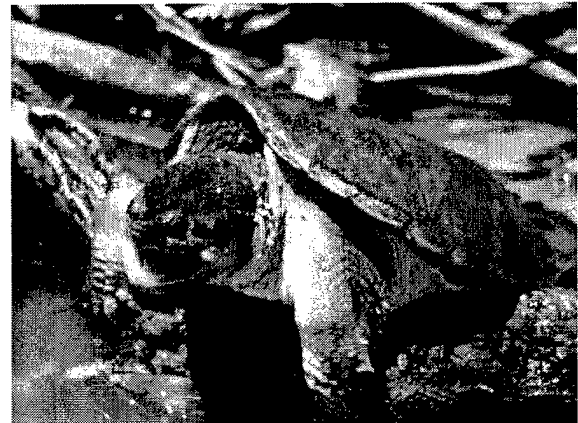




Snapping Turtle Habitats Potentially Impacted by USACE Reservoir Operations

BACKGROUND: Changing water levels or other operations at U.S. Army Corps of Engineers (USACE) reservoirs may impact critical habitat parameters for snapping turtle species. This technical note identifies snapping turtle species and habitats potentially impacted by USACE reservoir or other water-control projects as reported by resource managers (Table 1). Current state and/or Federal legal protection status as well as the distribution of USACE Districts and reservoir projects potentially impacted by snapping turtle conservation issues are summarized (Figure 1, Table 2). Life-history summaries and habitat requirement descriptions are given for the snapping turtle species identified as potentially impacted at reservoir operations. This group includes only two species; the alligator snapping turtle and common snapping turtles. Alligator snapping turtles are Federal candidates for protection and common snapping turtles are listed as either state species of special concern or carry harvesting regulations in 15 states. Environ-



Common Snapping Turtle
photo by Dena Dickerson

mental issues associated with these turtles were reported by 25 USACE projects from 3 USACE Districts (3 USACE Divisions).



Alligator Snapping Turtle
photo by Dena Dickerson

Distribution of the alligator snapping turtle is restricted to U.S. river systems that drain into the Gulf of Mexico, whereas the common snapping turtle range extends throughout the United States east of the Rocky Mountains (Figure 2). Both species prefer benthic living and foraging and are opportunistic omnivorous scavengers. Alligator snapping turtles most frequently occur in the deep water of rivers, canals, and lakes (Figure 3).

| Snapping Turtles Potentially Impacted by Reservoir Operations | | |
|--|------------------------------|---|
| Turtle Common Name | Scientific Name | Protection Status |
| Alligator snapping | <i>Macroclmys temminckii</i> | Federal candidate for protection |
| Common snapping | <i>Chelydra serpentina</i> | State possession/harvesting regulations |

DTIC QUALITY INSPECTED 4

DISTRIBUTION STATEMENT A
Approved for Public Release
Distribution Unlimited

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Common snapping turtles can be found in almost every kind of freshwater habitat. Although biological data on alligator snapping turtles are severely lacking, reports of population declines have been attributed to commercial harvesting for food and the pet trade. Common snapping turtles are among the more abundant aquatic turtles; however, overcollecting has seriously reduced many populations.

| Table 1 Summary of Survey Results, Snapping Turtles | | | | | | |
|--|---------------------------------------|----------------------------------|----------------------|----------------------------|--|------------------------|
| Species | Protection Status | | Divisions Identified | Districts Identified | Number | |
| | State | Federal | | | District | Total |
| Alligator snapping turtle | State protected | Federal candidate for protection | SWD MVD | Little Rock Rock Island | 24 ? | 24 |
| Common snapping turtle | Possession/ harvesting regulations | | LRD | Pittsburgh | 1 | 1 |
| | | | Summary | SWD MVD LRD | Little Rock Rock Island Pittsburgh | 24 ? 1 25 |

? Questions remain about survey response

POINT OF CONTACT: For additional information, contact one of the authors, Ms. Dena D. Dickerson (601-634-3772, dickerd@ex1.wes.army.mil), Mr. Kevin J. Reine (601-634-3436, reinek@ex1.wes.army.mil), or Ms. Kim L. Herrmann (601-634-3689), or the manager of the Ecosystem Management and Restoration Research Program, Dr. Russell F. Theriot (601-634-2733, therior@ex1.wes.army.mil). This technical note should be cited as follows:

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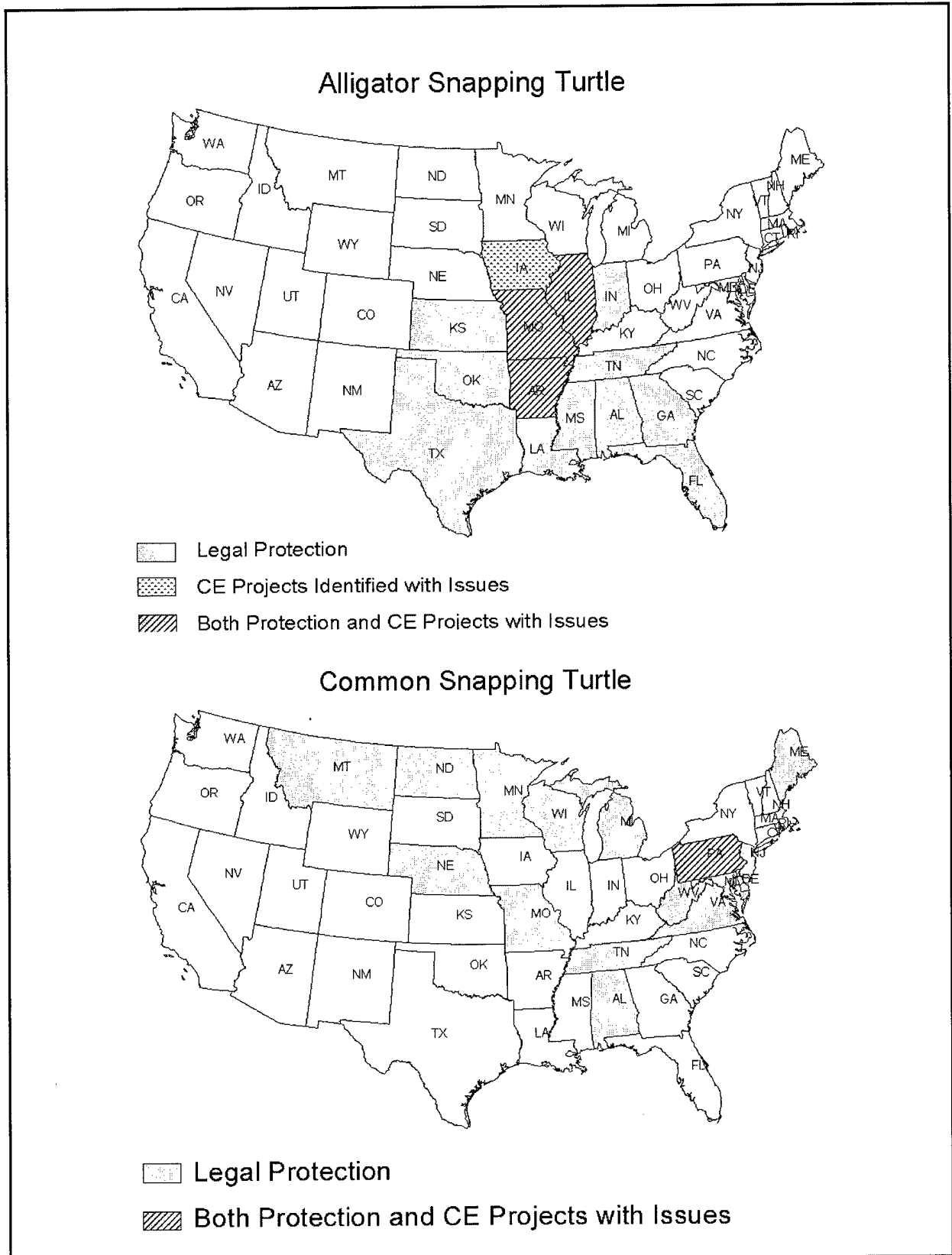


Figure 1. Legal protection status

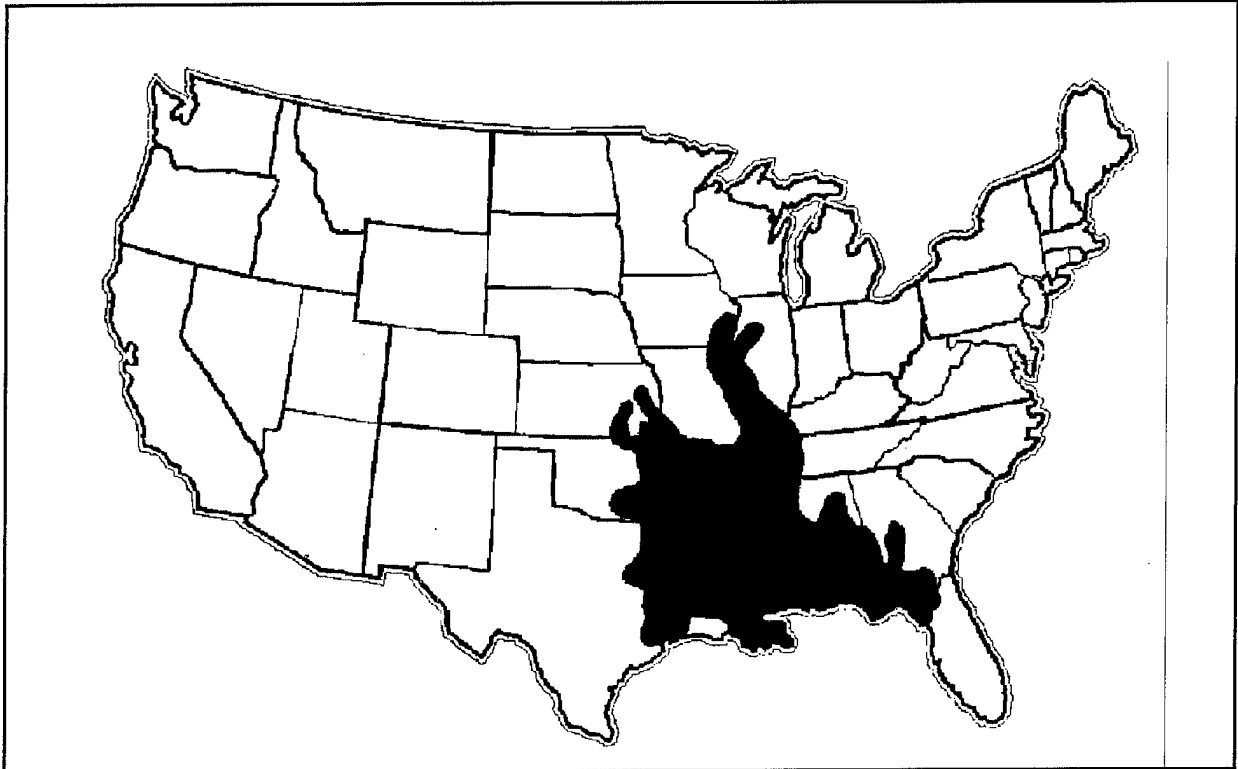


Figure 2. Alligator snapping turtle habitat range

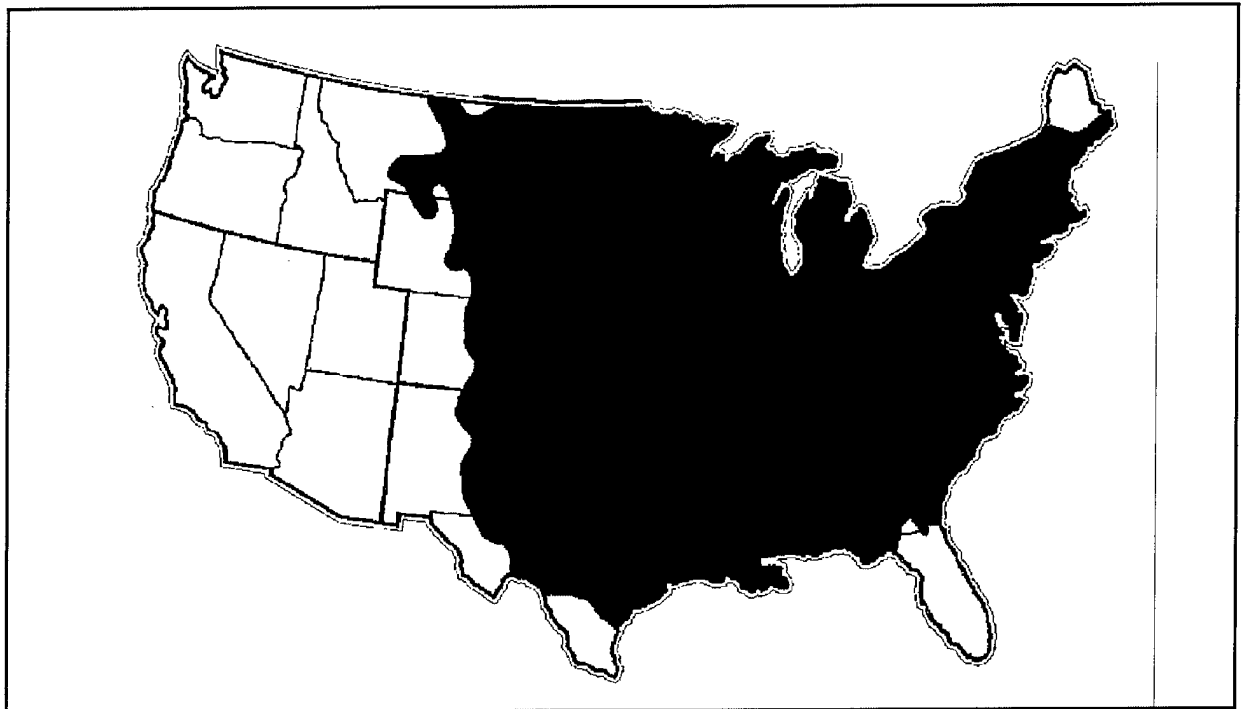


Figure 3. Common snapping turtle habitat range

Table 2
Turtle Protection Status by Species

| Turtle Species | North Atlantic States | | | | | | | | | | South Atlantic States | | | | | |
|------------------------------|-----------------------|------|------|-------|----|-----|------|------|------|------|-----------------------|------|------|------|-------|------|
| | ME | NH | VT | MA | CT | RI | NY | PA | NJ | DE | MD | VA | NC | SC | GA | FL |
| Alligator snapping FC | 1/95 | 1/98 | 3/98 | 11/97 | 95 | 95 | 2/97 | 1/94 | 6/96 | 3/97 | 11/94 | 5/92 | 9/94 | 1/98 | 10/97 | 8/97 |
| Common snapping | PHR | | | | | PHR | | PHR | PHR | PHR | PHR | | | | t | SSC |

| Turtle Species | Midwest States | | | | | | | | | | Southwest States | | | | | Pacific States | | | | |
|------------------------------|----------------|------|------|------|------|------|-----|------|-------|------|------------------|------|------|-------|------|----------------|------|--|--|--|
| | ID | MT | WY | CO | KS | NE | ND | SD | NM | AZ | NV | UT | CA | OR | WA | HI | AK | | | |
| Alligator snapping FC | 9/97 | 3/97 | 1/97 | 7/95 | 6/93 | 5/94 | 97 | 3/96 | 12/97 | 1/97 | 5/94 | 3/97 | 3/97 | 12/96 | 7/93 | 1/97 | 9/93 | | | |
| Common snapping | | SSC | | | SSC | PHR | PHR | | | | | | | | | | | | | |

| Turtle Species | North Central States | | | | | | | | | | Gulf States | | | | | | |
|------------------------------|----------------------|------|------|------|-------|------|----|------|------|------|-------------|------|------|-------|------|------|------|
| | KY | MO | IA | MN | WI | In | IL | OH | MI | WV | TX | LA | MS | AL | OK | AR | TN |
| Alligator snapping FC | 11/97 | 6/97 | 1/98 | 7/96 | 12/97 | 4/97 | 94 | 9/97 | 6/94 | 1/97 | 11/97 | 1/97 | 6/96 | 11/97 | 4/93 | 6/96 | 9/94 |
| Common snapping | | SSC | | | | E | T | | | | T | PHR | SSC | SSC | PHR | SSC | SSC |
| | | PHR | | SSC | PHR | | | | PHR | PHR | | | | PHR | | | PHR |

FT Federally threatened
 FC Candidate for Federal protection
 SSC State species of special concern
 T or ST State threatened
 E or SE State endangered
 PHR Possession and/or harvesting regulations
 Shading Indicates species with potential issues at CE Reservoirs

Profile: Alligator snapping turtle (*Macrolemys temminckii*)

Distribution: The alligator snapping turtle is confined to river systems in the United States that drain into the Gulf of Mexico. The species is widely distributed in the Mississippi Valley from Kansas (Clarke 1981), Illinois (Morris and Sweet 1985), and Indiana (Grannan and Anderson 1992), to the Gulf, and has been reported from almost all river system in the Suwannee River in Florida (Iverson and Etchberger 1989) to the San Antonio River in Texas (Iverson 1992).

Habitat: The alligator snapping turtle most frequently occurs in the deep water of rivers, canals, lakes, oxbows, and sloughs; but it is also found in swamps and marshes near running water and occasionally in the brackish water of the coastal plain (Ernst and Barbour 1989). The preferred living and foraging habitat of alligator snappers is stream bottoms with mud substrate and abundant aquatic vegetation, but they have also been found in sand substrate without aquatic vegetation (Soule 1992). Sloan and Taylor (1987) reported that alligator snappers in northeast Louisiana preferred floatant (dense floating vegetation mat) with cypress (*Taxodium distichum*) or buttonbush (*Cephalanthus occidentalis*). Juveniles may be found in small streams.

Behavior: Information about the behavior of alligator snappers under natural conditions is insufficient. What information is known has been acquired primarily from captives. Adults are highly aquatic; typically only nesting females venture onto land. Alligator snapping turtles seldom if ever bask (Pritchard 1989). The snapper walks along the stream bottom and seldom swims. This turtle is highly secretive, hiding during daylight hours and becoming active at night. Unlike other aquatic turtles, alligator snappers cannot remain submerged for long periods of time (average 40-50 min) (Ernst et al. 1994). Considered an ambush predator, the alligator snapping turtle entices fish within striking distance by its pseudo-annelid lure, located on the floor of its mouth. Tracking studies indicate homing and territorial behaviors as well as daily and seasonal movement patterns (Harrell et al. 1996).

Reproduction: Mating has been observed with captive specimens during February, March, and April in Florida (Allen and Neil 1950), and in Oklahoma during October (Grimple 1987). No evidence exists that *Macrolemys* lays more than one clutch per season. Allen and Neill (1950) reported clutch sizes ranging from 9 to 44 eggs. Eggs are laid in April, May, June, and July, depending on location. Nesting is diurnal. Nests are dug with the hind limbs and eggs are laid in sand or sand mixed with silt and organic alluvium usually adjacent to streams or rivers. Nests are frequently found on the overgrown ends of sandbars. Ewert (1976) noted a conspicuous absence of nests on open sandbars and in low forested areas with leaf litters and matted roots. The tail and hind limbs are used to cover and pack the nest. Incubation ranges from 79 to 107 days, with variability due to mean temperature. Possible hatchling overwintering occurs in the nest. Gender determination is temperature-dependent.

Food habits: Alligator snapping turtles are opportunistic scavengers that consume a variety of prey with fish representing a large portion of their diet (Pritchard 1989). Diet may also consist of crayfish, crabs, freshwater mussels, snakes, small alligators, salamanders, fruit (tupelo, palmetto), and aquatic grasses. In addition, other turtles such as *Graptemys*, *Trachemys*, *Pseudemys*, *Sternotherus*, *Macrolemys*, and *Trionyx* are known to be prey (Shipman et al. 1991).

Populations: George (1987) and Pritchard (1989) reviewed anecdotal information from trappers and state wildlife biologists and concluded that a substantial decline in this species has occurred throughout its range. Decline in Louisiana has been attributed to commercial harvesting.

Remarks: *Protection Status:* Federal: Federal candidate for protection; Endangered: Indiana; Threatened: Georgia, Illinois, Texas; State species of special concern: Florida, Kansas, Montana, Mississippi, Alabama, Arkansas and Tennessee; Possession and/or harvesting regulations: Louisiana and Oklahoma.

Profile: Common snapping turtle (*Chelydra serpentina*)

Distribution: The range of the common snapping turtle extends from Nova Scotia, New Brunswick, and southern Quebec west to southeastern Alberta, and southward east of the Rocky Mountains to southern Florida and the Texas coast in the United States.

Habitat: Typically found in almost every kind of freshwater habitat, but prefers slow-moving water with a soft mud or sand bottom and abundant aquatic vegetation. Generally lives in shallow bodies of water, but may live along the edges of deep lakes and rivers. Florida snapping turtles are frequently found in canals, sloughs, and pools and can be found in acidic, muck-bottom hammock streams. The snapping turtle may also enter brackish coastal waterways (Kiviat 1980).

Behavior: *Chelydra* usually moves slowly over the bottom; however, if disturbed it can swim rapidly. It usually spends the bulk of the day floating just beneath the surface, lying on the bottom of a deep pool, or buried in the mud in shallow water. A social relationship with *Chrysemys picta* (painted turtles) basking on the back of a floating snapping turtle has been described by Legler (1956). In the southern range, the turtle may be active year round. In the northern range, hibernation begins by late October; however, radiotelemetry studies indicate not all snapping turtles hibernate (Ultsch and Lee 1983). Burrowing in mud bottoms, or using muskrat burrows or lodges is the typical overwintering preference. Large congregations sometimes hibernate together (Meeks and Ultsch 1990). Emergence from hibernation usually occurs in April or as late as May in Canada. While basking can occur out of water, it occurs most frequently in the water with the turtle floating on the surface with just the head and top of the carapace exposed. Aerial basking is restricted by the animal's intolerance of high temperatures and by rapid loss of moisture. Hatchlings are attracted to large areas of intense illumination, which allows them to find their way from the nest to the water.

Reproduction: Mating occurs from April to November with peak nesting from 15 May to 15 June; however, nesting may occur prior to this in the south or afterwards in the north (Ewert 1976). Nesting in Canada may not begin until mid-June, with the season extending into July (Robinson and Bider 1988). The nesting cycle is bimodal (morning and evening) over most of its range, (e.g. New York, Michigan); however, this is not true for all locations (e.g. Virginia, mostly morning nesting) (Petokas and Alexander 1980). Nests are dug with the hind feet in an open site in relatively loose sand, loam, vegetable debris, or sawdust piles. Muskrat and beaver lodges are sometimes used, as well as manmade sites such as roadsides, railways, and dams. Clutch size is variable, ranging from 6 to 104 (typical range: 20-40). Incubation time, longest in the northern region, ranges from 55 to 125 days, but 75 to 95 days is more typical (Congdon et al. 1987). Emergence from the nest normally occurs from mid-August to early October, but may be earlier in the southern range or delayed until the following spring (southeastern Pennsylvania; Ernst (1966)). More northern populations in the United States and Canada have very low frequencies of overwintering in the nest by hatchlings (Obbard and Brooks 1981). Gender determination is temperature-dependent.

Food habits: Common snapping turtles are omnivorous, eating almost anything to include insects, spiders, isopods, amphipods, crayfish, fiddler crabs, shrimp, clams, snails, earthworms, leeches, freshwater sponges, frogs and toads, salamanders, small turtles, snakes, fish, aquatic or semiaquatic birds, plant material, and small mammals. The snapping turtle is considered a nuisance since it consumes game fish and ducklings (Abel 1992).

Populations: Even though snapping turtles are among the more abundant aquatic turtles, overcollecting has seriously reduced many populations (Ernst et al. 1994). Studies have shown sex ratios within a population are typically 1:1 and this ratio is maintained throughout adulthood (Mosimann and Bider 1960). After emergence from the nest, hatchlings and juvenile size and age classes may predominate in the population; however, this is short-lived due to their high mortality. Chemical pollution is linked to population decline (Ryan et al. 1986).

Remarks: *Protection Status:* State species of special concern: Minnesota, Montana; Possession and/or harvesting regulations: Montana, Wisconsin, Michigan, West Virginia, Alabama, Tennessee, Nebraska, North Dakota, Rhode Island, Pennsylvania, New Jersey, Delaware, Maryland, Virginia.

REFERENCES

- Abel, B. (1992). "Snapping turtle attacks on trumpeter swan cygnets in Wisconsin," *Passenger Pigeon* 54:209-13.
- Allen, E. R., and Neill, W. T. (1950). "The alligator snapping turtle *Macrochelys temminckii* in Florida," Special Publication, Ross Allen's Reptile Institute 4:1-15.
- Clarke, R. F. (1981). "A record of the alligator snapping turtle, *Macrochelys temminckii* (Testudines: Chelydridae), in Kansas," *Transactions of the Kansas Academy of Science* 84:59-60.
- Congdon, J. D., Breitenbach, G. L., van Loben Sels, R. C., and Tinkle, D. W. (1987). "Reproduction and nesting ecology of snapping turtles (*Chelydra serpentina*) in southeastern Michigan," *Herpetologica* 43:39-54.
- Ernst, C. H. (1966). "Overwintering of hatchling *Chelydra serpentina* in southeastern Pennsylvania," *Philadelphia Herpetological Society Bulletin* 14:8-9.
- Ernst, C. H., and Barbour, R. W. (1989). *Turtles of the world*. Smithsonian Institution Press, Washington, DC.
- Ernst, C. H., Lovich, J. E., and Barbour, R. W. (1994). *Turtles of the United States and Canada*. N. P. Dutro, ed., Smithsonian Institution.
- Ewert, M. A. (1976). "Nests, nesting and aerial basking of *Macrochelys* under natural conditions, and comparisons with *Chelydra* (Testudines: Chelydridae)," *Herpetologica* 32:150-56.
- George, G. A. (1987). "The current status of the alligator snapping turtle, *Macrochelys temminckii*, with a review of its natural history," *Proceedings, 11th International Herpetological Symposium (Chicago, Illinois)*, M. Rosenberg, ed., 75-81.
- Grannan, L. T., Jr., and Anderson, R. (1992). "Geographic distribution: *Macrochelys temminckii*," *Herpetological Review* 23:88.
- Grimple, R. (1987). "Maintenance, behavior, and reproduction of the alligator snapping turtle, *Macrochelys temminckii*, at the Tulsa Zoological Park," *Bulletin of Oklahoma Herpetological Society* 12:1-6.
- Harrel, J. B., Allen, C. M., and Hebert, S. J. (1996). "Movements and habitat use of subadult alligator snapping turtles (*Macrochelys temminckii*) in Louisiana," *American Midland Naturalist* 135:60-67.
- Kiviat, E. (1980). "A Hudson River tidemarsch snapping turtle population," *Transactions of the Northeastern Sector Wildlife Society* 37:158-68.
- Legler, J. M. (1956). "A social relationship between snapping and painted turtles," *Transaction of the Kansas Academy of Science* 59:461-62.
- Meeks, R. L., and Ultsch, G. R. (1990). "Overwintering behavior of snapping turtles," *Copeia* 1990:880-84.
- Morris, M. A., and Sweet, M. J. (1985). "Size, age, and growth of an alligator snapping turtle, *Macrochelys temminckii*, in Georgia," *Copeia* 1978:154-56.
- Mosimann, J. E., and Bider, J. R. (1960). "Variation, sexual dimorphism, and maturity in a Quebec population of the common snapping turtle, *Chelydra serpentina*," *Canadian Journal of Zoology* 38:19-38.
- Obbard, M. E., and Brooks, R. J. (1981). "Fate of overwintering clutches of the common snapping turtle (*Chelydra serpentina*) in Algonquin Park, Ontario," *Canadian Field-Naturalist* 95:350-52.
- Petokas, P. J., and Alexander, M. M. (1980). "The nesting of *Chelydra serpentina* in northern New York," *Journal of Herpetology* 14:239-44.
- Pritchard, P. C. H. (1989). *The alligator snapping turtle: Biology and conservation*, Milwaukee Public Museum, Milwaukee, WI.
- Robinson, C., and Bider, J. R. (1988). "Nesting synchrony—a strategy to decrease predation of snapping turtle (*Chelydra serpentina*) nests," *Journal of Herpetology* 22:470-73.
- Ryan, J.J., Lau, B. P.-Y., and Hardy, J. A. (1986). "2,3,7,8-tetrachlorodibenzo-P-dioxin and related dioxins and furans in snapping turtle (*Chelydra serpentina*) tissues from the upper St. Lawrence River," *Chemosphere* 15:537-48.

- Shipman, P., Edds, D., and Blex, D. (1991). "Report on the recapture of an alligator snapping turtle (*Macrochelys temminckii*) in Kansas," *Kansas Herpetological Society Newsletter* 85:8-9.
- Sloan, K. N., and Taylor, D. (1987). "Habitats and movements of adult alligator snapping turtles in Louisiana," *Proceedings of the Annual Conference of the Southeast Association of Fish and Wildlife Agencies* 43:343-48.
- Soule, J. D. (1992). "Element stewardship abstract for *Macrochelys temminckii*," Report submitted to The Nature Conservancy, Boston, MA.
- Ultsch, G. R., and Lee, D. (1983). "Radiotelemetric observations of wintering snapping turtles (*Chelydra serpentina*) in Rhode Island," *Journal of the Alabama Academy of Science* 54:200-06.