

ORNATE BOX TURTLE SPECIES STATUS ASSESSMENT FOR ILLINOIS



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Species Description and Conservation Status

The Ornate box turtle (*Terrapene ornata*), also called the Western box turtle, is one of the several box turtles native to North America, named because they can close their shell tightly when they feel threatened (Conant and Collins 1991). Two subspecies currently exist, the Ornate subspecies *ornata* and the Desert subspecies *luteola* (Conant and Collins op. cit.). The *ornata* subspecies is a grassland taxa whose range reaches its eastern most limit in Illinois, extreme northwestern Indiana, and southern Wisconsin, west and south to Nebraska, eastern Colorado, eastern New Mexico, through Texas, western Louisiana, western Arkansas, and Missouri (Conant and Collins op. cit.) (Figure 1). They frequent the plains and prairies, as well as sandy areas, and can tolerate more arid conditions than the Eastern box turtle by burrowing (Conant and Collins op. cit.). They also can be found in fields (Smith 1961) and open brushy areas (Johnson 2000).

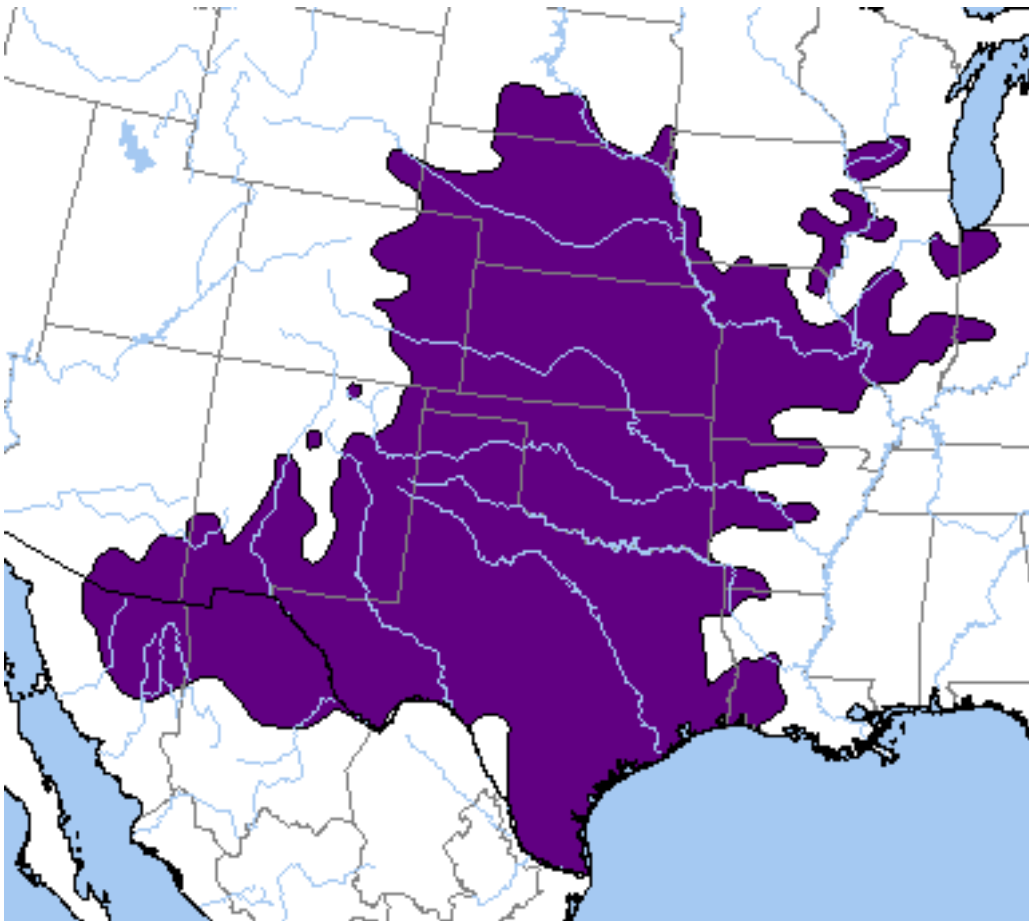


Figure 1. NatureServe range map of the Ornate Box Turtle (*Terrapene ornata*). 2013. Nature Serve Range map note: Range depicted for New World only.

Activity patterns of Ornates correspond with weather, time of day, and season, such as temperature, humidity, rain, time of day, and reproductive status. Activity levels increase with rain events, and turtles are less active during abnormally warm and dry periods (Tucker et. al. 2015).

Ornate box turtles are omnivorous, feeding on both plant and animal foods readily (Smith 1961), although they are primarily insectivorous, comprising 90% of their diet (Johnson 2000). Mulberries and wild strawberries are also consumed along with other plant material (Ernst and Barbour 1972). Carapace lengths of 10-12.5 cm (4-5 inches) are normal, with the record being 15.4 cm (6 1/8 inches) (Conant and Collins 1991). There is sexual dimorphism in adults with males having a cupped plastron and red eyes, whereas females lack the cupped plastron and have brown eyes. Generally, Ornate box turtles live between 26-37 years of age in the wild (Blair 1976; Metcalf and Metcalf 1985; Gibbons 1987; Christiansen et. al. 2004). Males can reach reproductive size at a carapace length of 10-10.9 cm (4-4.5 inches) and females at 11-11.9 cm (4 3/8- almost 5 inches) (Legler 1960).

Age at maturity for females is 10-11 years and for males is 8-9 years (Legler op. cit.). Egg clutch sizes range from two to eight eggs (Johnson 2000), although in Wisconsin that number is only two to four (Doroff and Keith 1990). Edmonds et. al. (2020) reported clutch sizes ranging from one to six eggs in northern Illinois (Carroll and Ogle counties), with a mean of 2.64 and 4.55. Hatching success is only from 42 to 58%. In Wisconsin it was found that turtles return to the same area to breed and nest each year (Doroff and Keith op. cit., Curtin 1997). Ornates do exhibit site fidelity to annual home ranges and to previously used overwinter sites (Refsnider et. al. 2012). Home ranges comprise anywhere from 0.5 to 143.5 acres. In Will and Grundy counties, Ornates began hibernation between late September to mid October with daylight hours at 12, with egress from hibernation from mid April to early May (Milanovich et. al. 2017). Therefore, prescribed burn timeframes should be ceased by the end of March. Fall burn timeframes should not begin until November 1.

Threats to the Ornate box turtle include collecting for the pet trade, habitat fragmentation, vehicular mortality, habitat alteration, and predation (Belzer and Steisslinger 1999; Blair 1976; Doroff and Keith 1990; Gibbs and Shriver 2002; Redder, et. al. 2006).

Nationally, the ornate box turtle has a conservation status of G5, secure by NatureServe (Nature Serve Explorer 2022). NatureServe classifies the species as S1S2 "Critically Imperiled to Imperiled" in Illinois (2022) (Figure 2). In the other 15 states it occurs in, its status varies from secure to critically imperiled.

The Ornate box turtle was first listed as state threatened in 2009 (Illinois Endangered Species Protection Board 2009) due to its restricted habitats or low populations in Illinois. It is also a Species in Greatest Need of Conservation for the Illinois Wildlife Action Plan (Illinois Department of Natural Resources 2015).

A species guidance document was prepared by the Wisconsin DNR (2013). Blood biochemical analyses were examined in wild Ornates by Harden et. al. (2018) during the turtle's active season in northern Illinois.

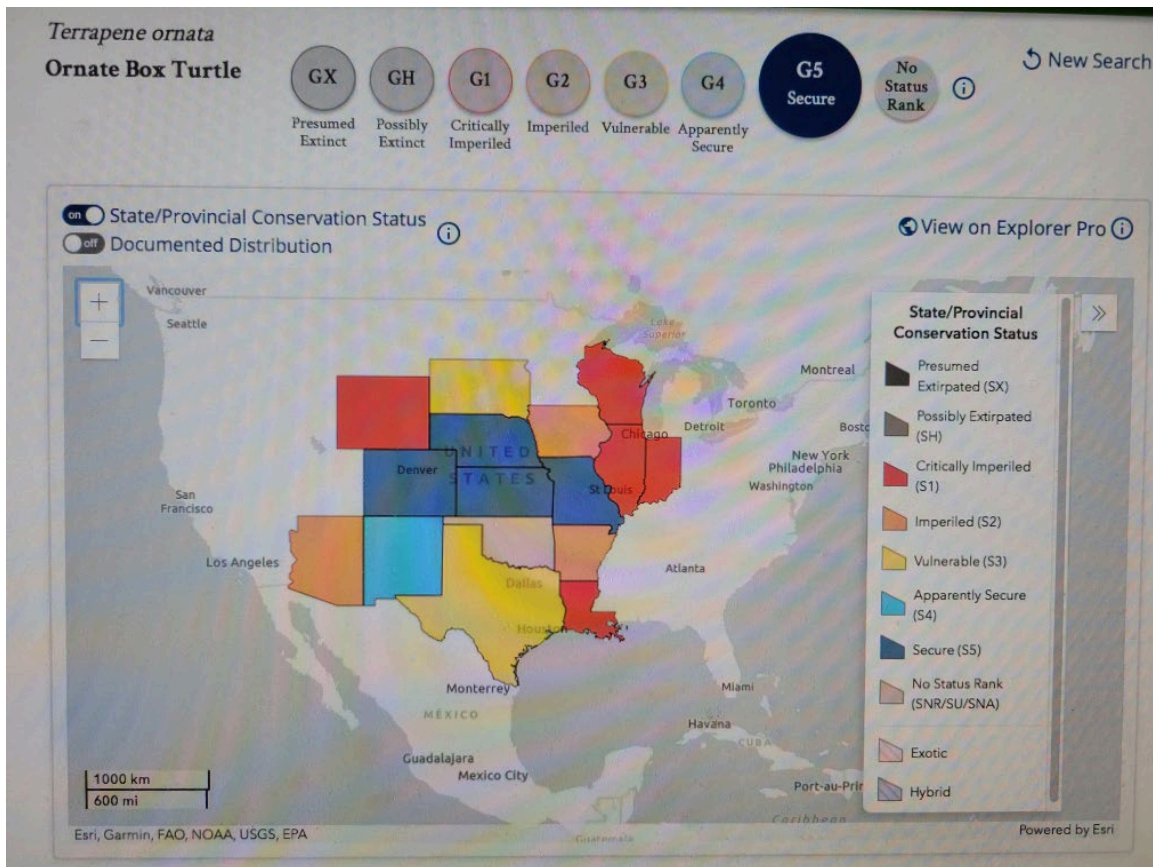


Figure 2. NatureServe range map of the Ornate Box Turtle (*Terrapene ornata*). 2022. Nature Serve Range map note: Range depicted for New World only.

Distribution Estimate

In Illinois, the turtle was historically known to occur in around 45 counties (Smith 1961) (Figure 3). That number declined to 38 counties, and then went from 38 to 15 between 1980 to 2016. Presently it may not occur in more than ten counties. As of January 2019 from the Illinois E/T Database, there are several records that have not been confirmed in over ten years (Figure 4). That decline can be attributed to habitat loss and fragmentation, and probably illegal collection.

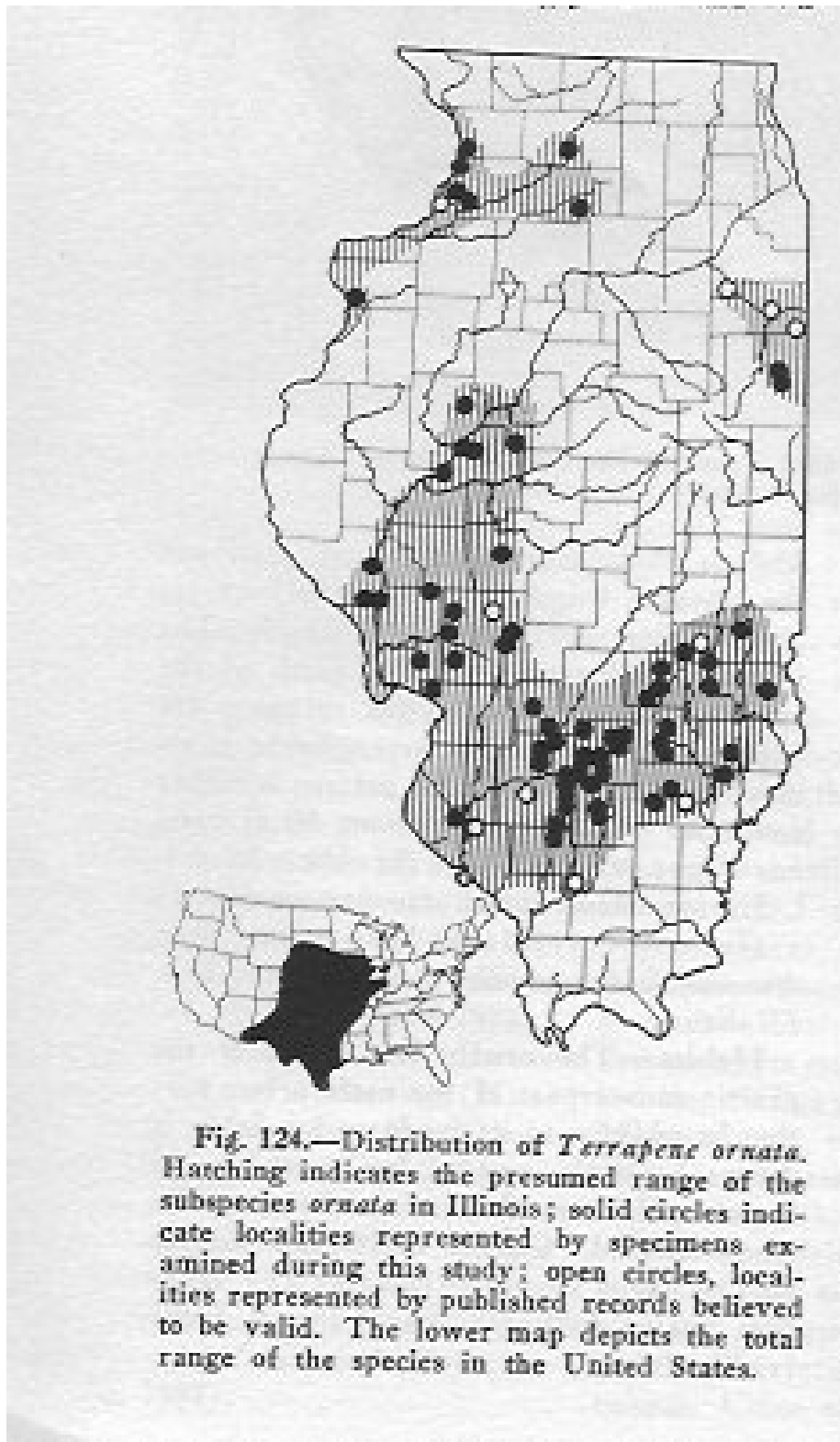


Figure 3. Ornate box turtle records from Smith (1961).

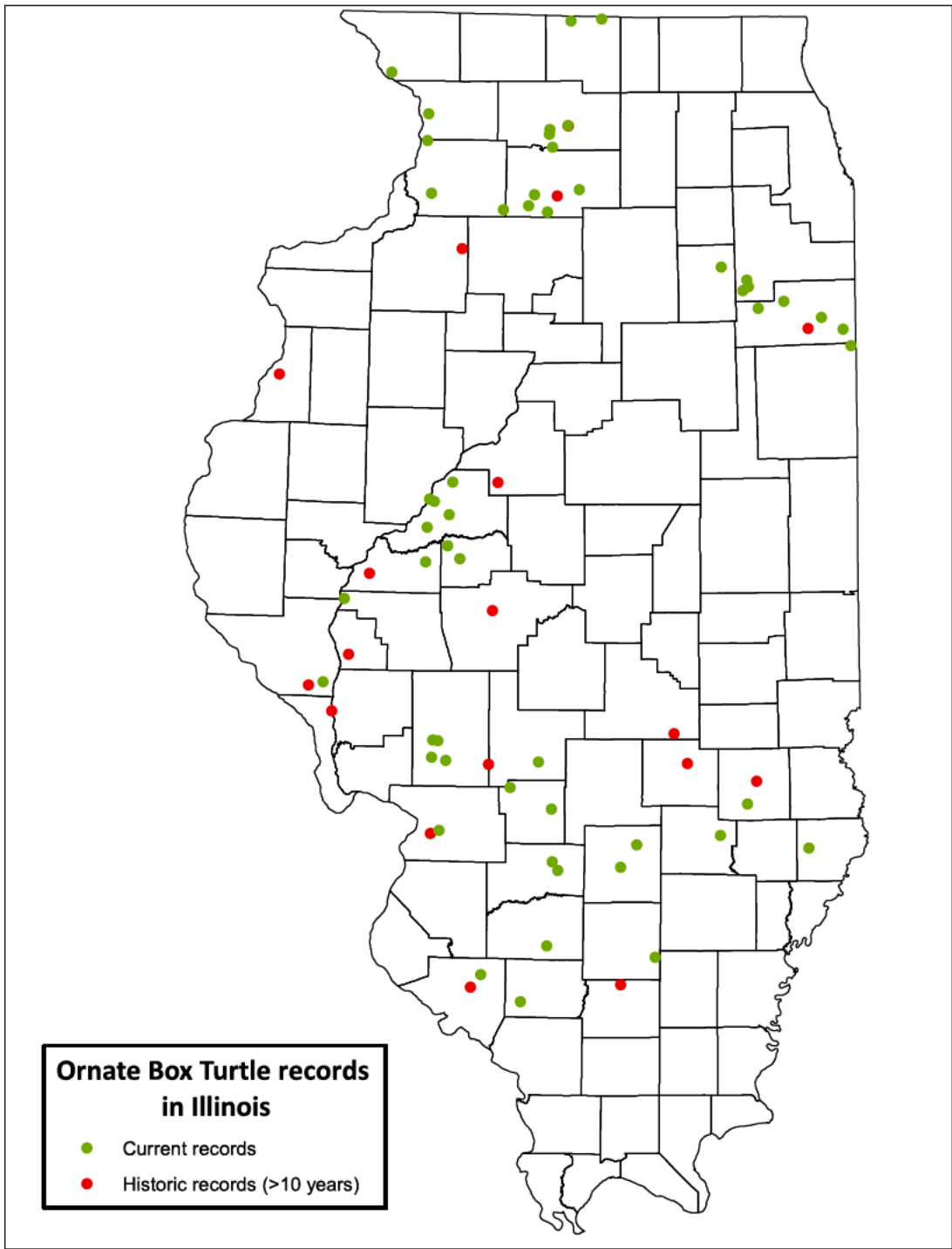


Figure 4. IDNR E/T database map for ornate box turtles January 2019.

Abundance Estimate

In Illinois, abundance estimates for the Ornate box turtle are not available. Current telemetry monitoring and marking every individual found to determine a minimum population size is being undertaken. It is thought that a population size of 700 individuals is needed to maintain 90% of the population's allelic diversity over 200 years (Kuo and Janzen 2004).

Head-starting programs in northwestern Illinois [REDACTED] in Carroll County have been summarized by Strickland and Britton (2010) and Sievers (2015).

Population Identification and Viability

Element Occurrence Viability Ranking for the Ornate box turtle in Illinois would be ranked as BC, in between good (B) and fair (C). Based on the Nature Serve Generic Guidelines (Hammerson et. al. 2020), a good ranking is defined as occurrence being favorable with respect to population size and/or quality and quantity of occupied habitat. A fair ranking is defined as occurrence being persistent with appropriate management or protection, but not necessarily maintaining current or historical levels of population size. In Illinois, there are larger populations in the northern and central part of the State, whereas smaller populations exist in the south-central and southern part of the State.

Several populations of ornate box turtles currently exist in Illinois, and the process has begun to try and cluster those as distinct groups. Telemetry studies are being conducted at several locations of Ornate box turtles.

Genetically, Dr. Michael Dreslik is looking at possibly sampling genetic material from ornate box turtles to analyze.

Viability is possible for the Ornate box turtle in Illinois. There are certainly large recognized populations such as [REDACTED] More monitoring is being done to further lock down exactly what sex ratios, mixed age classes, and recruitment for each population.

There still is a need to obtain nest survival and hatchling survivorship in order to establish a PVA for this species.

So information would be needed to improve this SSA, including:

- Determine population sizes at known sites with significant habitat
- Nest site characteristics and nest survival
- Hibernation site characteristics
- Habitat characteristics

- Genetic information
- Assess minimum viable population size estimate
- Juvenile survivorship in order to build a PVA

Literature Cited

- Ballard, S.R. 2021. Email "Turtle transmitters needed for SPHA" Feb. 26th.
- Belzer, B. and M.B. Steisslinger. 1999. The box turtle: Room with a view on species decline. *The American Biology Teacher* 61 (7):510-513.
- Blair, W.F. 1976. Some aspects of the biology of the ornate box turtle, *Terrapene ornata*. *Southwestern Naturalist* 21 (1):89-104.
- Christiansen, J.L., J.M. Grzybowski, and B.P. Rinner. 2004. Facial lesions in turtles, observations on prevalence, reoccurrence, and possible origin. *Journal of Herpetology* 37 (3):293-298.
- Conant, R. and J.T. Collins. 1991. Reptiles and amphibians of Eastern/Central North America. Peterson Field Guide. Houghton Mifflin Company, Boston and New York. Xviii + 450 pp.
- Curtin, C.G. 1997. Biophysical analysis of the impact of shifting land use on ornate box turtles, Wisconsin, USA. Pp. 31-36 in J. Van Abbema (ed.). Proceedings: Conservation, restoration, and management of tortoises and turtles – an international conference. New York Turtle and Tortoise Society and the WCS Turtle Recovery Program, New York.
- Doroff, A.M. and L.B. Keith. 1990. Demography and ecology of an ornate box turtle (*Terrapene ornata*) population in south-central Wisconsin. *Copeia* 1990:387-399.
- Edmonds, D., L. Adamovicz, M.C. Allender, and M.J. Dreslik. Reproductive output of Ornate box turtles (*Terrapene ornata*) in Illinois, USA. *Herpetological Conservation and Biology* 15 (2):467-475.
- Ernst, C.H. and R.W. Barbour. 1972. *Turtles of the United States*. Univ. Kentucky Press, Lexington. X + 347 pp.
- Gibbons, J.W. 1987. Why do turtles live so long? *BioScience* 37 (4):262-269.
- Gibbs, J.P. and W.G. Shriver. 2002. Estimating the effects of road mortality on turtle populations. *Conservation Biology* 16 (6):1647-1652.

- Hammerson, G.A., D. Schweitzer, L. Master, J. Cordeiro, A. Tomaino, L. Oliver, and J. Nichols. 2020. Ranking Species Occurrences: Generic Guidelines and Decision Key. NatureServe Biotics 5, Version 1.0. 16 pp.
- Harden, L.A., J. Fernandez, J.R. Milanovich, B.P. Struecker, and S.R. Midway. 2018. Blood biochemical reference intervals for wild ornate box turtles (*Terrapene ornata*) during the active season. *Journal of Wildlife Diseases* 54 (3):587-591.
- Illinois Department of Natural Resources. 2015. Illinois Comprehensive Wildlife Conservation Plan Implementation Guide. Illinois Department of Natural Resources, Springfield, Illinois. vii + 294 pp.
- Illinois Endangered Species Protection Board. 2009. Checklist of Endangered and Threatened Animals and Plants of Illinois. Illinois Endangered Species Protection Board, Springfield, Illinois. 20 pp.
- Johnson, T.R. 2000. The amphibians and reptiles of Missouri. Second edition. Missouri Dept. Conservation, Jefferson City. 400 pp.
- Kuo, C.-H. and F.J. Janzen. 2004. Genetic effects of a persistent bottleneck on a natural population of ornate box turtles (*Terrapene ornata*). *Conservation Genetics* 5:425-437.
- Legler, J.M. 1960. Natural history of the ornate box turtle, *Terrapene ornata ornata* Agassiz. *Univ. of Kansas Publ. of Museum of Natural History*. 11:527-669.
- Metcalf, A.L. and E. Metcalf. 1985. Longevity in some Ornate box turtles (*Terrapene ornata ornata* Agassiz). *Journal of Herpetology* 12 (3):411-412.
- Milanovich, J.R., B.P. Struecker, S.A. Warcholek, and L.A. Harden. 2017. Thermal environment and microhabitat of ornate box turtle hibernacula. *Wildlife Biology* 2017 (4):1-7.
- Nature Serve. 2013. Data provided by NatureServe in collaboration with Robert Ridgely, James Zook, The Nature Conservancy—Migratory Bird Program, Conservation International--- CABS, World Wildlife Fund – US, and Environment Canada – WILDSPACE. Data accessed Jan. 2013.
- Nature Serve Explorer. 2022. *Terrapene ornata*- Ornate Box Turtle. Online comprehensive report.
https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.102021/Terrapene_ornata

- Redder, A.J., C.K. Dodd Jr., and D. Keinath. 2006. Ornate box turtle (*Terrapene ornata ornata*): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. Available online at:
<http://www.fs.fed.us/r2/projects/scp/assessments/ornateboxturtle.pdf>
- Refsnider, J.M., J. Strickland, and F.J. Janzen. 2012. Home range and site fidelity of imperiled ornate box turtles (*Terrapene ornata*) in northwestern Illinois. *Chelonian Conservation and Biology* 11 (1):78-83.
- Sievers, E.R. 2015. Reintroduction biology of head-started ornate box turtles. Missouri State Univ. Graduate Theses. 1352. vii + 47 pp.
- Smith, P.W. 1961. The amphibians and reptiles of Illinois. *Illinois Nat. Hist. Surv. Bull.* 28 (1):1-298 pp.
- Strickland, J.T. and E. Britton. 2010. Conservation & management of the imperiled ornate box turtle. *Outdoor Illinois* May 2010: 17-19.
- Tucker, C.R., J.T. Strickland, B.S. Edmond, D.K. Delaney, and D.B. Ligon. 2015. Activity patterns of ornate box turtles (*Terrapene ornata*) in northwestern Illinois. *Copeia* 103 (3):502-511.
- Wisconsin Department of Natural Resources. 2013. Wisconsin Ornate Box Turtle Species Guidance. Bureau of Natural Heritage Conservation, Wisconsin Dept. Natural Resources, Madison. PUB-ER-711.