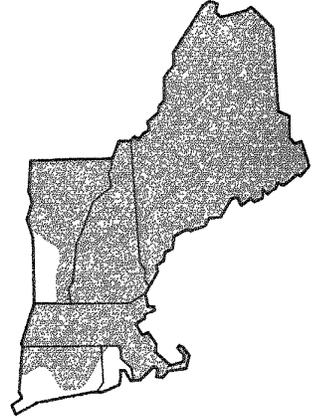
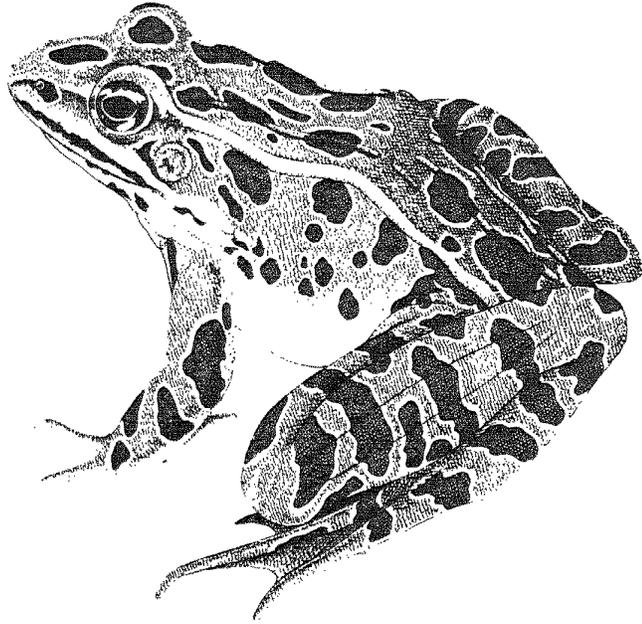
COMMENT: Breeds before all other ranids in the Northeast. Adults have been observed migrating across surface ice toward chorusing wood frogs (T. Andrews, personal observation). Brush piles, grassy hummocks, and other terrestrial objects used as cover rather than utilizing aquatic escape (Marshall and Buell 1955).

KEY REFERENCES: Heatwole 1961, Martof 1970, Wright and Wright 1949.

²Possardt, E. E. The breeding biology and larval development of the wood frog (*Rana sylvatica*). Dept. For. and Wildl. Manage., Univ. Mass., Amherst. Unpublished.

Northern Leopard Frog

(*Rana pipiens*)



RANGE: Nova Scotia, S. Labrador to se. British Columbia, to e. parts of Oregon, Washington and California, to n. Arizona and New Mexico, and to Ohio, n. New York and New England.

RELATIVE ABUNDANCE IN NEW ENGLAND: Common; spotty distribution in southern part of range, very uncommon in parts of formerly occupied range.

HABITAT: Commonly found in wet open meadows and fields and wet woods during summer months. River floodplains, Connecticut (M. Klemens, personal communication). Breeds in ponds, marshes, slow shallow streams, and weedy lake shores. Usually hibernates from October or November to March, hibernates under water or in caves (Rand 1950). Sometimes emerges in early February (Smith 1956:110) and during warm days in winter (Zenisek 1964).

SPECIAL HABITAT REQUIREMENTS: Wet meadows.

AGE/SIZE AT SEXUAL MATURITY: At 3 years of age in Michigan (Force 1933).

BREEDING PERIOD AND EGG DEPOSITION: March to May, congregates to breed (Wright and Wright 1949:482).

NO EGGS/MASS: 4,000 to 6,500 eggs laid in masses in shallow water, sometimes attached to twigs.

TIME TO HATCHING: 13 to 20 days (Wright 1914:58).

TADPOLES: 9 to 12 weeks, transform July and August. Overwinter as tadpoles in Nova Scotia (Bleakney 1952).

HOME RANGE/MOVEMENT: Daily travel within home range reported to be usually less than 5 to 10 m in wet pasture and marsh (Dole 1965). Average nightly movement during rainy periods was 36 m in Michigan (Dole 1968). Occasional long-range movement, often exceeding 100 m during rainy nights (Dole 1965).

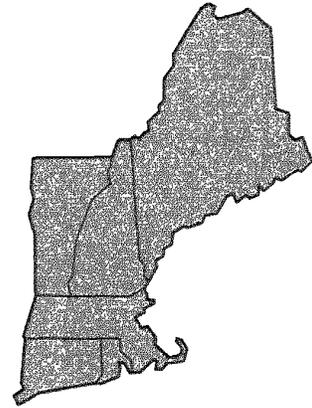
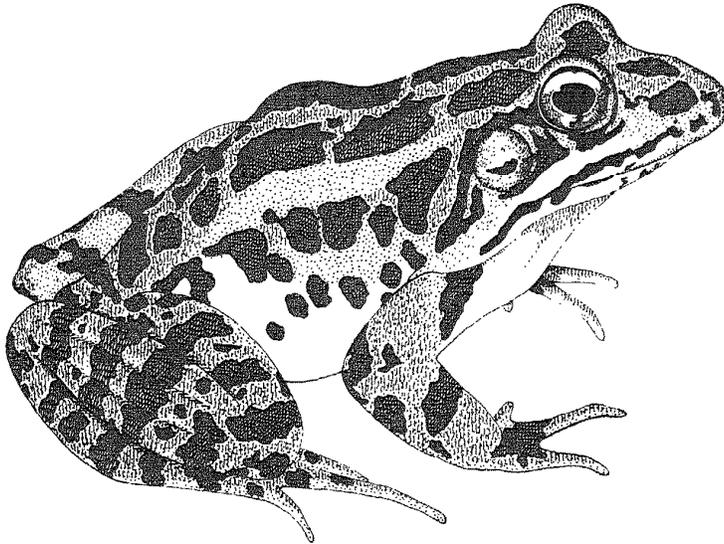
FOOD HABITS/PREFERENCES: Insects; particularly beetles, lepidopteran larvae, wasps, bugs, crickets, grasshoppers, and ants; also takes sowbugs, spiders, small crayfish, snails, and myriopods. Almost 99 percent of food items were insects and spiders (Drake 1914). Occasional records of having taken small birds and snakes. Food species taken correlates with peaks in insect prey abundance (Linzey 1967).

COMMENTS: During dry summer days frogs may sit in "forms," small clearings made in wet soil within their home range (Dole 1965). Most northeastern leopard frogs are probably introduced "exotics" released from laboratories and classrooms. Some believe the species is not native to New England (T. Tynning, personal communication).

KEY REFERENCES: Dole 1968, Logier 1952.

Pickereel frog

(*Rana palustris*)



RANGE: Nova Scotia and the Gaspé Peninsula through se. Ontario to Wisconsin se. to e. Texas and ea. to South Carolina. Absent from C. Illinois, nw. Ohio and parts of the South.

RELATIVE ABUNDANCE IN NEW ENGLAND: Locally common.

HABITAT: Colder waters of lakes, ponds, clear streams, springs, sphagnum bogs, limestone quarry pools. In Massachusetts, fairly ubiquitous along streams and shores of permanent ponds and lakes (T. Andrews, personal communication). In summer found in pastures, fields, or woodlands, often at a distance from water. Prefers water with thick vegetation at edges for cover. Hibernates in mud at bottom of ponds or in ravines under stones from October to March. Some individuals found wintering in caves in Indiana (Rand 1950).

SPECIAL HABITAT REQUIREMENTS: Shallow, clear water of bogs and woodland ponds for breeding.

AGE SIZE AT SEXUAL MATURITY: Unreported.

BREEDING PERIOD AND EGG DEPOSITION: March to May.

NO. EGGS/MASS: 2,000 to 3,000 eggs (Wright 1914:67). Eggs laid in firm globular masses attached to submerged plants and branches.

TIME TO HATCHING: 11 to 21 days (Wright 1914:67).

TADPOLES: 80 to 100 days, some overwinter as tadpoles. Transform July to September.

HOME RANGE/MOVEMENT: Unreported.

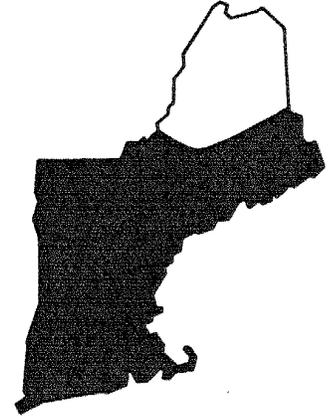
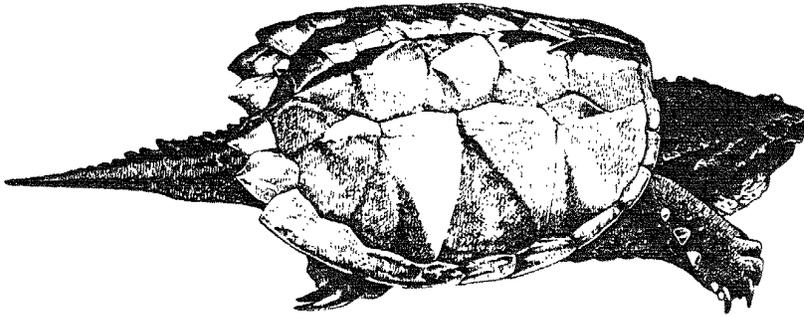
FOOD HABITS/PREFERENCES: In adults, 95 percent of food items were terrestrial arthropods (Smith 1956:108). Snails, small crayfish, aquatic amphipods and isopods are also eaten.

COMMENTS: Diurnal; may be crepuscular during hot weather. Sensitive to pollution and changes in water quality. Skin secretions may be toxic to other amphibians confined with pickereel frogs.

KEY REFERENCES: Schaaf and Smith 1971, Smith 1956, Wright and Wright 1949.

Common Snapping Turtle

(*Chelydra s. serpentina*)



RANGE: Across the Eastern United States to the Rocky Mountains, s. Canada to the Gulf of Mexico and into Central America.

RELATIVE ABUNDANCE IN NEW ENGLAND: Common.

HABITAT: Bottom dweller in any permanent and many semipermanent bodies of fresh or brackish water; occasionally in temporary water. Marshes, swamps, bogs, pools, lakes, streams, rivers, frequently in areas with soft muddy banks or bottoms. Formerly thought to prefer permanent water. Almost entirely aquatic, but will travel overland. Hibernates from October to March or April in mud or debris in lake bottoms, banks, and muskrat holes, but has been seen walking on and under the ice (Carr 1952:64). Little known about winter activity.

SPECIAL HABITAT REQUIREMENTS: Aquatic habitat.

AGE/SIZE AT SEXUAL MATURITY: Carapace length of 10 inches (25.4 cm) reported by Hammer (1969).

BREEDING PERIOD: Late April to November, sperm may remain viable in females for several years.

EGG DEPOSITION: Mid-June. Nests made in soil of banks or in muskrat houses. Also on lawns, driveways, fields, sometimes far from water.

CLUTCH SIZE: 11 to 83 eggs; females may lay two clutches per year in southern portions of range. Typically 20 to 30 eggs per clutch (Cahn 1937, cited in Conant 1938:128).

INCUBATION PERIOD: 55 to 125 days (Hammer 1969), typically 80 to 91 days, depending on environmental conditions.

EGGS HATCH: Late August to early October, may overwinter in nest until spring in northern portions of range. Nests often destroyed by mammalian predators.

HOME RANGE/MOVEMENT: Average distance traveled by 107 individuals was 0.69 mile (1.1 km), with most movement within the same marsh in South Dakota (Hammer 1969). In a New York marsh, movement of 100 m was the average for 85 individuals; home ranges from 3 to 9 ha (Kiviat 1980). Established range in Pennsylvania 4.5 acres (1.8 ha), reported by Ernst (1968b). Quite migratory. Females exhibit strong nesting site fidelity and will travel more than 0.5 km overland through forest and uneven terrain between water bodies in Ontario. Maximum round-trip distance of 16 km between home range and nesting site (Obbard and Brooks 1980).

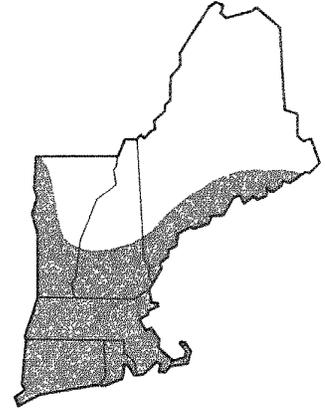
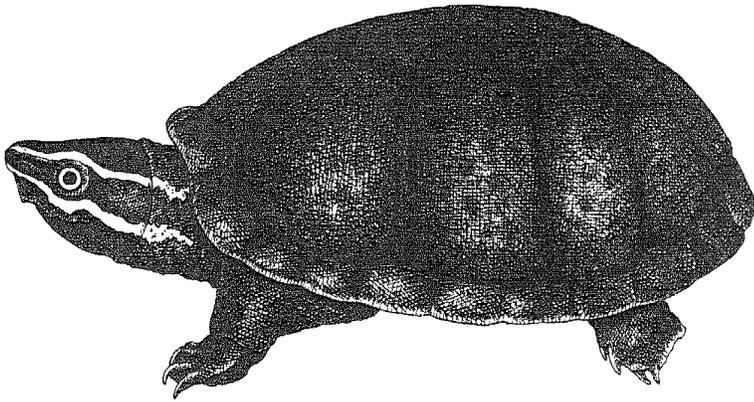
FOOD HABITS/PREFERENCES: Omnivorous feeders; animal matter accounts for 54 percent of prey items including fish (40 percent), crayfish, aquatic invertebrates, reptiles, birds, mammals; plant material 37 percent (Alexander 1943). Primary fish species in diet included suckers, bullheads, sunfish, and perch in Connecticut (Alexander 1943). May occasionally take young waterfowl; not destructive to natural population of fish or waterfowl. Scavenges for any food readily available.

COMMENTS: High levels of persistent organochlorine contaminants found in the tissues of Hudson River Specimens (Stone et al. 1980).

KEY REFERENCES: Babcock 1919, Hammer 1969, Kiviat 1980.

Stinkpot

(*Sternotherus odoratus*)



RANGE: Atlantic coast, s. Ontario, w. to the Mississippi River, s. to c. Texas, s. Florida. Absent from n. New England.

RELATIVE ABUNDANCE IN NEW ENGLAND: Common.

HABITAT: Permanent bodies of water: still, shallow, clear lakes, ponds, and rivers, muddy bottoms preferred. Frequently found in reservoirs (M. Klemens, personal communication). Refrains from using temporary water sources. Formerly thought to refrain from using water with fluctuating levels. Not in streams at higher elevations in the East. Large populations found in areas with abundant aquatic vegetation (Pope 1939:39). Scattered records for occurrence in marshes, swamps, bogs, sloughs (Pope 1939:39). Usually gregarious when hibernating in bottom mud, debris, beneath rocks in river bottoms, or in river banks when the temperature falls below 10°C (50°F) (Cagle 1942).

SPECIAL HABITAT REQUIREMENTS: Permanent water bodies. Exclusively aquatic except when laying eggs.

AGE/SIZE AT SEXUAL MATURITY: Stinkpots in the northern portions of the range mature more slowly than individuals in the southern regions. Males at 3 or 4 years, females at 2 to 7 years (Tinkle 1961), or perhaps at 9 to 11 years (Risely 1932).

BREEDING PERIOD: April to October, peak in April to May, September to October.

EGG DEPOSITION: May to August, peak in June. Eggs laid in muck, rotted logs, stumps, sandy soil, grass, or on the ground at lake margins.

CLUTCH SIZE: 1 to 9 eggs (highest numbers in North), typically 3 to 6.

INCUBATION PERIOD: 60 to 90 days (Barbour 1971:162), 35 to 40 days (Edgren 1960).

EGG HATCH: September to October (in North). Gregarious nesting habits, often malodorous.

HOME RANGE/MOVEMENT: Overland movements probably seasonal or forced (Ernst and Barbour 1972:40). Average home range is 0.06 acre (0.02 ha) for males and 0.12 acre (0.05 ha) for females in Oklahoma. Overland movements ranged from 166 to 227 feet (35.4 to 69.2 m) for males, and 113 to 146 feet (34.4 to 44.5 m) for females (Mahmoud 1969). Exhibited homing behavior in Michigan—13 out of 28 released individuals traveled up to 700 feet (213 m) to initial capture points (Williams 1952).

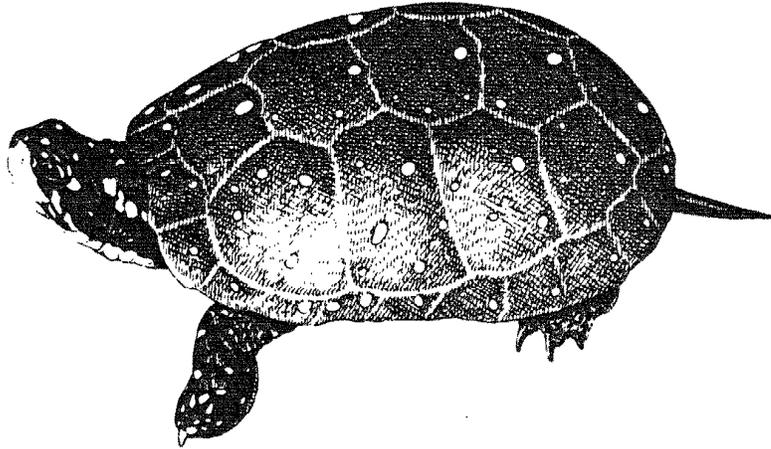
FOOD HABITS/PREFERENCES: Principally carnivorous, feeds along the bottom for snails, clams, aquatic insects and their larvae, particularly dragonfly nymphs and caddisfly larvae (Lagler 1943), minnows, worms, tadpoles, and fish eggs (Babcock 1919:36). While scavenging, plants and algae as well as carrion are eaten. Carrion accounted for 40 percent of the diet by volume for 73 individuals in Michigan (Lagler 1943).

COMMENTS: Also called the musk turtle. Often basks well out of water on horizontal limbs of slanting trees along the water's edge. Highly aquatic; activity periods in morning and evening in Oklahoma (Mahmoud 1968). Individuals frequently covered with algae growth.

KEY REFERENCES: Ernst and Barbour 1972, Mahmoud 1969.

Spotted Turtle

(*Clemmys guttata*)



RANGE: Southern Marine to s. Quebec w. to Lake Michigan, n. half of Ohio to e. portion of Virginia s. to n. Florida.

RELATIVE ABUNDANCE IN NEW ENGLAND: Uncommon to rare.

HABITAT: In unpolluted, small shallow bodies of water such as woodland streams, wet meadows, bog holes, small ponds, marshes, swamps, roadside ditches, and brackish tidal creeks. In Rhode Island, found in salt marshes and small bogs or ponds with adjacent dry upland oak-pine forest (C. Raithel, personal communication). Prefers areas with aquatic vegetation. Hides in mud and detritus at bottom. Wanders over land. Basks along water's edge on brush piles in water (T. Graham, personal communication) and on logs or vegetation clumps. Often found in cranberry bogs. Hibernates in muddy bottoms during the coldest winter months. May aestivate during hottest periods of summer (T. Tynning, personal communication).

SPECIAL HABITAT REQUIREMENTS: Unpolluted shallow water.

AGE/SIZE AT SEXUAL MATURITY: Males about 83.4 mm plastron length, females about 80.8 mm plastron length in Pennsylvania (Ernst and Barbour 1972:73).

BREEDING PERIOD: March to May, peak usually June.

EGG DEPOSITION: June to July. Eggs usually laid in well-drained soil of marshy pastures, or in tussocks (M. Klemens, personal communication).

CLUTCH SIZE: 1 to 8 eggs (Adler 1961), average 3 to 5.

INCUBATION PERIOD: 70 to 83 days.

EGGS HATCH: Late August (Ernst and Barbour 1972:74) to September (Finneran 1948). Overwintering in nest may occur.

HOME RANGE/MOVEMENT: For adults in Pennsylvania marsh range averaged 1.3 acre (0.5 ha) according to Ernst (1968b); moved less than 0.5 mile (0.8 km) (Ernst 1968a). Females migrate outside of home range to nest (Ernst 1970).

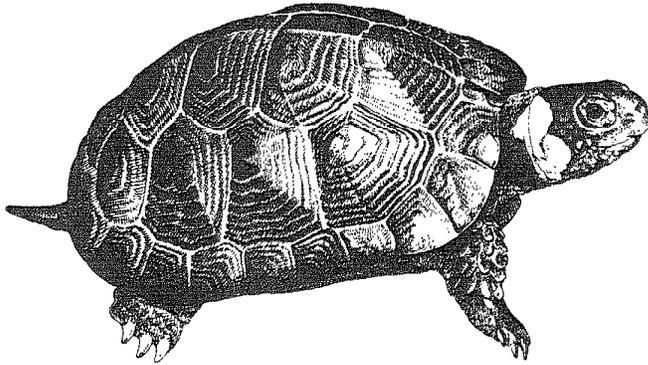
FOOD HABITS/PREFERENCES: Omnivorous. Eats crustaceans, mollusks, spiders, earthworms, aquatic insects, and other invertebrates; occasionally takes frogs and tadpoles, small fish, carrion, and vegetable matter. Food taken only under water.

COMMENTS: Overcollecting, coupled with draining and filling of swamps (and possibly pollution), is depleting the population. A strongly diurnal species (Graham and Hutchinson 1979).

KEY REFERENCES: Ernst 1972a, Ernst and Barbour 1972, Stewart 1974.

Bog Turtle

(*Clemmys muhlenbergii*)



RANGE: Scattered colonies through New York, s. to ne. Maryland, s. Virginia, w. North Carolina and Georgia.

RELATIVE ABUNDANCE IN NEW ENGLAND: Endangered (U.S. Department of Interior 1980).

HABITAT: Unpolluted open sphagnum bogs or wet meadows; sluggish clear meadow streams with muddy or mucky bottoms (Zappalorti et al. 1979).³ Frequents shallow meandering waterways in swamps and wet meadows. In Connecticut, associated with open canopy and calcareous wetlands (M. Klemens, personal communication). Hibernates midautumn to late March or April. Hibernaculum is in a subterranean rivulet or seepage area with continually flowing water in New Jersey (Zappalorti and Farrell 1980).⁴ Commonly basks in spring and early summer. In New Jersey bogs, individuals found basking on sedge grass tussocks or in open shallow pools (Zappalorti et al. 1979).

SPECIAL HABITAT REQUIREMENTS: Abundance of grassy or mossy cover, high humidity, and full sunlight.

³Zappalorti, R. T.; Farrell, R. F.; Zanelli, E. M. 1979. The ecology and distribution of the bog turtle, *Clemmys muhlenbergii* (Schoepff), in New Jersey, Pt. 2. Report to the New Jersey Dept. of Environ. Protection, Endangered and Nongame Spec. Proj., Federal Aid Prog. and Herpetological Associates. HA Rept. No. 79.02, Vol. 1, 38 pp. Unpublished.

⁴Zappalorti, R. T.; Farrell, R. F. 1980. An ecological study of the bog turtle, *Clemmys muhlenbergii*, Schoepff (Reptilia, Testudines, Emydidae), in New Jersey, Pt. 3. Report to the New Jersey Dept. of Environ. Protection, Endangered and Nongame Spec. Proj., Federal Aid Prog. and Herpetological Associates. HA Rept. No. 80.01. Unpublished.

AGE/SIZE AT SEXUAL MATURITY: At 5 years and plastron length of 75 mm (Barton and Price 1955). From 6 to 8 years, at plastral length of 70 mm (Ernst 1977).

BREEDING PERIOD: Late April to early June.

EGG DEPOSITION: June to July, often in tussocks or on top of sphagnum in open, sunny areas on bogs (Zappalorti et al. 1979).

CLUTCH SIZE: 2 to 5, typically 2 to 3 (Zappalorti et al. 1979).

INCUBATION PERIOD: 7 to 8 weeks (Nemuras 1969).

EGGS HATCH: July to early September (Ernst and Barbour 1972:77-78). In northern locations, hatchlings may overwinter in the nest.

HOME RANGE/MOVEMENT: Average range was 1.28 ha for 19 individuals in Lancaster County, Pennsylvania (Ernst 1977). Ranging from 0.008 to 0.943 ha, traveling through wet runs (Barton 1957, cited in Ernst 1977:246). Average movement was 12 m between recaptures for a male; when displaced, the same individual moved 0.4 km in 1 day returning to initial point of capture (Ernst and Barbour 1972:79).

FOOD HABITS/PREFERENCES: Omnivorous. Eats berries (20 percent), insects (80 percent), (Surface 1908:158), also slugs, earthworms, crayfish, frogs, snakes, nestling birds, seeds of pondweeds and sedges, snails, carrion; availability determines food consumption (Barton and Price 1955). Forages on land and under water.

Bog Turtle (Continued)

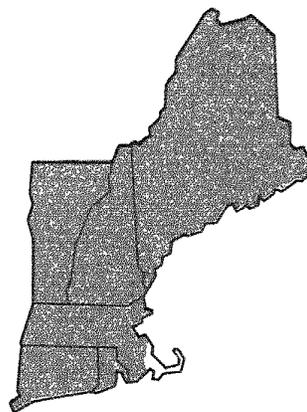
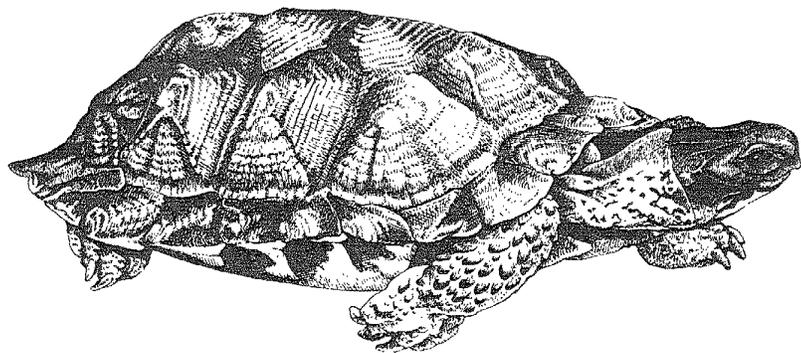
(*Clemmys muhlenbergii*)

COMMENTS: Formerly named Muhlenberg's turtle. May aestivate during dry summer months (Ernst and Barbour 1972:77). Seldom active during the hottest part of the day (Zappalorti and Farrell 1980). Overcollection of this species is a problem, and locality information should be reported with discretion to prevent exploitation. Formerly abundant; population decreases related to wetland drainage and fill.

KEY REFERENCES: Barton and Price 1955, Bury 1979, Ernst and Bury 1977, Zappalorti et al. 1979, Zappalorti and Farrell 1980.

Wood Turtle

(*Clemmys insculpta*)



RANGE: Nova Scotia w. through the Great Lakes region to e. Minnesota. In the East extending s. to n. Virginia.

RELATIVE ABUNDANCE IN NEW ENGLAND: Once common, population declining.

HABITAT: Frequents slow-moving meandering streams with sandy bottoms and overhanging alders (T. Graham, personal communication). Basks during morning hours along banks of streams. Disperses from water sources during summer months to fields, woods, and roadsides. Restricted to hardwood forest areas in New Jersey (Farrell and Zappalorti 1979);⁵ pine barrens area, Rhode Island (Tucker, personal observation).

Returns in fall to streams to hibernate in muddy banks and bottoms through late March to April. Have been found hibernating in holes in stream banks (T. Graham, personal communication), in decaying vegetation of woods and trout streams with deep pools (M. Klemens, personal communication). Will also use abandoned muskrat burrows; some use same hibernaculum each year (Farrell and Zappalorti 1979).

SPECIAL HABITAT REQUIREMENTS: Wooded river banks; open sandy nesting areas.

AGE/SIZE AT SEXUAL MATURITY: Seems to vary geographically and between individuals. In New Jersey, specimens at 165 mm carapace length, aged between 7 and 8 years were thought to be sexually mature (Harding and Bloomer 1979). About 10 years and 160 mm carapace length in Michigan (Harding 1977).

⁵Farrell, R. F.; Zappalorti, R. T. The ecology and distribution of the wood turtle, *Clemmys insculpta* (LeConte). New Jersey, Pt. 1. (Preliminary report on a research contract between the New Jersey Dept. of Environ. Protection, Endangered and Nongame Species Proj., Nat. Audubon Soc. and Herpetological associates No. 79.03.) Unpublished.

BREEDING PERIOD: March, May, October (Ernst and Barbour 1972:82), when stream temperature reaches about 15°C (59°F) (Farrell and Zappalorti 1979).⁶ Mating occurs in shallow water.

EGG DEPOSITION: May to June. Eggs laid in prepared depressions in open areas with sandy soils or gravel, not necessarily near water.

CLUTCH SIZE: 4 to 12 eggs (Carr 1952:122), averages 8 to 9 (Farrell and Zappalorti 1979) 5 to 18 in Michigan (Harding 1977).

INCUBATION PERIOD: 77 days (Allen 1955); 58 to 69 days in laboratory (Farrell and Zappalorti 1980).

EGGS HATCH: August to October. Hatchlings may overwinter in the nest in northern parts of range.

HOME RANGE/MOVEMENT: One male moved an average of 90 mm for three recaptures, one female was found 15 m from initial capture point (Ernst and Barbour 1972:83). Exhibited fidelity to a particular stream or brook in New Jersey (Farrell and Zappalorti 1979), and Pennsylvania (Strang 1983); mean home range was 447 m for 10 individuals in lowland forest.

FOOD HABITS/PREFERENCES: Omnivorous. Eats young vegetation, grass, moss, mushrooms, berries, insects and their larvae, worms, slugs, snails (Surface 1908:161-162); also carrion, tadpoles, frogs, and fish. Feeds in water or on land.

⁶Farrell, R. F.; Zappalorti, R. T. An ecological study of the wood turtle, *Clemmys insculpta* (LeConte). (Reptilia. Testudines, Emydidae) in northern New Jersey, Pt. 2. (Report to the New Jersey Dept. of Environ. Protection, Endangered and Nongame Species Proj., Herpetological Assoc. Rep. No. 80.02.) Unpublished.

Wood Turtle (Continued)

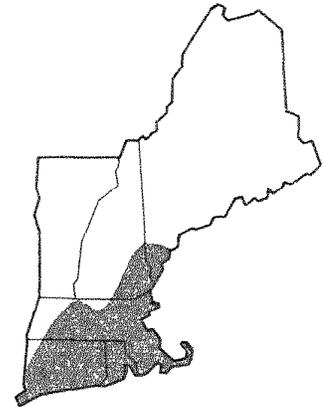
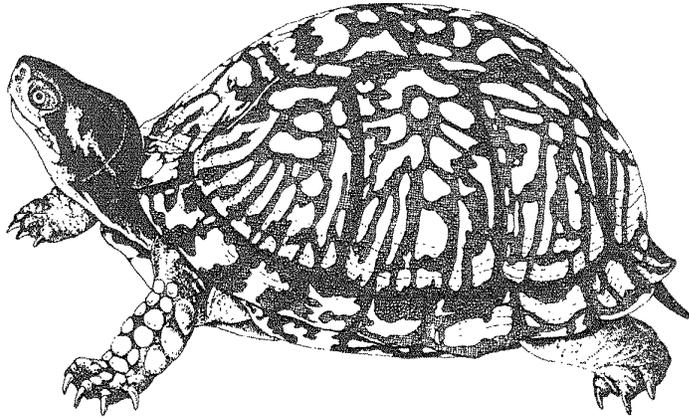
(*Clemmys insculpta*)

COMMENTS: Formerly thought to be one of the most terrestrial turtles, actually found equally in water and on land. Lives in large groups or colonies (Farrell and Zappalorti 1979). Diurnal. Development of wooded river banks and widespread commercial collection are factors contributing to population decline. Not tolerant of pollution. Young not often encountered.

KEY REFERENCES: Ernst 1972b, Farrell and Zappalorti 1979.

Eastern Box Turtle

(*Terrapene c. carolina*)



RANGE: Southeastern Maine and the Thousand Island region of New York w. to the Mississippi River, c. Illinois and s. to n. Florida.

RELATIVE ABUNDANCE IN NEW ENGLAND: Locally common, more abundant farther south; declining in many areas.

HABITAT: Woodlands, field edges, thickets, marshes, bogs, stream banks; typically found in well-drained forest bottomland (Stickel 1950). Young semiaquatic. Has been observed swimming in slow-moving streams and ponds. Found chiefly in open deciduous forests (N. Green, personal observation). Also found on mountain slopes in Massachusetts (T. Tying, personal communication). During hot dry weather may rest in mud or water or burrow under logs or decaying vegetation for extended periods. When not active, rests in brush piles and thickets. Hibernates from depths of several inches to 2 feet (0.6 m) below surface in loose soil, decaying vegetation, mud, or in stream banks from late fall to April.

SPECIAL HABITAT REQUIREMENTS: Old fields, powerline clearings, ecotones with sandy soils favored (M. Klemens, personal communication).

AGE/SIZE AT SEXUAL MATURITY: 4 to 5 years in Kentucky, (Ernst and Barbour 1972:43), 5 to 10 years in Indiana (Minton 1972:165).

BREEDING PERIOD: After emerging from hibernation in April, sometimes continuing to fall. Females may lay viable eggs for up to 4 years after mating (Ewing 1943).

EGG DEPOSITION: June to July in the Northeast. Females often seen crossing roads in Massachusetts and New Jersey during nesting season (T. Graham, personal communication).

CLUTCH SIZE: 3 to 8 eggs, average 4 to 5.

INCUBATION PERIOD: 87 to 89 days (Allard 1935, cited in Carr 1952:146).

EGGS HATCH: August to September, hatchlings may overwinter in nest.

HOME RANGE/MOVEMENT: From 150 to 750 feet (45.7 to 228.4 m); 12 individuals averaged movement of 390 feet (118.8 m) on Long Island (Breder 1927). For 62 individuals in mixed woodlands and open habitat on Long Island, average range was less than 750 feet (228.4 m) as reported by Nichols (1939). Stickel (1950) reported average diameter of 350 feet (106.6 m) in Maryland. One individual was found within 0.25 miles (0.4 km) from point of release 60 years previously (Allen 1868, cited in Babcock 1919:412). Maintains same home range for many years, occasionally leaves normal home range for random wandering or egg laying (Stickel 1950). Homing instinct displayed by 45 out of 60 turtles (Nichols 1939).

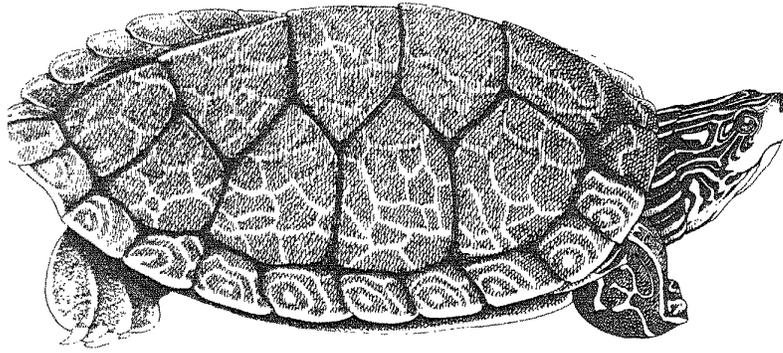
FOOD HABITS/PREFERENCES: Younger individuals chiefly carnivorous, older individuals more herbivorous. Food items include animals such as earthworms, slugs, snails, insects and their larvae, particularly grasshoppers, moths and beetles; crayfish, frogs, toads, snakes, and carrion; vegetable matter such as leaves, grass, bugs, berries, fruits and fungi.

COMMENTS: Terrestrial and diurnal. Digs into leaf litter toward end of day. Bisection of habitat by roads can reduce or destroy populations. The reversion of much agricultural land to woodland may be a beneficial change to populations (M. Klemens, personal communication). Estimated age at full growth is 20 years. May live 60 to 80 years (Nichols 1939). Some individuals may live more than 100 years (Graham and Hutchinson 1969).

KEY REFERENCES: Carr 1952, Ernst and Barbour 1972, Stickel 1950.

Map Turtle

(*Graptemys geographica*)



RANGE: Lake Champlain to the Great Lakes w. to the Mississippi drainage to e. Minnesota, s. to Louisiana and nw. Georgia. Along Susquehanna drainage. Introduced to Delaware River. Nests as far south as Poughkeepsie, Dutchess County, New York.

RELATIVE ABUNDANCE IN NEW ENGLAND: Uncommon and of limited distribution.

HABITAT: Aquatic, inhabiting rivers and lakes. Prefers large bodies of water with soft bottoms and aquatic vegetation. Hibernates in mud of shallow water from late fall to early spring. May be active on or under ice. Gregoriously basks on logs or rocks or along beaches and grassy shores. In Michigan, found in riffles of pebble-bottom streams that have interspersed, deeper, muddier pools (M. Klemens, personal communication). Move from shallow bays to nesting areas and reenter bays to overwinter in Quebec (Gordon 1980).

SPECIAL HABIT REQUIREMENTS: Water bodies with muddy or soft bottom substrate.

AGE/SIZE AT SEXUAL MATURITY: Females at 7.5 inches (190.5 mm) and larger (Newman 1906, cited in Pope 1939:169).

BREEDING PERIOD: April and autumn (Ernst and Barbour 1972:110).

EGG DEPOSITION: May to July, peak mid-June. Nesting season begins in mid-June in Quebec and averages 2 weeks in duration (Gordon 1980). Nests made in soft sand or soil away from beaches.

CLUTCH SIZE: 10 to 16 eggs (Cahn 1937), typically 12 to 14 eggs. More than one clutch may be laid.

EGGS HATCH: Late August to early September (Carr 1952:199), some may overwinter in the nest.

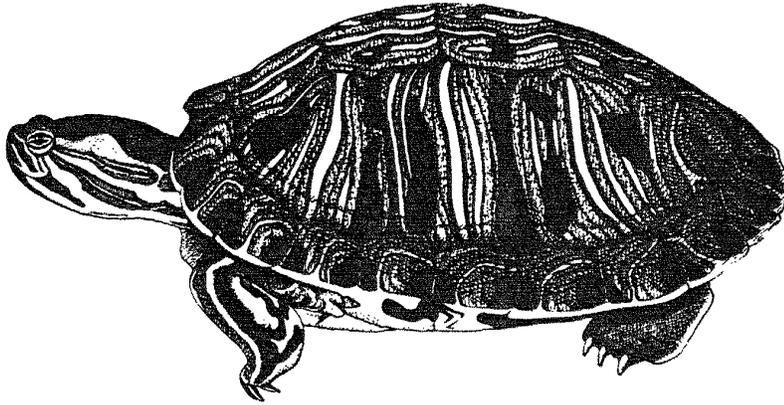
HOME RANGE/MOVEMENT: Unreported.

FOOD HABITS/PREFERENCES: Aquatic feeders—snails and clams are the major components of the diet; other small mollusks, crayfish, vegetable matter, fish, insects, and carrion are eaten (Carr (1952: 199).

KEY REFERENCES: Evermann and Clarke 1916, Newman 1906.

Red-eared Slider

(*Pseudemys scripta elegans*)



RANGE: Central Ohio w. to se. Iowa, s. into New Mexico, Texas, Alabama and w. Tennessee. Feral in parts of the Northeast.

RELATIVE ABUNDANCE IN NEW ENGLAND: Locally common.

HABITAT: Ponds, shallow areas of lakes, creeks and drainage ditches. Hibernates when water temperature drops below 10°C (50°F). Sometimes occupies muskrat burrows or hollow stumps.

SPECIAL HABITAT REQUIREMENTS: Quiet water with muddy bottom, abundant vegetation, projecting substrate, such as logs or rocks for basking.

AGE/SIZE AT SEXUAL MATURITY: Plastron length for males 90 to 100 mm, for females 150 to 195 mm.

BREEDING PERIOD: Unreported.

EGG DEPOSITION: April to mid-July. Females may be capable of reproducing for 40 to 50 years. Average longevity may be 50 to 75 years (Cagle 1950). Female excavates nest hole in earth, deposits eggs and seals hole with mud and debris. May move a mile (1.6 km) from water to find suitable nest site.

CLUTCH SIZE: 2 to 22, typically 5 to 10. 1 to 3 clutches per season.

INCUBATION PERIOD: 68 to 70 days (*Pseudemys scripta troostii* incubated in laboratory, Cagle 1950).

EGGS/HATCH: July 1 to mid-September (Illinois and Louisiana).

HOME RANGE/MOVEMENT: Most sliders (n = 1,006) inhabiting a drainage ditch in Mississippi River floodplain remained within one-half mile (0.8 km) of release site (Cagle 1944:24).

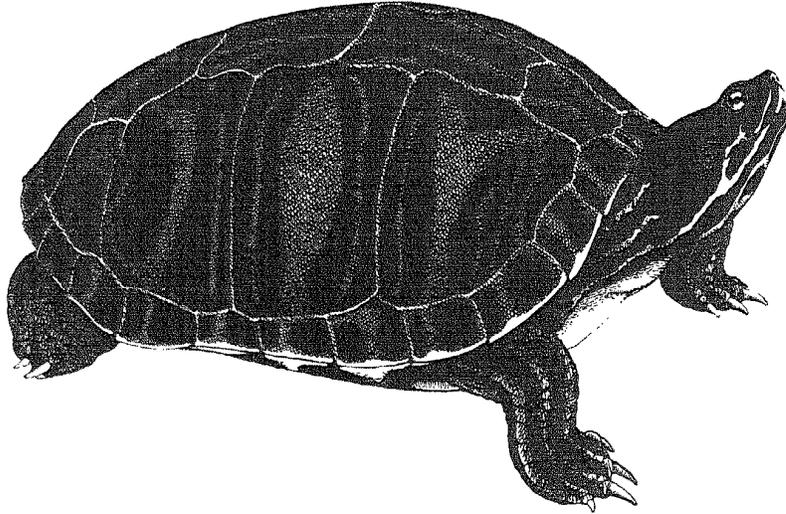
FOOD HABITS/PREFERENCES: Omnivorous. Take tadpoles, crayfish, mollusks, large larvae of aquatic insects, small fish (Cahn 1937).

COMMENTS: Possibly feral in Maryland (Cooper 1959). Active from late April until October in Illinois. Highly aquatic, avoids land except when laying eggs. Aestivates in mud when temperatures exceed 31°C (89°F) (Cagle 1950).

KEY REFERENCES: Cagle 1950, Cahn 1937, Cooper 1959, Webb 1961.

Plymouth Redbelly Turtle

(*Pseudemys rubriventris bangsi*)



RANGE: Plymouth County, Massachusetts. Recently, skeletal remains and a shell found in Ipswich, Essex County, Massachusetts (Graham 1982).

RELATIVE ABUNDANCE IN NEW ENGLAND: Endangered (federal list).

HABITAT: Ponds of different sizes in Plymouth County. Frequents shallow coves (Graham 1971a).

SPECIAL HABITAT REQUIREMENTS: Muddy-bottomed shallows with abundant aquatic vegetation, especially milfoil (*Myriophyllum*) and bladderwort (*Utricularia*) (Graham 1980).

AGE/SIZE AT SEXUAL MATURITY: Probably not reached during first 9 years (Graham 1971a). Average life span estimated at 40 to 55 years (Graham 1980).

BREEDING PERIOD: Probably early spring and fall (T. Graham, personal communication).

EGG DEPOSITION: Mid-June to early July. Prefer to nest in disturbed sites (T. Graham, personal communication).

CLUTCH SIZE: Range 12 to 17 eggs — average 14.5 (T. Graham, personal communication).

EGGS HATCH: Probably September, fall (T. Graham, personal communication), July if they overwinter. Average hatching time of 75 days for 17 eggs incubated in a laboratory at 29°C (84°F) (Graham 1971b). If hatchlings overwinter, emerge during the following July.

HOMERANGE/MOVEMENT: Unknown but wanders on land especially during fall and late spring. Found 0.5 to 2.0 miles (0.8 to 3.2 km) from water on occasion. Significance of wandering unknown (T. Graham, personal communication).

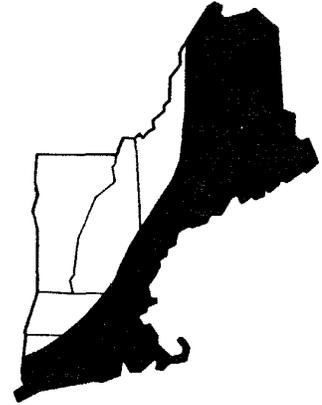
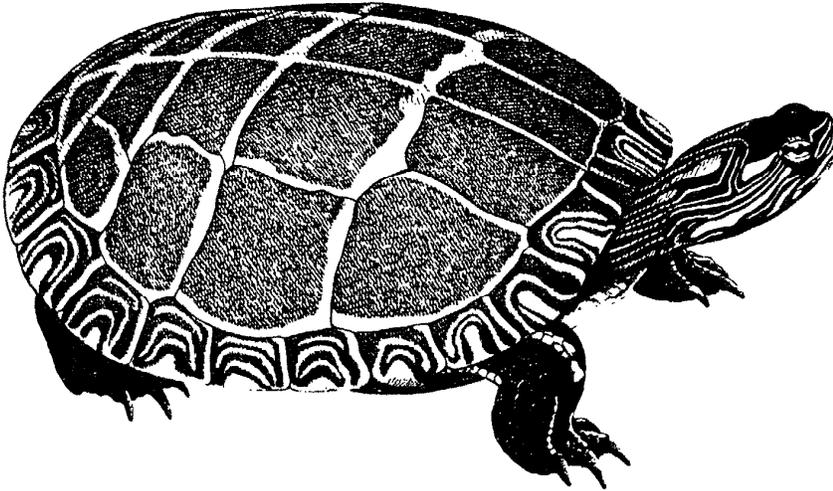
FOOD HABITS/PREFERENCES: Primarily herbivorous, feeding mainly on milfoil, also feeds on bladderwort (Graham 1980) and arrowhead (*Sagittaria*) (Graham 1971a). Dietary shift to crayfish in fourth season (Graham 1971a).

COMMENTS: Basks during early morning hours on elevated sites or in water by floating or resting on weed mats (Graham 1980). Discovered in Plymouth, Massachusetts, in 1869 (Lucas 1916). Population estimate about 200 to 300 in Plymouth County (T. Graham, personal communication).

KEY REFERENCES: Graham 1971a, 1971b, 1980; Lazell 1976.

Eastern Painted Turtle

(*Chrysemys p. picta*)



RANGE: Nova Scotia to ne. New York, to Cape Hatteras and inland to e. Alabama. In the Northeast merges with range of the Midland painted turtle.

RELATIVE ABUNDANCE IN NEW ENGLAND: Common, often abundant.

HABITAT: Quiet, shallow ponds, marshes, woodland pools, rivers, lake shores, wet meadows, bogs, and slow-moving streams. Sometimes in brackish tidal waters, salt marshes (Pope 1939:183). Stagnant and polluted waters are sometimes inhabited (Smith 1956:150). When in water, usually remains in submerged vegetation. Basks on small hummocks, logs, rocks, sometimes congregating in large groups. Hibernates by burrowing into mud or decayed vegetation of pond bottoms.

SPECIAL HABITAT REQUIREMENTS: Aquatic habitat.

AGE/SIZE AT SEXUAL MATURITY: Correlated with size, in Michigan males exceeded 81 mm plastron length, females ranged from 110 to 120 mm (Gibbons 1968a).

BREEDING PERIOD: March to mid-June and fall (Gibbons 1968a). Peak in April in Connecticut (Carr 1952:218).

EGG DEPOSITION: May to July. Nest sites within a few yards of water (Cahn 1937, cited in Smith 1961:140), or up to one-half mile away (T. Tynning, personal communication).

CLUTCH SIZE: 2 to 11 eggs, females may lay 2 clutches (Gibbons 1968a), typically 5 to 6 eggs.

INCUBATION PERIOD: 72 to 80 days (Ernst and Barbour 1972:143). 63 days (Lynn and vonBrand 1945). Hatchlings from late clutches may overwinter in the nest. Nests are often destroyed by raccoons and skunks.

EGGS HATCH: Late August to early September, in Connecticut (Finneran 1948).

HOME RANGE/MOVEMENT: Displays short-distance homing ability; fewer than 15 percent moved more than 100 m in a marsh in Michigan (Gibbons 1968a). Average distance traveled was 112 m in a shallow bay of a Wisconsin lake; 70 percent of the turtles did not travel. Individuals may remain in the same locality for years if conditions are favorable (Pearse 1923).

FOOD HABITS/PREFERENCES: Aquatic insects, snails, small fish, tadpoles, mussels, carrion, and aquatic plants taken by foraging along the bottom. Diet usually about 50 percent vegetation.

COMMENTS: Diurnal. Emerges from hibernation in late March or early April in Massachusetts (Graham 1971a).

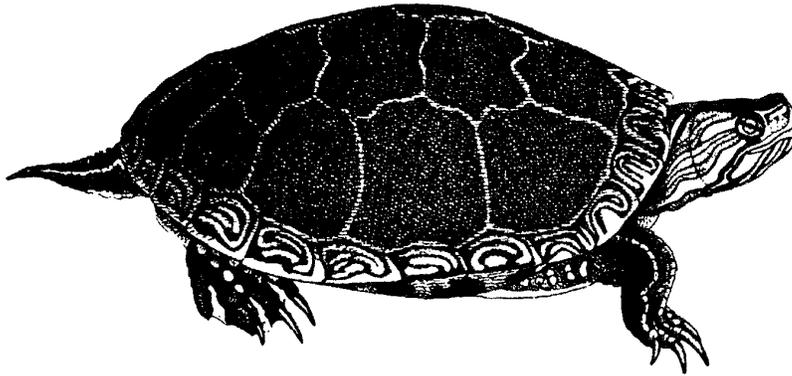
Chrysemys p. picta and *C. p. marginata* intergrade in the Northeast. Intergrades accounted for 79 percent of 89 individuals examined from the Delaware Water Gap in New Jersey (Stein 1980).⁷

KEY REFERENCES: Carr 1952, Ernst 1971, Ernst and Barbour 1972, Gibbons 1968a.

⁷Stein, R. J. Species account form for: Second symposium on endangered and threatened plants and animals of New Jersey. Unpublished.

Midland Painted Turtle

(*Chrysemys picta marginata*)



RANGE: New Hampshire, s. Quebec and Ontario to e. Wisconsin. Through c. Illinois s. to Tennessee. Vermont and New York s. to w. of the Shenandoah River.

RELATIVE ABUNDANCE IN NEW ENGLAND: Intergrades with *C. p. picta* are abundant.

HABITAT: Quiet water, preferably shallow areas with dense vegetation. Tolerant of some industrial pollution. Basks in groups on sunlit logs. Sometimes found away from water. Usually hibernates in muddy bottoms of ponds, but has been reported active yearlong.

SPECIAL HABITAT REQUIREMENTS: Aquatic habitats.

AGE/SIZE AT SEXUAL MATURITY: 5 years for males, 6 to 7 years for females (Pope 1939:185).

BREEDING PERIOD: Early spring after emerging from hibernation; fall matings have been reported.

EGG DEPOSITION: June to July. Eggs often laid in high banks.

CLUTCH SIZE: 3 to 10 eggs, average 5 to 8.

EGGS HATCH: Hatchlings emerge in September or the next spring (Smith 1961:140).

HOME RANGE/MOVEMENT: Average summer movement within a pond about 90 m. Movements have been divided into three types: initial emigration in the spring of 63 to 144 m from hibernation ponds to other ponds with mats of

floating vegetation; late summer movements of 86 to 91 m, back to hibernation ponds; and late autumn movements of 88 to 130 m to deep water areas in Michigan (Sexton 1959). Sixty percent of the individuals studied in a Michigan lake exhibited homing behavior (Williams 1952).

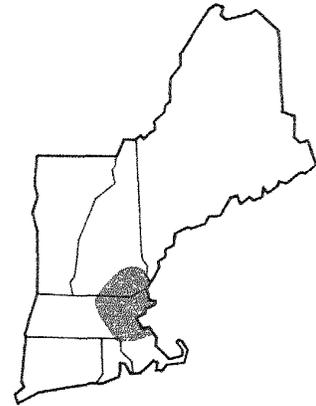
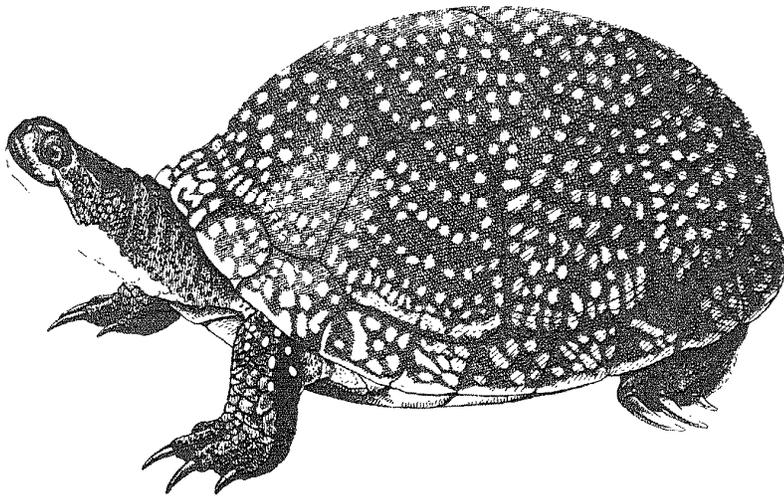
FOOD HABITS/PREFERENCES: Aquatic vascular plants, seeds, algae, and invertebrates including crustaceans, mollusks, insects and their larvae, and worms. Also takes carrion, fish, and frogs. Aquatic plants accounted for more than 60 percent of the diet and insects about 20 percent in Michigan (Lagler 1943).

COMMENTS: In New England there are no Midland turtle populations *per se*. Individuals are part of an intergrade swarm. Information provided in this account is based on references for *Chrysemys picta marginata* where intergrades do not occur. In New England, *Chrysemys picta marginata* and *C. p. picta* life history and habitat information are the same (M. Klemens, personal communication). Diurnal.

KEY REFERENCES: Carr 1952, Sexton 1959, Smith 1961.

Blanding's Turtle

(*Emydoidea blandingii*)



RANGE: Scattered colonies in New York, New Hampshire, and e. Massachusetts. Southern Quebec across the Lake States to c. Minnesota, s. to Iowa and c. Illinois. Spotted occurrence from Nova Scotia to Ohio.

RELATIVE ABUNDANCE IN NEW ENGLAND: Populations localized and distribution spotty throughout its range (McCoy 1973:136.1). Generally scarce to rare, locally abundant in Massachusetts (Lazell 1972). An endangered species in Canada.

HABITAT: Shallow waters preferred; marshes, bogs, ditches, ponds, swamps, also in protected coves and inlets of large lakes with abundant aquatic vegetation. May wander overland. Basks on logs, stumps, banks. Active in winter or hibernates in mud or debris.

SPECIAL HABITAT REQUIREMENTS: Shallow waters with soft muddy bottoms and aquatic vegetation.

AGE/SIZE AT SEXUAL MATURITY: During 12th year for males with a plastron length of 181 to 190 mm, Massachusetts (Graham and Doyle 1977); males 131 to 190 mm in Michigan (Gibbons 1968b). Size differences between these two populations probably due to differences in food quality and availability (Graham and Doyle 1977).

BREEDING PERIOD: Early spring through October, most often from March to May (Ernst and Barbour 1972:181). Peak in late April (T. Graham, personal communication).

EGG DEPOSITION: June to July. Nests made in sandy soils of upland areas.

CLUTCH SIZE: 6 to 11 eggs (Carr 1952:136), typically 8 to 9 eggs, clutches of 9, 13, and 16 eggs for Massachusetts females (T. Graham, personal communication). Clutch of 17 for a July nesting female (Graham and Doyle 1979). Two clutches may be laid each season.

INCUBATION PERIOD: Unreported.

EGGS HATCH: Autumn or next spring.

HOME RANGE/MOVEMENT: Less than 100 m for 4 individuals in a marsh in sw. Michigan (Gibbons 1968b).

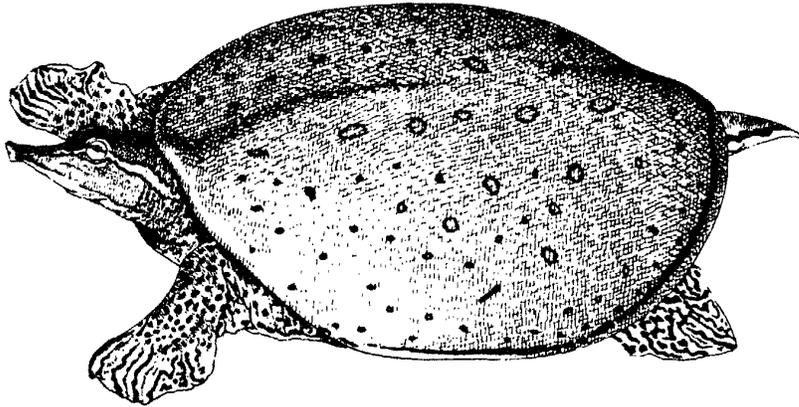
FOOD HABITS/PREFERENCES: Crustaceans, insects, mollusks, fish, carrion, aquatic plants, succulent shoots, and berries. Crustaceans and crayfish account for about 50 percent of diet, insects more than 25 percent, and other invertebrates and vegetable matter 25 percent (Lagler 1943).

COMMENTS: Escaped individuals found in Connecticut (Lamson 1935). Primarily diurnal. In Michigan found in rivers (M. Klemens, personal communication).

KEY REFERENCES: Gibbons 1968b, Graham and Doyle 1977, 1979, McCoy 1973.

Eastern Spiny Softshell

(*Trionyx s. spiniferus*)



RANGE: Western New York across the Great Lakes states to the Mississippi River, n. Wisconsin s. to the Tennessee River extending e. to c. Pennsylvania. A disjunct colony occupies the Champlain Valley. Introduced into the Maurice River system of New Jersey.

RELATIVE ABUNDANCE IN NEW ENGLAND: Uncommon.

HABITAT: Aquatic, inhabiting large river systems. Also found in lakes and ponds. Intolerant of pollution from sewage, industrial, or chemical wastes (Minton 1972:191). Basks on sand bars, mud flats, grassy beaches, but will use logs, rocks, and other objects when sandy or muddy banks are unavailable (Williams and Christiansen 1982). Hibernates beneath 2 to 3 inches (5.1 to 7.6 cm) of river bottom mud from October to April in the north.

SPECIAL HABITAT REQUIREMENTS: Shallow muddy bottoms for burrowing. Some aquatic vegetation essential (N. Green, personal observation).

AGE/SIZE AT SEXUAL MATURITY: Females with plastron length of 180 to 200 mm, males at 90 to 100 mm.

BREEDING PERIOD: April or May.

EGG DEPOSITION: May to August. Eggs laid in sandy soil or gravel beds near water's edge.

CLUTCH SIZE: Typically 12 to 18, with a range of 4 to 32 eggs (Ernst and Barbour 1972:264).

EGGS HATCH: August to October or hatchlings overwinter in nest.

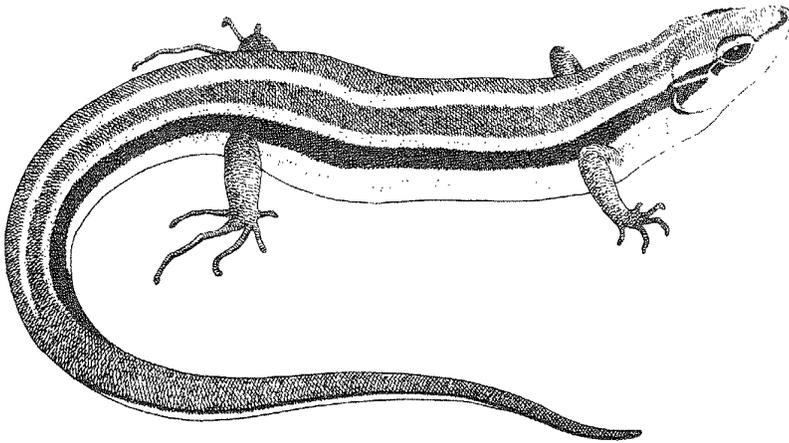
HOME RANGE SIZE: Unreported.

FOOD HABITS/PREFERENCES: Chiefly carnivorous. Crayfish and insects are the major food items with tadpoles, frogs, mollusks, and fish eaten less frequently; vegetation and other plant materials also consumed. Primarily benthic feeders (Williams and Christiansen 1982).

COMMENTS: Somewhat nocturnal.

KEY REFERENCES: Ernst and Barbour 1972, Minton 1972, Webb 1973.

Five-lined Skink
(*Eumeces fasciatus*)



RANGE: Southern end of Lake George, New York and se. New York s. to n. Florida, w. to c. Texas. Northern limit from Pennsylvania, Ontario to c. Wisconsin and N. Missouri.

RELATIVE ABUNDANCE IN NEW ENGLAND: Rare in the Northeast through se. Connecticut. Records for Massachusetts are from Barre (Storer 1840:19) and New Bedford (Allen 1870:260).

HABITAT: Mesic wooded areas, open or moderately dense with ground cover. Most abundant around old buildings and open woods. Frequently in damp spots, under logs, rock piles, leaf litter, sawdust piles. Suns for brief periods on warm days (Smith 1946:349). Found on open talus slopes in mixed deciduous woodlands, New York. Primarily terrestrial, but will climb snags to find insects. Hibernates from October until mid-March in decaying logs or below the frost line, underground or under large rocks.

SPECIAL HABITAT REQUIREMENTS: Open woods with logs and slash piles.

AGE/SIZE AT SEXUAL MATURITY: After second hibernation.

BREEDING PERIOD: May.

EGG DEPOSITION: Typically in June or July, 6 to 7 weeks after breeding (Smith 1956:193). Eggs laid under rocks, logs, in rotted stumps, in loose soil. Females usually guard eggs during incubation (Conant 1975:122). Ad-

dled eggs are ingested; it has been suggested that brooding females remove these eggs to reduce chances of predation (Groves 1982).

CLUTCH SIZE: 4 to 20 eggs (Barbour 1971:209), typically 9 to 12. Younger individuals lay fewer eggs (Fitch 1970).

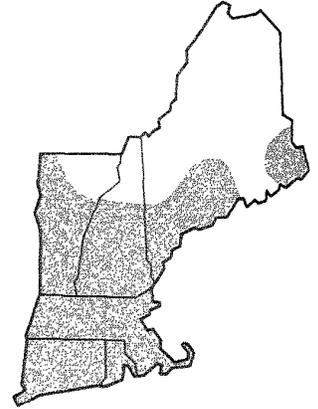
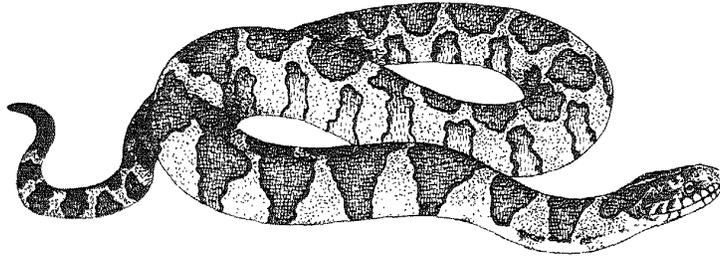
HOME RANGE/MOVEMENT: Males home-range diameter about 90 feet (27.4 m), females about 30 feet (9.1 m), in e. Kansas (Fitch 1954, cited in Minton 1972:210). Individuals may remain in same home range or move after emerging from hibernation.

FOOD HABITS/PREFERENCES: Primarily insects and spiders, also snails, grubs, small vertebrates, including young mice. Lizards occasionally eaten; will eat its own shed skin.

KEY REFERENCES: Barbour 1971; Smith 1946, 1956.

Northern Water Snake

(*Nerodia s. sipedon*)



RANGE: Southern Maine, s. Ontario to n. Wisconsin, s. through Kansas to e. Colorado, n. Oklahoma to c. Indiana, Kentucky, and Tennessee, e. to North Carolina and New England.

RELATIVE ABUNDANCE IN NEW ENGLAND: Abundant in suitable habitat.

HABITAT: Aquatic and semiaquatic habitats. Common around spillways and bridges where rocks provide cover, uncommon in deeply shaded woodland swamps and ponds, probably due to lack of basking sites (M. Klemens, personal communication). Found in the vicinity of rivers, brooks, wet meadows, ponds, swamps, bogs, old quarries. Inhabits salt or fresh water (Wright and Wright 1957:513), absent from heavily polluted waters. Prefers still or slow-moving water. Hibernates in crevices of rocky ledges, or in banks adjacent to water habitat.

SPECIAL HABITAT REQUIREMENTS: Branches or logs overhanging the water, or boulders of dams and causeways in reservoirs (T. Tynning, personal communication).

AGE/SIZE AT SEXUAL MATURITY: Males 635 to 1,148 mm, females at 650 to 1,295 mm (Wright and Wright 1957:513).

BREEDING PERIOD: April to May and early fall.

YOUNG BORN: August to early October, usually during the last half of August. Viviparous.

NO. OF YOUNG: 10 to 76 young, average 20 to 40. Larger females have larger litters.

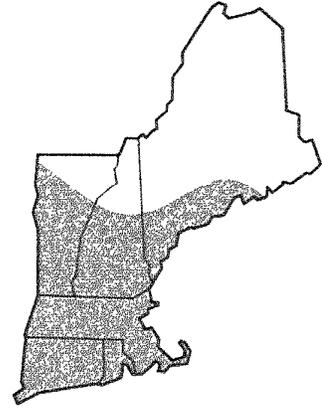
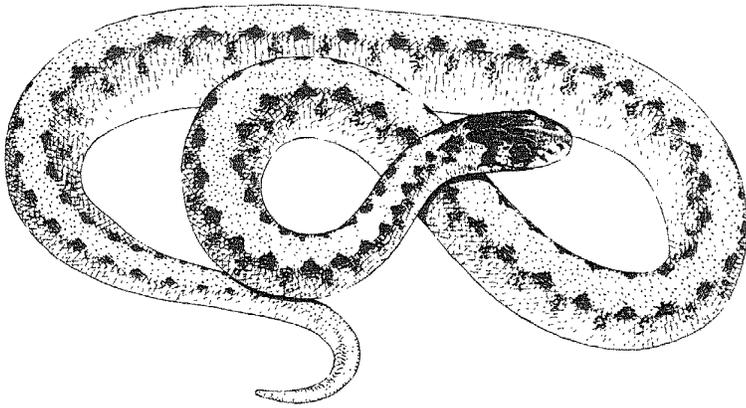
HOME RANGE/MOVEMENT: One individual moved 380 feet (115.8 m) along a river after 2 years (Stickel and Cope 1947). In large ponds at an Indiana fish hatchery, 80 percent were recaptured in the same pond, 89 percent were in the same pond or an adjacent pond. Snakes along streams had larger home ranges (Fraker 1970).

FOOD HABITS/PREFERENCES: Cold-blooded vertebrates: fish account for 61 percent of food items, frogs and toads 21 percent, salamanders 12 percent; also insects, crayfish, recently dead fish (Uhler et al. 1939). Fish account for more than 95 percent of diet (Raney and Roecker 1947). May occasionally take shrews and mice.

COMMENTS: Frequently found basking. Active both day and night.

KEY REFERENCES: Schmidt and Davis 1941, Wright and Wright 1957.

Northern Brown Snake
(*Storeria d. dekayi*)



RANGE: Eastern United States from s. Maine and s. Canada w. to Michigan, s. to South Carolina. Range overlaps that of the Midland brown snake. Reported from Somerset Co., Maine, October 1984 (C. Baumgartner and R. Nemecek, personal communications).

RELATIVE ABUNDANCE IN NEW ENGLAND: Common.

HABITAT: Ubiquitous, found in urban and rural areas, dry or moist situations, vacant lots, parks, trash piles. May be abundant along railroad tracks (T. Tynning, personal communication). In the wild, found in damp woods, swamps, clearings, bogs, roadsides, open fields. Hides under stones, banks, logs, brush piles, leaves. Rare in old-growth forests (J. Lazell, personal communication). Hibernates in large groups from October to November until March or April; may use ant hills or abandoned mammal burrows.

AGE/SIZE AT SEXUAL MATURITY: At 2 years (Noble and Clausen 1936).

BREEDING PERIOD: Late March to April and possibly in the fall.

YOUNG BORN: Late July to August. Gestation period of 105 to 113 days (Clausen 1936). Viviparous.

NO. OF YOUNG: 3 to 27 young (Fitch 1970), typically 14.

HOME RANGE/MOVEMENT: Average daily movement of 10 to 15 feet (3.0 to 4.6 m) on Long Island. Thirteen of 32 individuals displayed homing behavior (Noble and Clausen 1936).

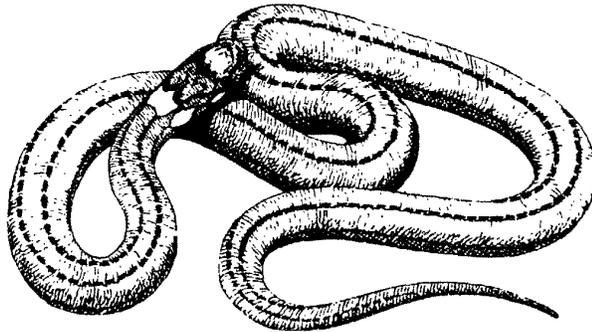
FOOD HABITS/PREFERENCES: Slugs, snails, earthworms, insects, minnows, and tiny toads are occasionally eaten.

COMMENTS: Formerly DeKay's snake. Commonly found in aggregations throughout the year (Noble and Clausen 1936). May seem to be scarce during July and August when it moves down into soil to lower temperature zones. Degree of fossorial tendency varies with microhabitat temperature preference (Elick et al. 1979). Active evening to early morning; one of the few New England snakes that is active at night.

KEY REFERENCES: Schmidt and Davis 1941, Wright and Wright 1957.

Northern Redbelly Snake

(*Storeria o. occipitomaculata*)



RANGE: Nova Scotia to s. Manitoba, s. to e. Texas, Georgia, and throughout the Eastern United States.

RELATIVE ABUNDANCE IN NEW ENGLAND: Locally abundant.

HABITAT: Moist woods, hillsides, sphagnum bogs, upland meadows and valleys. Found under surface debris, also around abandoned buildings. Occurs at elevations from sea level to mountains. Prefers woodlands: pine, oak-hickory, aspen, hemlock groves (Wright and Wright 1957:717). More frequently found in upland woody ridges. Occasionally found in damp meadows, marshy areas, swamp and bog edges. Hibernates from fall to March or April. Active through mid-October in Connecticut (M. Klemens, personal communication).

SPECIAL HABITAT REQUIREMENTS: Woodlands.

AGE/SIZE AT SEXUAL MATURITY: Males 182 to 359 mm, females 211 to 383 mm (Wright and Wright 1957:718), at 2 years (Blanchard 1937a).

BREEDING PERIOD: Probably after emerging from hibernation; a late summer or fall mating may also occur (Barbour 1971:287).

YOUNG BORN: August to September. Viviparous.

NO. OF YOUNG: 1 to 14 young (Blanchard 1937a), typically 7 to 8.

HOME RANGE/MOVEMENT: 1 adult found 100 feet (30.4 m)

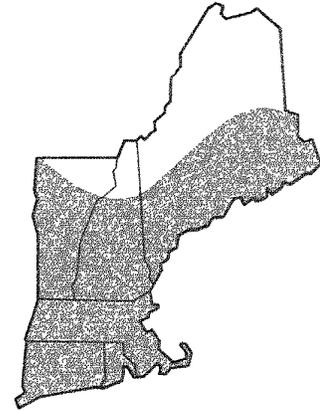
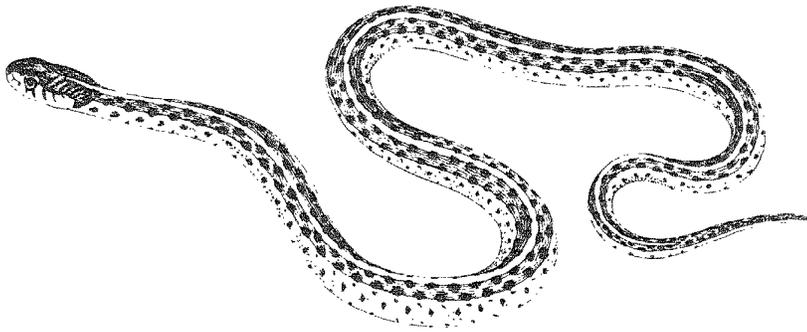
from release point in Michigan after 7 days (Blanchard 1937a).

FOOD HABITS/PREFERENCES: Consumes slugs, earth worms, soft insects and larvae, sowbugs; occasionally, small salamanders.

COMMENTS: Has been found active at all times of day and evening. Degree of fossorial behavior varies (Elick et al 1979). Young commonly mistaken for young ring-necked or Northern brown snakes.

KEY REFERENCES: Barbour 1971, Schmidt and Davis 1941, Wright and Wright 1957.

Eastern Garter Snake (*Thamnophis s. sirtalis*)



RANGE: Nova Scotia to e. Manitoba s. to e. Texas, and throughout the Eastern United States. Intergradation with *T. s. pallidula* occurs in n. New England (Fitch 1980:270.1).

RELATIVE ABUNDANCE IN NEW ENGLAND: Very abundant; most common and widespread snake.

HABITAT: Ubiquitous, terrestrial; found in moist areas, forest edges, stream edges, fence rows, vacant lots, bogs, swamps, overgrown yards. One specimen found under a rock in a stream through a dark hemlock grove (M. Klemens, personal communication). Found in almost all damp environments, from river bottoms to mountain elevations.

Hibernates, often gregariously, in holes, rock crevices, mud, anthills, rotted wood, uprooted trees, house foundations, and sometimes partially or completely submerged under streambed rocks, from October to March or April. One of the earliest snakes to emerge from hibernation. Can survive the winter above frost line (Bailey 1949).

AGE/SIZE AT SEXUAL MATURITY: Females in second year, some males the second spring after birth (Carpenter 1952a). At 400 mm snout to vent length for males and 500 mm for females in Kansas (Fitch 1965:531).

BREEDING PERIOD: Concentrated in the first few warm days after emergence from hibernation in mid-March to May, also in fall before hibernation (Anderson 1965:169). Mates at or near hibernation site.

YOUNG BORN: July to early September. Gestation period of 3 to 4 months or longer in cooler climates (Blanchard and Blanchard 1942). Viviparous.

NO. OF YOUNG: 3 to 85 young, typically 14 to 40. Zehr (1962) found 12 to 13 young was the average in New Hampshire. Number of young correlated with size and age of female (Fitch 1965:558).

HOME RANGE/MOVEMENT: Approximately 5 acres (2.0 ha), most ranges were smaller in cutover agricultural fields in Indiana (Minton 1972). Activity range of about 2 acres (0.8 ha) in Michigan woodlands and open fields (Carpenter 1952a). Carpenter (1952b:250) defined activity range as an area covered by an animal in the course of its day-to-day existence, and which lacks definite home site or other center of activity. Home ranges of 35.0 acres (14 ha) for males and 22.2 acres (9.1 ha) for females were found in mixed habitat in Kansas (Fitch 1965:538). Many individuals migrate from hibernacula to summer ranges.

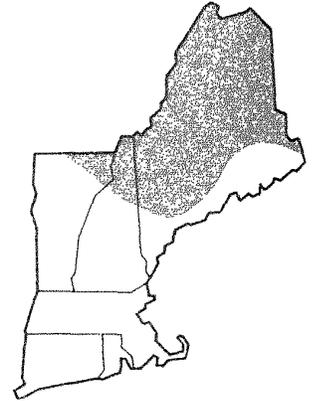
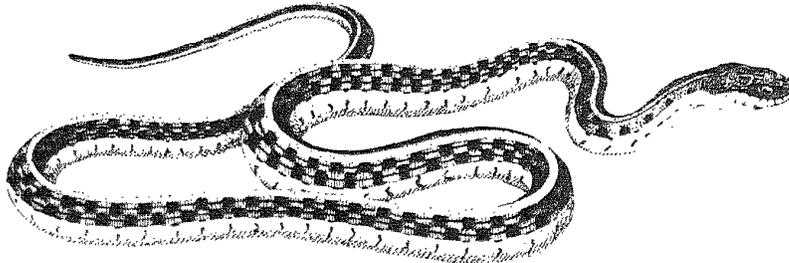
FOOD HABITS/PREFERENCES: Earthworms account for 80 percent of food items, also amphibians, carrion, fish, leeches, caterpillars, other insects, small birds, rodents (Carpenter 1952b); also slugs, other snakes, mollusks, crayfish, sowbugs (Hamilton 1951).

COMMENTS: Diurnal but sometimes active at night (Minton 1972:250). Seeks cover under objects on hot summer days. Pesticides have reduced local populations in New York (Gochfeld 1975).

KEY REFERENCES: Carpenter 1952b; Fitch 1965, 1980; Wright and Wright 1957.

Maritime Garter Snake

(*Thamnophis sirtalis pallidula*)



RANGE: Eastern Quebec extending to Alberta in discontinuous populations, s. to n. New Hampshire, New York and n. Michigan. Intergrades with *T. s. sirtalis* to w. and s. parts of range.

RELATIVE ABUNDANCE IN NEW ENGLAND: Unreported.

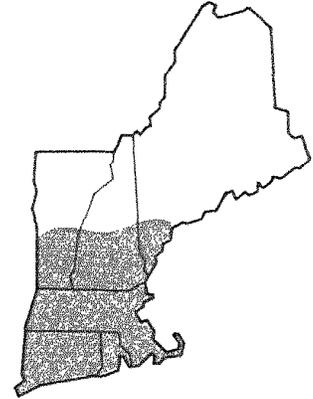
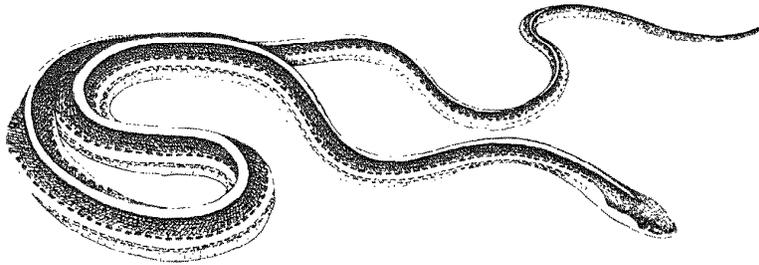
HABITAT: Found in mature hardwood stands, fir stands with mixed understory, and along forest roads in northern New Hampshire.

COMMENTS: Little information available on life history.

KEY REFERENCES: Bleakney 1959, Fitch 1980.

Eastern Ribbon Snake

(*Thamnophis s. sauritus*)



RANGE: Southern Maine to South Carolina and the Florida panhandle. Southern Indiana s. to e. Louisiana. Northern limits through s. Indiana to c. New England.

RELATIVE ABUNDANCE IN NEW ENGLAND: Generally common, but uncommon in Connecticut (M. Klemens, personal communication).

HABITAT: Semiaquatic, inhabiting stream edges, swampy areas, wet meadows, ponds, bogs, and ditches. Prefers areas with brushy vegetation at waters' edge for concealment. Also in damp or wet deciduous or northern pine forests. Seldom far from cover (Carpenter 1952b). May escape higher ground temperatures in summer by seeking shelter in shrubs or underground. Hibernates from October to March (Wright and Wright 1957:825).

SPECIAL HABITAT REQUIREMENTS: Mesic woodlands with aquatic habitat.

AGE/SIZE AT SEXUAL MATURITY: Females during second year (Carpenter 1952a), males 400 to 819 mm, females 451 to 900 mm (Wright and Wright 1957:825).

BREEDING PERIOD: After emergence from hibernation.

YOUNG BORN: Late July to September, viviparous.

NO. OF YOUNG: 3 to 20, typically 10 to 12.

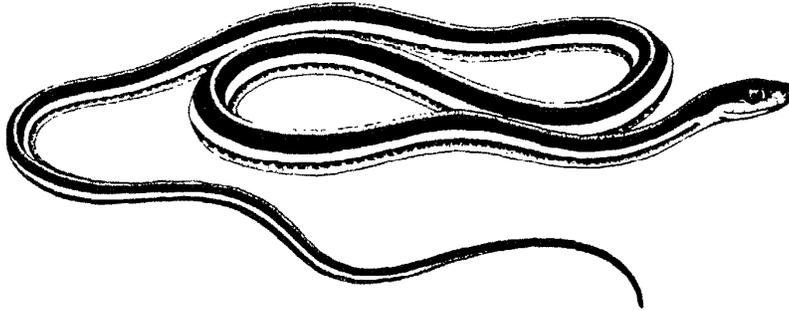
HOME RANGE/MOVEMENT: Average activity range of about 2 acres (0.8 ha), average distance traveled was approximately 280 feet (85.3 m) in open Michigan grassland and marsh (Carpenter 1952b).

FOOD HABITS/PREFERENCES: Frogs, toads, and salamanders account for 90 percent of prey items; usually smaller or metamorphosing individuals were taken; also mice, spiders, minnows, and some insects (Carpenter 1952b).

KEY REFERENCES: Carpenter 1952b, Rossman 1970.

Northern Ribbon Snake

(Thamnophis sauritus septentrionalis)



RANGE: Central Maine w. through nw. New England and s. Ontario to Michigan, s. to se. Illinois, Indiana, Ohio and n. Pennsylvania.

COMMENTS: Diurnal.

KEY REFERENCES: Conant 1975, Minton 1972.

RELATIVE ABUNDANCE IN NEW ENGLAND: Rare.

HABITAT: Sunny areas with low, dense vegetation that is near bodies of shallow quiet water. Damp meadows, grassy marshes, northern sphagnum bogs, borders of ponds, lakes and meandering creeks. Semiaquatic. Probably hibernates October to March (Minton 1972:260).

SPECIAL HABITAT REQUIREMENTS: Shallow, permanent water in open, grassy habitat.

AGE/SIZE AT SEXUAL MATURITY: Some females at almost 2 years (Carpenter 1952a).

BREEDING PERIOD: Probably spring and fall (Minton 1972:260).

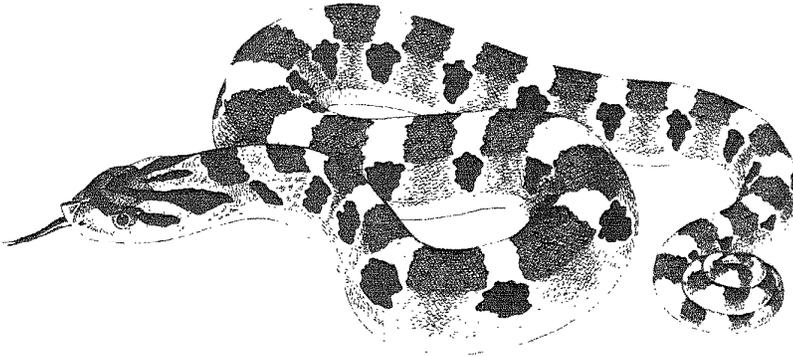
YOUNG BORN: July to August (Minton 1972:260).

NO. OF YOUNG: 4 to 10 or 11 young (Minton 1972:260). Viviparous.

HOME RANGE/MOVEMENT: Unknown.

FOOD HABITS/PREFERENCES: Frogs, salamanders, fish. Captives will eat minnows. Brown (1979) noted that 93 percent of the food items in 21 stomachs were comprised of anurans.

Eastern Hognose Snake
(*Heterodon platyrhinos*)



RANGE: Cape Cod and c. Massachusetts w. to Ohio, s. Ontario, c. Minnesota, and se. South Dakota, s. to c. Texas and s. Florida. Recently reported from Hillsborough, New Hampshire, in 1984 (unconfirmed). Also from Kittery, Maine (W. Chorman, personal communication).

RELATIVE ABUNDANCE IN NEW ENGLAND: Locally common.

HABITAT: Where sandy soils predominate, such as beaches, open fields, dry, open pine or deciduous woods. Has been found on hillsides, farm fields, and around outbuildings. In Pennsylvania most frequently found in upland situations, intermountain and river valleys (McCoy and Bianculli 1966). Low-lying areas of Connecticut (M. Klemens, personal communication), and in marshy woodlands in the Albany Pine Bush in New York, and wooded creek bottomlands (M. Stewart, personal communication). Hibernates from late September to April or May under forest floor debris, stumps, trash piles (Wright and Wright 1957:308).

SPECIAL HABITAT REQUIREMENTS: Sandy soils, open woodlands.

AGE/SIZE AT SEXUAL MATURITY: Male 400 to 1,050 mm, females 450 to 1,200 mm (Wright and Wright 1957:309).

BREEDING PERIOD: April to May and probably fall (Fitch 1970).

EGG DEPOSITION: June to July. Eggs laid in earth, under or in pulpy wood of decaying logs.

CLUTCH SIZE: 4 to 61 eggs, typically 22 (Fitch 1970).

INCUBATION PERIOD: 39 to 60 days (Anderson 1965:185).

EGGS HATCH: July to September, peak in August.

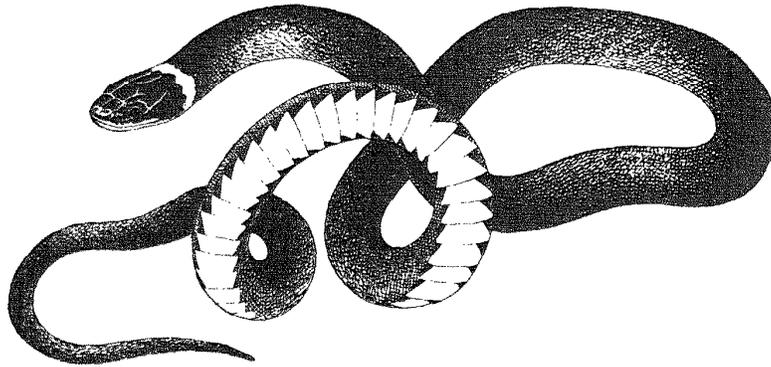
HOME RANGE/MOVEMENT: After 5 months one individual in Maryland mixed habitat had moved 100 feet (30 m) (Stickel and Cope 1947).

FOOD HABITS/PREFERENCES: Toads preferred, but frogs, fish, salamanders, insects, and worms are taken; rarely small birds and mammals and occasionally other snakes (Edgren 1955). Amphibians and reptiles accounted for 80 percent of the food items in 10 specimens in Virginia (Uhler et al. 1939).

COMMENTS: Diurnal. Fossorial habits, probably seek cover by burrowing (Edgren 1955). Particularly vulnerable to heavy herbicide and pesticide use. Defense behavior includes head rearing, "hood" display, mock striking, and feigning death.

KEY REFERENCES: Blem 1981, Edgren 1955, McCoy and Bianculli 1966, Smith 1956, Wright and Wright 1957.

Northern Ringneck Snake
(*Diadophis punctatus edwardsi*)



RANGE: Nova Scotia, s. Ontario to Wisconsin. Eastern and s. Ohio to se. Illinois, n. Alabama and ne. through c. Virginia to New England.

RELATIVE ABUNDANCE IN NEW ENGLAND: Common.

HABITAT: Secretive, found under cover especially in moist shady woodlands with abundant hiding cover: stony woodland pastures, rocks, stone walls, old woodland junk piles, logs, debris, loose bark of logs and stumps; shale banks in Maine (Fowler and Sutcliffe 1952), and boards are all used as cover. Hibernates from September to April or May. One individual found in a woodchuck den (Grizzel 1949).

SPECIAL HABITAT REQUIREMENTS: Mesic areas with abundant cover.

AGE/SIZE AT SEXUAL MATURITY: Males at 13 to 14 months (Fitch 1960b), males 220 to 500 mm, females 220 to 550 mm (Wright and Wright 1957:187).

BREEDING PERIOD: Soon after emerging from hibernation.

EGG DEPOSITION: Late June to early July. Eggs laid in rotted logs, under logs or stones. Several females may use the same nest.

CLUTCH SIZE: 1 to 10 eggs, typically 3 or 4 (Blanchard 1937b). Smaller females lay fewer eggs (Fitch 1970).

INCUBATION PERIOD: 4 to 6 weeks (Minton 1944). Average of 56 days in laboratory conditions (Blanchard 1930, cited in Wright and Wright 1957:188).

EGGS HATCH: Late August through September.

HOME RANGE/MOVEMENT: Undocumented.

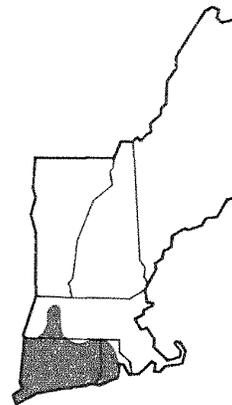
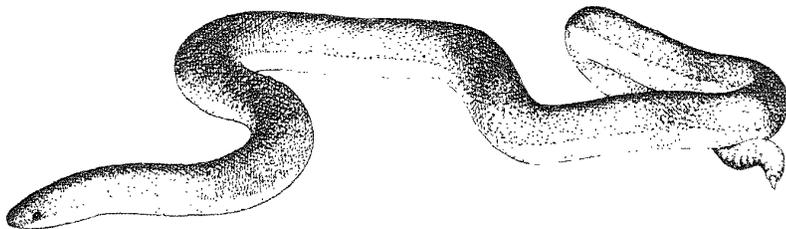
FOOD HABITS/PREFERENCES: Toads, frogs, salamanders, earthworms, lizards, small snakes, insects, and grubs.

COMMENTS: Nocturnal. Degree of fossorial tendency varies with temperature preference (Elick et al. 1979).

KEY REFERENCES: Schmidt and Davis 1941, Wright and Wright 1957.

Eastern Worm Snake

(*Carphophis a. amoenus*)



RANGE: Southcentral Massachusetts, se. New York through c. Pennsylvania to s. Ohio. South to c. Alabama, n. Georgia and South Carolina.

RELATIVE ABUNDANCE IN NEW ENGLAND: Locally abundant.

HABITAT: Dry to moist forests, often near streams; in the loose soil of gardens or weedy pastures. Sandy areas favored (M. Klemens, personal communication). Found in dry oak/pitch pine areas in Springfield, Massachusetts, (T. Tynning, personal communication) and under loose bark slabs, logs, stones, leaves, and other debris. Fossorial; has extended periods of inactivity. Hibernates in rotting wood, underground, or in burrows of other animals. Remains underground until May except for warm sunny days.

SPECIAL HABITAT REQUIREMENTS: Loose soil for burrowing, cover objects.

AGE/SIZE AT SEXUAL MATURITY: 3 years (Fitch 1970).

BREEDING PERIOD: Probably spring to early summer (McCauley 1945:97) and fall (Fitch 1970).

EGG DEPOSITION: Late June to early July. Eggs probably laid in depressions under boulders or in hollow logs. Incubation period of 48 to 49 days in Kansas (Fitch 1970).

CLUTCH SIZE: 2 to 8 eggs (Wright and Wright 1957:106), typically 5 (McCauley 1945:55).

EGGS HATCH: August to September.

HOME RANGE/MOVEMENT: About 0.25 acre (0.1 Kentucky (Barbour 1971:240). Average for 10 individuals in a forested mountainous area of Kentucky was m^2 or 0.025 ha (Barbour et al. 1969a).

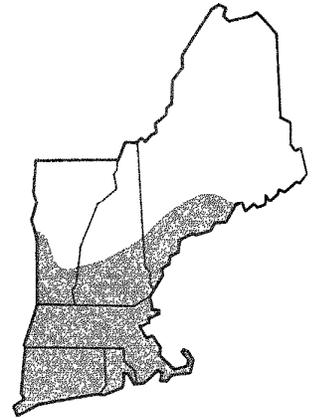
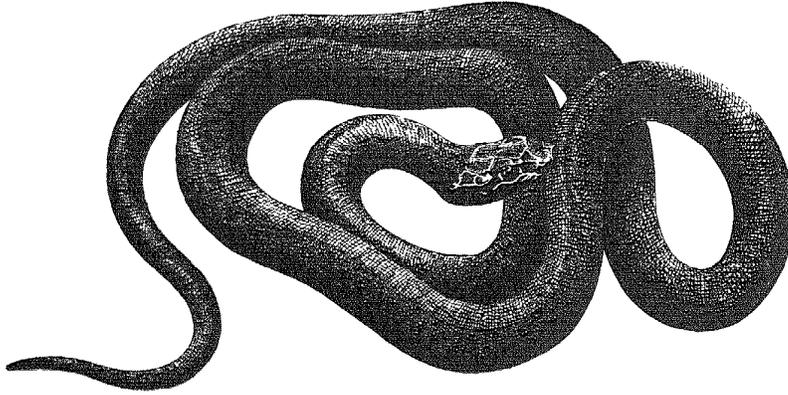
FOOD HABITS/PREFERENCES: Earthworms, soft-bodied insects and their larvae, grubs or slugs.

COMMENTS: Nocturnal and secretive.

KEY REFERENCES: Barbour et al. 1969a, Schmic Davis 1941, Wright and Wright 1957.

Northern Black Racer

(*Coluber c. constrictor*)



RANGE: Southern Maine to sw. Ohio, s. to c. Alabama to South Carolina and throughout the Eastern United States.

RELATIVE ABUNDANCE IN NEW ENGLAND: Locally abundant.

HABITAT: Moist or dry areas, forests and wooded areas, fields, roadsides, swamps, marshes, clearings, near old buildings, trap rock ridges (M. Klemens, personal communication), stone walls, and farms. Has been found in deciduous and pine forests. Partially arboreal. Will use ledges for sunning.

Hibernates in large congregations, sometimes with copperheads and rattlesnakes, often using deep rock crevices or abandoned woodchuck holes. Among the earliest snakes to emerge from hibernation.

AGE/SIZE AT SEXUAL MATURITY: Males at 13 to 14 months (Fitch 1960b), males 680 to 1,595 mm, females 710 to 1,683 mm (Wright and Wright 1957:135).

BREEDING PERIOD: May to early June.

EGG DEPOSITION: June to early July. Laid in rotting wood, stumps, decaying vegetable matter, loose soil.

CLUTCH SIZE: 7 to 31 eggs, typically 16 to 17, clutch size proportional to size of female (Fitch 1963:420).

INCUBATION PERIOD: Average of 51 days (Fitch 1970).

EGGS HATCH: Late August to September.

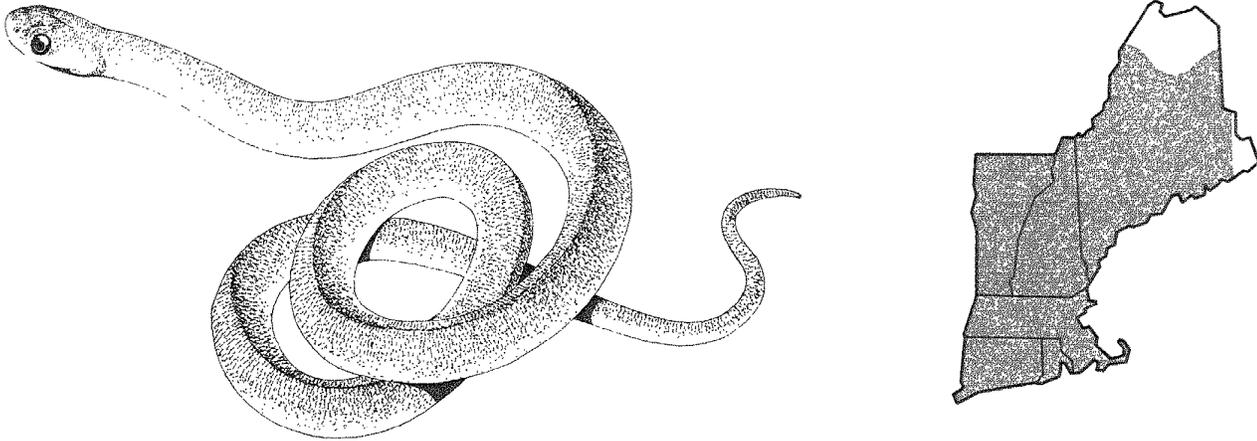
HOME RANGE/MOVEMENT: Very territorial; seems to have definite home range (Smith 1956:239). Average distance of 903 feet (275.2 m) in mixed Maryland habitat for 3 individuals after 2 years (Stickel and Cope 1947). Requires large tracts of mixed old fields and woodlands (M. Klemens, personal communication).

FOOD HABITS/PREFERENCES: Varied diet includes small mammals, insects, frogs, toads, small birds, birds' eggs, snakes and lizards (Uhler et al. 1939). Small mammals and insects are 50 percent of diet (Surface 1906).

COMMENTS: Diurnal.

KEY REFERENCES: Fitch 1963, Wilson 1978.

Eastern Smooth Green Snake
(*Opheodrys v. vernalis*)



RANGE: Nova Scotia, s. Ontario, into c. Minnesota to s. Wisconsin, Michigan, ne. Ohio to the Appalachians of Virginia and West Virginia and north from c. New Jersey throughout New England with the possible exception of n. Maine.

RELATIVE ABUNDANCE IN NEW ENGLAND: Common, but currently declining in s. New England.

HABITAT: Upland areas, grassy fields, mountain meadows; high altitude areas with grassy, open spots. Also found in open aspen stands, sphagnum bogs, marshes, in vines and brambles, and hardwood stands.

SPECIAL HABITAT REQUIREMENTS: Upland grassy openings.

AGE/SIZE AT SEXUAL MATURITY: Probably second year (Seibert and Hagen 1947).

BREEDING PERIOD: Late August in Ontario (Smith 1956:236). Spring and late summer (Behler and King 1979:640).

EGG DEPOSITION: Late July to August.

CLUTCH SIZE: 3 to 12 eggs (Wright and Wright 1957:558), typically 7 (Blanchard 1933). Nest sites may be used by several females.

INCUBATION PERIOD: Varies from 4 to 23 days (Blanchard 1933).

EGGS HATCH: August to early September.

HOME RANGE/MOVEMENT: Less than 30 yards (27.4 m) for 10 of 12 individuals studied in an uncultivated field in Illinois (Seibert and Hagen 1947).

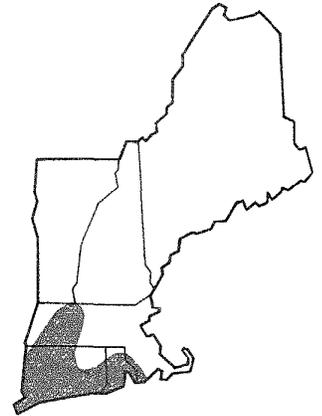
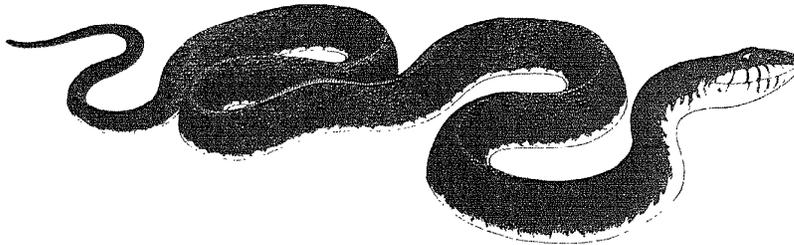
FOOD HABITS/PREFERENCES: Insects account for 73 percent of prey items, also spiders, snails (Surface 1906). Salamanders, millipedes, centipedes, particularly caterpillars, orthopterans, ants, flies (Uhler et al. 1939).

COMMENTS: Hibernates early fall to April or May. Population decline may be related to insecticide spraying and loss of open fields and pasture. Inhabits abandoned farmland dominated by successional vegetation and man-made debris on Long Island, New York (Schlauch 1975).

KEY REFERENCES: Schmidt and Davis 1941, Seibert and Hagen 1947, Wright and Wright 1957.

Black Rat Snake

(*Elaphe o. obsoleta*)



RANGE: Southwestern New England w. through s. New York to sc. Illinois, and the Mississippi River area in Wisconsin, south to Oklahoma, c. Louisiana and Georgia. Range may be extending n. in the Connecticut River Valley (T. Tynning, personal communication).

RELATIVE ABUNDANCE IN NEW ENGLAND: Common.

HABITAT: Variety of habitats including woodlands, thickets, field edges, farmlands, rocky hillsides and mountaintops, river bottoms, old barns. Readily climbs trees. Found in dry oak and oak-hickory woods, and mesic bottomland forests, may occur in very dense woods (Wright and Wright 1957:232). In Connecticut found in gorges and some coastal areas (M. Klemens, personal communication).

Hibernates late November to April, may use talus slopes, cisterns or unused wells. Often found in groups with copperheads and rattlesnakes where these snakes occur.

AGE/SIZE AT SEXUAL MATURITY: At 4 years (Fitch 1970). Males 1,095 to 1,835 mm, females 715 to 1,800 mm (Wright and Wright 1957:233).

BREEDING PERIOD: May to June.

GESTATION PERIOD: 8 to 12 weeks (Oliver 1955:243).

EGG DEPOSITION: July to August. Laid in loose soil, decaying wood, manure piles, sawdust piles.

CLUTCH SIZE: 6 to 24 eggs, typically 14.

HOME RANGE/MOVEMENT: Average at least 600 m in diameter for males, and at least 500 m for females in woods and fields in Maryland (Stickel et al. 1980).

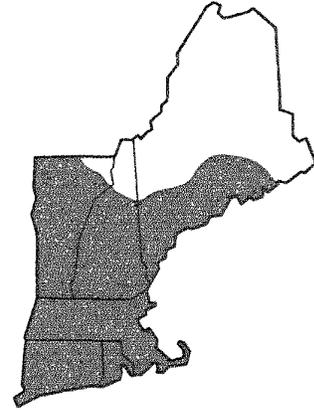
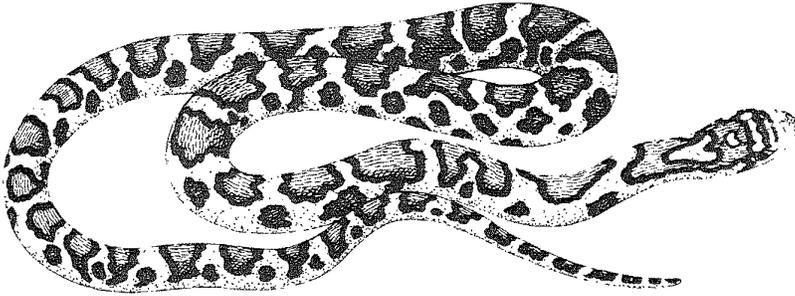
FOOD HABITS/PREFERENCES: Small mammals account for 60 percent of prey items, particularly rodents, small birds and their eggs (30 percent), also amphibians, insects, spiders (Uhler et al. 1939). Young opossums, weasels, owls, and sparrow hawks have been captured as food (Minton 1972:272). Prey is killed by constriction.

COMMENTS: Formerly pilot or pilot black snake. Diurnal and arboreal. May reside in hollow trees (Conant 1975:194).

KEY REFERENCES: Anderson 1965, Schmidt and Davis 1941, Smith 1956, Stickel et al. 1980, Wright and Wright 1957.

Eastern Milk Snake

(*Lampropeltis t. triangulum*)



RANGE: Southeastern Maine and s. Ontario to c. Minnesota, s. to Tennessee and w. North Carolina and throughout the Northeast. Intergrades with the scarlet king snake (*L. t. elapsoides*), in the sw. and se. portion of its range.

RELATIVE ABUNDANCE IN NEW ENGLAND: Common.

HABITAT: Various habitats, usually with brushy or woody cover, and found from sea level to mountain elevations. Usually found under cover. Farmlands, woods, out-buildings, meadows, river bottoms, bogs, rocky hillsides, rodent runways (M. Klemens, personal communication). Found under logs, stones, boards, well covers, stones in creek bottoms (M. Stewart, Personal communication) or other cover during the day. In pine forests, second-growth pine, bog woods, hardwoods, aspen stands. Hibernates from October or November to April.

SPECIAL HABITAT REQUIREMENTS: Suitable cover or loose soil for egg laying.

AGE/SIZE AT SEXUAL MATURITY: Third or fourth year (Fitch and Fleet 1970), males to 1,115 mm, females 404 to 966 mm (Wright and Wright 1957:371).

BREEDING PERIOD: June (Wright and Wright 1957:371).

EGG DEPOSITION: Mid-June to July, in piles of soil, sawdust or manure, or under other cover, often in a communal nest site.

CLUTCH SIZE: 6 to 24 eggs, typically 13.

INCUBATION PERIOD: 6 to 8 weeks (Wright and Wright 1957:371).

EGGS HATCH: Late August to October.

HOME RANGE/MOVEMENT: About 50 acres (20.25 ha) for *L. t. sypila*, movements of 250 to 1,300 feet (76.2 to 396.2 m) in open woodland in ne. Kansas (Fitch and Fleet 1970). Seasonal movement probable from drier hibernation sites to moist bottomlands for the summer (Breckenridge 1958, cited in Williams 1978:79).

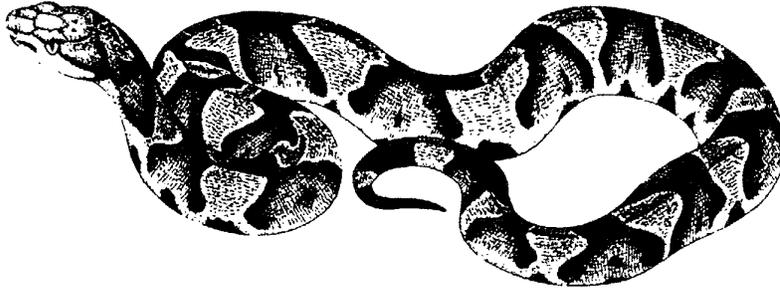
FOOD HABITS/PREFERENCES: Mice, other small mammals, other snakes, lizards, birds and their eggs, slugs. Mice accounted for 74 percent of the volume of stomach contents of 42 milk snakes in Pennsylvania (Surface 1908). Forages for food at night.

COMMENTS: Typically nocturnal. Numbers may be declining as abandoned fields revert to forests (T. Tynning, personal communication).

KEY REFERENCES: Fitch and Fleet 1970, Schmidt and Davis 1941, Wright and Wright 1957.

Northern Copperhead

(*Agkistrodon contortrix mokeson*)



RANGE: Southwestern New England to sw. Illinois, s. to c. Georgia and through c. North Carolina.

RELATIVE ABUNDANCE IN NEW ENGLAND: Uncommon to rare.

HABITAT: Usually associated with deciduous forests. Occupies varied habitats from swamps to mountain tops. Prefers areas with damp leaf litter (Fitch 1960a:116). Exposed mountainous, rocky hillsides, talus slopes, basalt ridges, ledges, open woods. Found in habitats with large rocks, rotting wood, and sawdust piles. During summer months may be found near swamps, ponds, or streams. Largely outside of white pine-northern hardwood, and beech-maple associations (Fitch 1960a:123). Reinert (1984) found this species used relatively open areas with high rock density and low density surface vegetation.

SPECIAL HABITAT REQUIREMENTS: Rocky hillsides, talus slopes.

AGE/SIZE AT SEXUAL MATURITY: Males during their second summer, females at 3 years (Fitch 1960a:272).

BREEDING PERIOD: After emergence from hibernation in April to May, peak in late May. Sperm may remain viable in the female for more than a year after copulation (Allen 1955). Gestation period of 105 to 110 days (Fitch 1960a:116).

YOUNG BORN: August to September, typically September in the Northeast. Viviparous.

NO. OF YOUNG: 1 to 17 young, typically 5 to 6 (Wright and Wright 1957:913). Litters produced in alternate years.

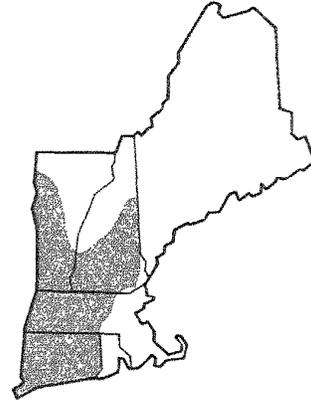
HOME RANGE/MOVEMENT: In mixed habitat of woodlands, ledges and grassland in Kansas. Fitch (1960a:147-149) recorded 24.4 acres (9.7 ha) for males and 8.5 acre (3.4 ha) for females. Seasonal movements occur between hibernaculum and lowland areas.

FOOD HABITS/PREFERENCES: Mice, other small rodents, insects, small birds, salamanders, lizards, small snakes, frogs, toads. Food obtained by ambush.

COMMENTS: Nocturnal during summer months, diurnal in spring and fall. Has survived eradication in some areas due to cryptic coloration and retiring habits. Usually gregarious. During hibernation (from October to April) sometimes found with other species of snakes including rattlesnakes, but mutually exclusive in Connecticut (Peterson 1970). Den sites are reused each year — a major limiting factor.

KEY REFERENCES: Anderson 1965, Fitch 1960a, Reiner 1984, Schmidt and Davis 1941, Smith 1956, Wright and Wright 1957.

Timber Rattlesnake
(*Crotalus horridus*)



RANGE: Southern New Hampshire, the Champlain Valley to sw. New York, w. along the Ohio River Valley and n. to the Mississippi River in Wisconsin. Extending to n. Texas s. Illinois, n. Georgia and through the Appalachians to New Jersey.

RELATIVE ABUNDANCE IN NEW ENGLAND: Uncommon to rare.

HABITAT: Timbered areas with rocky outcroppings, dry ridges, and second growth deciduous or coniferous forests with high rodent populations. Usually southern exposures. Sometimes in swamps, quarries, old stone walls, abandoned buildings. Often found near streams in late summer. Most common in areas not frequented by man, few such sites remain. Reaches elevations of 6,000 feet (1,800 m) in the Southeast, but probably not found at highest elevations in the Northeast due to harsh climatic conditions (Klauber 1972:511). Reinert (1984) found that in Pennsylvania this species frequented forested habitats rather than dry, rocky outcroppings. Hibernates from September to April in large numbers in rocky crevices usually overgrown with brush. Found with copperheads and other snakes, due to paucity of hibernacula (T. Tynning, personal communication).

SPECIAL HABITAT REQUIREMENTS: Rock outcroppings on forested hillsides.

AGE/SIZE AT SEXUAL MATURITY: Probably 3-1/2 to 4 years (Klauber 1972:335).

BREEDING PERIOD: Fall in Connecticut (T. Tynning, personal communication) and Wisconsin (Messeling 1953). After emerging from hibernation (Fitch 1970). Gestation period probably about 5-1/2 to 6 months.

YOUNG BORN: Late August to September, probably biennial cycles (Klauber 1972:691). Viviparous.

NO. OF YOUNG: 5 to 17 young, typically 7 to 10 (Klauber 1972:733).

HOME RANGE/MOVEMENT: Females return to hibernation dens to give birth to young. Hibernation dens may be used year after year. Home ranges and favored refuges probably exist, but few investigations have been conducted (Klauber 1972:606-607).

FOOD HABITS/PREFERENCES: Prefers warm-blooded prey. Small mammals account for 87 percent of prey taken (Uhler et al. 1939), particularly mice, but includes rabbits, shrews, chipmunks, squirrels, bats, songbirds, and other snakes. Forages at night (Kimball 1978).

COMMENTS: Extirpated from much of its former range by man; overcollection and habitat disturbance are serious threats to *Crotalus horridus* in the Northeast. Danger to humans is grossly exaggerated.

KEY REFERENCES: Anderson 1965, Collins and Knight 1980, Klauber 1972, Wright and Wright 1957.

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